BASIC ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE PROPOSED MINING PERMIT (KIMBERLEY WEST) AND WASTE MANAGEMENT ACTIVITIES ON A PORTION OF PORTION 1 OF THE FARM WITPOORTJIE 245 IQ, A PORTION OF THE REMAINDER OF PORTION 14 OF THE FARM ROODEPOORT 237 IQ AND REMAINDER OF PORTION 1 AND A PORTION OF PORTION 92 OF THE FARM VLAKFONTEIN 238 IQ, MAGISTERIAL DISTRICT OF JOHANNESBURG, GAUTENG.

DMR REF. NO: GP 30/5/1/3/2 (10289) MP
MALANSCHOLES NO: MSC/64/18/WESTWITS – KIMBERLEY WEST

Copies of the Draft BARs will be placed at the following locations for public review:

Name and Location	Physical Address
Roodepoort Civic Centre	100 Christiaan de Wet Road, Florida Park, Roodepoort
Witpoortjie Library	22 Payne Street, Witpoortjie, Roodepoort
Sol Plaatje Hall	1960 Motlaka Street, Sol Plaatje, Roodepoort

Please contact MalanScholes Consulting (MSC) for an electronic copy of the BAR to be emailed or provided on CD.

All comments on the BAR should be submitted to Malan Scholes Consulting at the details shown below. Comments received will be used to update the BAR, as relevant, and copies of all the comments will be included with the BAR when submitted to DMR. Please ensure that your comments reach Malan Scholes Consulting on or before 23 July 2018 (Kimberley West).

Email: projects@malanscholesconsulting.co.za,
720.13087.00001@slrconsulting.com

Tel: 011 718 4600/ 011 593 4737 Fax: 087 238 7092
Post: Postnet Suite 324, Private Bag X1, Melrose Arch, Johannesburg, 2076
Note: If using post, please also contact us telephonically to notify us of your submission.

DOCUMENT HISTORY
Document Control, Quality Control and Disclaimer

Report	Draft Basic Assessment and Environmental Management Plan for the proposed Kimberley West Mining Permit.		
Client	West Wits MLI (Pty) Ltd		
DMR REF. NO:	GP 30/5/1/3/2 (10289) MP		
Report Number	MSC/64/18WESTWITS - Kimberley West	**Report Status**	Draft 0.0
Draft Report	MSC/64/18/01	**Report Date**	June 2018

Report no	Date	Version	Status
MSC/64/18/01	2018/06/18	0.0	Draft for public review

DOCUMENT REVIEWED BY

Responsible person	Date	Position	Responsibility	Signature
Catherine da Camara	2018/06/08	Environmental Assessment Practitioner	**Reviewer**	
DuToit Wilken	2018/06/05	Senior Specialist	**Author**	

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

BASIC ASSESSMENT REPORT

AND

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT: West Wits MLI (Pty) Ltd

Contact Person: Michael Quinert

TEL NO:	+27 (0) 11 718 4600
FAX NO:	+27 (0) 87 238 7092
POSTAL ADDRESS:	Postnet Suite 324, P. Bag X1, Melrose Arch, Johannesburg, 2076
PHYSICAL ADDRESS:	Meyer &Co, Block A, Tiger Valley Office Park, 1st Floor, 10 Pony Street, Silver Lakes, Pretoria, 0081

FILE REFERENCE NUMBER SAMRAD: GP30/5/1/3/2 (10289) MP

EXECUTIVE SUMMARY

West Wits MLI (Pty) Ltd (West Wits) appointed Malan Scholes Consulting (Pty) Ltd (MSC) and not Malan Scholes Attorneys to facilitate the necessary regulatory processes that are required to form part of two (2) Mining Permit Applications and one (1) Mining Right Application.

West Wits Mining MLI (Proprietary) Limited (West Wits) has started the environmental assessment processes that form part of the two (2) mining permit applications to the Department of Mineral Resources (DMR) for the Kimberly West (GP30/5/1/3/2 (10289) MP) and Creswell Park (GP30/5/1/3/2 (10290) MP) opencast areas.

On behalf of West Wits, Malan Scholes Consulting (Pty) Ltd (MSC) appointed Elemental Sustainability (Pty) Ltd (Elemental-S) to undertake the Environmental Authorisation Application processes that form part of two (2) proposed opencast mining areas that are less than 5 hectares, namely the Kimberley West opencast pit and Creswell Park opencast pit. Elemental-S is the independent Environmental Assessment Practitioner (EAP) responsible for compiling the two (2) separate Basic Assessment Reports (BARs) and incorporating all necessary environmental specialist studies into the two (2) separate BARs, which are peer reviewed by Exigo Sustainability (Pty) Ltd an EOH Company. Whereas, SLR Consulting (South Africa) (Pty) Ltd (SLR) are playing a support role in the Public Participation Process.

The mining permit opencast areas would each be mined and rehabilitated within 1 to 2 years. The proposed mining permit for Kimberley West will be located on a Portion of Portion 1 of the Farm Witpoortjie 245 IQ, a Portion of the Remainder of Portion 14 of the Farm Roodepoort 237 IQ, a portion of the waste rock dump will be located on a Portion of Portion 92 of the Farm Vlakfontein 238 IQ and the section of the access /haul road will be located on a portion of the Remainder of Portion 1 of the Farm Vlakfontein 238 IQ, Gauteng Province. The mining permit area will constituting an area of 4.9565 hectares (ha) and a total area of 8.95ha.

The study area (Kimberley West) is located within the City of Johannesburg Municipality and Roodepoort Magisterial district. The study area is approximately 10km North West from Krugersdorp, 12km west from Randfontein, 7km South from Soweto and 4km North East from Roodepoort. West Wits is an operating gold mining company and the resources will be accessed via opencast mining.

Legislative Requirements

A summary of the most important legislation applicable to the proposed project are the following:

- *Constitution of South Africa, 1996 (Act No. 108 of 1996) [as amended];*

- Section 24(a): Everyone has the right to an environment that is not harmful to their health or well-being.

- *National Environmental Management Act (No. 107 of 1998) [as amended]*
  - Section 28 (1): Duty of Care and responsibilities to minimise and remediate environmental degradation.
- *EIA Regulations, 2014 (Government Notices 982) [as amended]*
  - The EIA regulations prescribes the manner and content of the Basic Assessment and Public Participation Processes to be followed.
- *Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) [as amended]*
  - In order to apply for a mining permit, an application was submitted on the Department of Mineral Resources' Samrad online application system.
- *National Water Act (Act No.36 of 1998) [as amended]*
  - Section 19: Prevention and remedying effects of pollution
- *National Environmental Waste Act (Act No. 59 of 2008) [as amended]*
  - Section 16: General duty in respect of waste management
- *National Nuclear Regulator Act (No. 47 of 1999) (NNR)*
  - Section 22: Certificate of registration, for the handling and management of gold and uranium containing material.
- *List of Waste Management Activities that have, or are likely to have a detrimental effect on the environment as promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended];*
- *Waste Classification and Management Regulations and Norms and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended];*
- *Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation (GN R. 632 of 2015);*
- *Mine Health and Safety Act, 1996 (Act No. 29 of 1996) [as amended];*
- *National Heritage Resources Act, 1999 (Act No. 25 of 1999);*
- *National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) [as amended];*
- *National Dust Control Regulations, 2013 (Government Notice 827 of 2013);*
- *Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) [as amended];*
- *National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended];*

- *Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2016 in terms of NEMBA (Government Notice 864 of 2016);*
- *Conservation of Agricultural Resources Act (no. 43 of 1983);*
- *Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended];*
- *Hazardous Chemical Substances Regulations, 1995 (Government Notice 1179 of 1995); and*
- *Other relevant national, provincial, district and local municipality legislation and guidelines that may be applicable to the application. Some of these are discussed in the next section.*

Need and Desirability

The main benefits associated with the proposed project are:

- Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees;
- Implementation of the proposed project will result in skills development associated with the mining method;
- To mine an existing reserve resource and to thereafter rehabilitate;
- The improvement of historical impacted land and newly impacted areas through rehabilitation and removal of rubble and rubbish illegally dumped.
- The availability of the economically mined and rehabilitated land being freed up for housing developments earmarked for the area, that aims to reduce the housing backlog experienced by the City of Johannesburg, while at the same time creating employment and extracting mineral resources for the benefit of the economy;
- Mined and rehabilitated land holds opportunity for spatial integration by reducing fragmentation and unlocking development potential in large areas;
- The eradication of access to dangerous historic workings targeted by informal miners (Zama Zamas), which are mainly illegal immigrants that pose a threat to the health and safety of the communities and themselves while mining illegally; and
- Short time period associated with the mining and rehabilitation of the area.

The project is aligned with the objectives of the MPRDA (Act 28 of 2002)

- To promote economic growth and mineral development in the Republic of South Africa
- To promote employment and advance the social and economic welfare of all South Africans
- To ensure that the nation's mineral resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development; and

- To ensure that holders of mining rights contribute towards the social-economic development of the area in which they are operating.

The net benefit to South Africa as a whole is a product produced for the world commodity market, earning South Africa the necessary foreign exchange and capital needed for a healthy economy and further capital investments in development projects for the long-term future of the country.

Gold is a unique metal, used as bullion and in jewellery, glass and electronics devices production. Thanks to its unique properties, gold has remained a critical material in the electronics sector. The quantity of gold utilised are significant, in 2016 more gold was used in technical applications than either platinum or palladium, two metals commonly associated with the industrial sector, while the amount of gold used in technology was roughly equivalent to central bank gold purchases between 2010 and 2016. The geology of the area is known for gold bearing reefs, and from a mining perspective is ideal for the type of land use.

On the 20 October 2014, the Department of Environmental Affairs published a Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010, in Government Notice 891 of 2014. The key components are listed and discussed below:

- Securing ecological sustainable development and use of natural resources
- Promoting justifiable economic and social development.

Ecological sustainable developments and use of natural resources

As a result of the nature of mining project, impacts on biodiversity areas including aquatic ecosystems, linkages between biodiversity areas and related species and the role that they play in the ecosystem probable.

The project area has been selected on the basis of the presence of economically mineable resources. The mining area would be located on land that has been impacted by historical and current mining activities, overgrazing, illegal dumping of waste and urbanisation. Sensitive ecological areas are associated with watercourses and more specifically the Klip River which runs along the western boundary of the mining permit application area (considered by the biodiversity specialist to be of moderate to low sensitivity).

The Transformed and Secondary Grassland Habitat Units as identified on the site have been significantly disturbed as a result of historic and on-going anthropogenic activities and the proliferation of alien and invasive plant species. The floral habitat within the Secondary Grassland Habitat Unit is already largely transformed and of decreased ecological integrity. No faunal or floral species of

conservation concern were observed on the site and were determined during the assessment to have a low probability of occurrence within the Secondary Grassland Habitat.

Promoting justifiable economic and social development

Community/society priorities are officially expressed through public documents including the provincial growth and development strategy and spatial development framework documents. In this regard the West Wits mining right application falls within an area defined in the City of Johannesburg spatial development framework (SDF) 2040 as a Transformation Zone.

The project is in line with the objective of the Gauteng Spatial Development Framework (GSDF) and the Gauteng Provincial Environmental Management Framework (GPEMF). One of the opportunities as identified in the GSDF is that a rehabilitated mining belt holds opportunity for spatial integration. Mined and rehabilitated land being freed up for housing developments will improve fragmentation, unlocking development potential in large areas that can be used for future urban development and infill. Where there is a mineral resource the DMR does not allow development that could result in sterilization of a mineral. Therefore if the mineral is mined it allows for the opportunity for development to take place.

The environment management zone for the proposed area in terms of the GPEMF is zone 1. The intention with this zone is to streamline urban development activities in it and to promote development infill, densification and concentration of urban development, in order to establish a more effective and efficient city region that will minimise urban sprawl into rural areas. The proposed mining activity is in line with the GPEMF zone as the mined and rehabilitated land will be freed up for housing development.

The proposed project will benefit society and the surrounding communities both directly and indirectly by generating additional employment at the proposed operation and through the extraction of mineral resources and beneficiation of mineral resources within Gauteng. Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees.

Prevention and mitigation measures as recommended by the specialists, were included in this Basic Assessment Report (BAR) and the Environmental Management Programme (EMPR), Mitigation Measures. The implementation of the EMPR will ensure that impacts are effectively managed and kept to a minimal. The potential cumulative impacts were also assessed and found to be of low significance after mitigation for the mining period.

Alternatives

The overall mining permit area is indicated in Appendix D, with locations of the individual activities on site. Areas to be avoided in terms of sensitivities are also indicated on the sensitivity maps in this report.

The following alternatives were investigated as feasible alternatives:

a) Location Alternatives proposed and preferred option.

Mining is determined by the present and availability of minerals. Minerals can only be mined where they exist. The location of the open pit mining areas was informed by the presence of economically mineable resources to which West Wits would have access. Extensive prospecting has indicated the presence of gold bearing reef on these properties. Therefore, the specific locations and extent of the mining activity is relatively set. The layout of the open pit operation has been designed to optimise the extraction of mineral resources. The topsoil and waste rock dumps have been positioned to create a safety, visual and/or noise berm between the mining operations and nearby receptors. Haul roads will be constructed, no other surface infrastructure is planned for the area.

The proposed property is in an area dominated by current and historical mining activities. The site is infested with alien vegetation, extensive illegal dumping of waste has taken place and illegal mining that is causing destabilisation of the area.

Minerals can only be mined where identified and economic viable, therefore it was not practical to select any other sites. No location alternatives was considered however a number of layout alternative and technology alternative were considered.

Location Alternatives based on Residential development:

The Environmental Impact Assessment is underway for the Living Africa – Spitz land Residential development. The proposed Spitz land mixed use housing development will be located on the Remaining Extent of Portion 14 of the Farm Roodepoort 237 IQ. A section of the proposed mining permit will be located on a portion of Portion 14 of the Farm Roodepoort 237 IQ. The southern section of the proposed residential development intersects the north eastern corner of the proposed mining area as presented in Figure 54.

The topsoil stockpile for the West Wits – Kimberley West mine section was re-designed to accommodate the proposed development. Due to the dire need for land for housing projects it was recommended that the placement of the topsoil stockpile is altered to minimise the impact on the proposed development.

The preferred alternative is to alter the placement of the topsoil stockpile not to intersect the proposed development.

b) The type of activity to be undertaken

The shallow or reserve that were identified during prospecting would be developed in the form of open pit mining, as the area cannot be accessed using underground mining methods. The open pit mining area will consist out of a single cut and mining operations will be undertaken using a conventional excavate, load and haul mining cycle. A number of activity alternatives were investigated as listed below:

Mining method alternatives:

Two mining methods were investigated, the first being drill and blasting and the second using modern technology (Xcentric rippers) for rock breaking. The use of modern rock breaking equipment was chosen as the preferred alternative over drill and blasting for the following beneficial reasons:

- Low ground vibration
- No air over-pressure shock waves
- No dangerous rock fly
- Low dust emissions
- No blasting fumes; and
- No leaching of chemical to receiving environment

The preferred alternative will be assessed in this report

Construction of Infrastructure

A number of layout alternatives were considered that included the placement of topsoil dumps, waste rock dumps and roads, the construction of infrastructure were also investigated. The preferred alternative regarding infrastructure is to utilise the existing infrastructure located at the Sol Plaatjies operation. No permanent infrastructure will be constructed on site.

Ore Processing and transporting alternatives

A number of alternative were investigated for the processing of ore. The construction of a process facility were investigated and found not to be feasible for this operation. The preferred alternative will be processing of ore at an establish facility off site. This will ensure optimisation of the current process facility and that no tailing storage facility will be constructed and operated in the area. This will have

a significant positive impact as no tailing storage facility will be constructed and operated as part of the mining operation and no treatment facility will be constructed. The use of an existing process facility will have a significant positive on resources as no additional resources (water, electricity, chemicals and disposal area) will be required for the project and the impact on air quality is limited to the mining operation.

No transport alternatives were investigated as a result of the distance to the facility, route alternative were investigated in the traffic impact assessment and the preferred route has been established. The ore will be transport by truck to the facility. West Wits has an existing toll agreement with Sibanye, alternative transport roots and toll treatment facilities are investigated by West Wits. For this application the alternatives are not assessed.

c) The design or layout of the activity

The design and layout of the mining activity is dependent on the mining plan. The mine planning is done in such a way to reduce the amount of material handling and to optimise the recovery of the resource. The topsoil and waste rock dumps have been positioned to create a safety, visual and/or noise berm between the mining operations and nearby receptors.

Various designs and layout for the mining operation has been considered and the final layout has been developed based on the availability of the gold reef as indicated by the prospecting conducted and a number of inputs from specialist studies, stakeholders and landowners. A number of alternatives for the placement of waste rock dumps, topsoil stockpiles and road network was investigated. The layout was finalised based on the following inputs:

- Availability of the resource;
- Sensitive areas;
- Specialist Studies ;
- Legislative requirements;
- Limiting material handling;
- Existing road network; and
- Comments from I&AP's and land owners;

The size and shape of the topsoil stockpile was altered as a result of input from stakeholders and landowners. The alteration decreased the area of the topsoil stockpile and increase the height of the stockpile. The stockpile will act as a visual barrier to opencast area. No infrastructure will be constructed on the site as existing infrastructure will be utilised. The layout has been finalised based on available information and therefore, no alternative layouts are assessed in this report.

d) The technology to be used in the activity

Two mining methods were chosen for investigation are proven mining methods within the industry and are currently being exploited at various mines around the country. Two mining methods were investigated, the first being drill and blasting and the second using modern technology (Xcentric rippers) for rock breaking. The use of modern rock breaking equipment was chosen as the preferred alternative over drill and blasting based on a vibration assessment undertaken. The preferred alternative will have a significant lower impact than drill and blasting and the following beneficial are associated with the preferred alternative:

- Low ground vibration
- No air over-pressure shock waves
- No dangerous rock fly
- Low dust emissions
- No blasting fumes; and
- No leaching of chemical to receiving environment

The modern rock breaking equipment (Xcentric Ripper) is the preferred alternative and no drill and blasting alterative will be assessed as an alternative. The method is less environmental, social intrusive and for this reason no alternatives to the will be assessed.

e) The operational aspects of the activity

No permanent services including water supply, electricity, or sewerage facilities are required. All infrastructure to be developed will be mobile and temporary including generators, portable toilets, crushers and water tanks. Alternatives for layout, site location, mining activities and transportation, processing of ore are discussed above.

f) The option of not implementing the activity

The "*no-go*" alternative refer to the option of not going ahead with the proposed project. This would mean that there would be no change to the current status of the site and the positive social-economic and other benefits associated with the proposed project would not be realised. The "no-go" alternative will result in the sterilisation of the resource by leaving the valuable resource in the ground. Implementation of the "no-go" alternative will lead to the following potential positive impact will not taking place.

- Direct economic benefits associated with wages, taxes and profits. Indirect economic benefits associated with the procurement of goods and services and the spending power of employees.

- The improvement of historical impacted land and newly impacted areas through rehabilitation and removal of rubble and rubbish illegally dumped.
- Freed up land for housing developments earmarked for the area, that aims to reduce the housing backlog experienced by the City of Johannesburg,
- Creating employment and extracting mineral resources for the benefit of the economy;
- Improving spatial integration by improve fragmentation, unlocking development potential in large areas; and
- The eradication of access to dangerous historic workings targeted by informal miners (Zama Zamas), which are mainly illegal immigrants that pose a threat to the health and safety of the communities and themselves while mining illegally.

According to Section 24 of the Constitution, a development must be ecologically sustainable and also support socio-economic development. The proposed mining activities has the potential to have a negative impact on the ecological environment as well as the social environment of the area. These impacts, however, can potentially be prevented, minimised, mitigated and managed to low and very low levels, as shown through the impact assessment.

i) Details of the Public Participation Process Followed

(Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land)

A joint Public Participation Process is undertaken for the proposed mining permit. The process is undertaken to ensure compliance with regard to the requirements in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended] (MPRDA), the National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended] (NEMA), the National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) [as amended] (NEMWA), the National Water Act, 1998 (Act No. 36 of 1998) [as amended] (NWA) and Environmental Impact Assessment Regulations (2014) [as amended].

Details of the Public Participation process followed

A Public Participation Process is undertaken for the Environmental Authorisation for the mining permits. The process is undertaken to ensure compliance with the requirements in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended]

(MPRDA) and the Environmental Impact Assessment Regulations (2014) [as amended]. This section describes the public participation process (PPP) undertaken to date in line with Chapter 6 of the EIA Regulations (2014) [as amended]. The intention of the PPP was to inform Interested and Affected Parties (I&APs), in sufficient detail, of the proposed project in order that I&APs may contribute meaningfully to the EIA process. SLR Consulting (South Africa) (SLR) has been appointed to play a support role in the Public Participation Process.

The PPP to date has included notification of I&APs through distribution of a Background Information Document (BID), placement of newspaper advertisements, placement of site notices, distribution of flyers, radio announcements, focussed engagement and meetings with community structures and public open meetings. A key aspect of public consultation is the notification of landowners, occupier and users within and adjacent to the application area.

More detail in this regard to the process followed is provided below.

Interested and affected party (I&AP) database

As part of the PPP an I&AP database has been developed for the project. I&APs identified for the project include:

- landowners, lawful occupiers and ward councillors within and adjacent to the mining permit application area
- ratepayer organisations, community leaders and community structures
- non-government organisations and associations working in the area
- mines, industry and businesses in the area
- parastatals
- commenting authorities:
    - Gauteng Department of Agriculture and Rural Development (GDARD)
    - Department of Water and Sanitation (DWS)
    - Department of Agriculture, Forestry and Fisheries (DAFF)
    - Department of Rural Development and Land Reform (DRDLR): Land Claims Commissioner
    - Department of Roads and Transport (DRT)
    - South Africa Heritage Resource Agency (SAHRA)
    - Provincial Heritage Resources Authority Gauteng (PHRAG)
    - Department of Economic Development
    - City of Johannesburg Health Department
    - City of Johannesburg Metropolitan Municipality

- Roodepoort Magisterial District Municipality
- Krugersdorp Magisterial District Municipality.

I&APs who attended meetings and /or submitted contact details have been registered on the I&AP database. The latest copy of the database is included in Appendix F-i. The database will be updated on an on-going basis throughout the process.

Comments for the two (2) Mining Permit Applications: (namely Kimberley West opencast pit and Creswell Park opencast pit)

- Elemental-S is the lead EAP with SLR play a supporting role in the Public Participation Process
- The BARs have not yet been placed out for public review yet, as the independent specialists have not yet completed their assessments
- The review periods for the Kimberley West will be from 21 June and 23 July 2018.
- The review period for the Creswell Park permit application is anticipated in July 2018 and August 2018.
- Please send all comments to projects@malanscholesconsulting.co.za and/or to 720.13087.00001@slrconsulting.com

Comments for the one (1) Mining Right Application:

- SLR is the lead EAP and is responsible for all Public Participation
- Please find the link to the Scoping Report for the West Wits Mining Project on SLR's website: https://slrconsulting.com/za/slr-documents/scoping-report-for-the-west-wits-mining-project
- A copy of the scoping report has been made available for a 30-day review and comment period, as from 17 May 2018 to 17 June 2018.
- Please send all comments to mmedallie@slrconsulting.co.za and/or 720.13087.00001@slrconsulting.com

Registration of any I&AP's can take place by registering on the I&AP's database, by sending details of the I&AP to MSC and or SLR. Please feel welcome to contact us should you have further queries or would need additional clarification.

Advertisements and site notices

During the initiation of the PPP, advertisements were placed in the following newspapers:

- Daily Sun on Thursday 22 March 2018 (national newspaper);

- Roodepoort Record on Friday 23 March 2018 (local newspaper);
- Dobsonville Urban News on Friday 30 March 2018 (local newspaper).

A copy advertisements placed are included in Appendix F-ii.

Site notices (400) in a mixture of English, Afrikaans, Zulu and Sotho were placed in key conspicuous positions in and adjacent to the greater mining right application area and mining permit area (between 23 and 28 March 2018). Where requested by ward councillors additional notices were provided as A4 handouts to the councillors for distribution in their wards.

A copy of the site notices are presented in Appendix F-iii with the location of the notices presented in Appendix F-iv.

Further Advertisements and site notices

In May, further advertisements were placed in the following newspapers:

- Roodepoort Record on Friday 4 May 2018;
- Roodepoort Record on Friday 11 May 2018;
- Daily Sun on Friday 18 May 2018;
- Roodepoort Record on Friday 18 May 2018; and
- Soweto Urban Dobsonville on Friday 18 May 2018.

A copy of the further newspaper advertisements are included in Appendix F-viii

Further site notices (in English) were placed at key locations in and adjacent to the mining right application area and mining permit area and flyers containing the same information were handed out (between 11 and 17 May 2018). The following further site notice and flyers were distributed specifically for the Kimberley West mining permit.

- Tshepisong (Ward 128) 10x site notices and 200x flyers
- Leratong Village (Ward 127) 10x site notices and 200x flyers
- Bram Fischerville (Ward 49) 15x site notices and 300x flyers
- Witpoortjie (Ward 71) 10x site notices and 200x flyers

A copy of the site notices are presented in Appendix F-ix with the location of the notices presented in Appendix F-x. The flyers distributed are presented in Appendix F-xi.

Radio Announcements

Radio announcements were also made on Jozi FM on Friday 18 May 2018.

Background Information Document (BID)

A BID document was compiled for the proposed project. The purpose of the BID was to inform I&APs about the proposed project, the EIA process, environmental attributes, possible impacts and means of providing input into the EIA process. The BID was made available in English and included details of the public scoping meetings. The BID was distributed by email, at the public scoping meetings and by hand (starting on 23 March 2018). Hand delivery of BID's were again undertake on 11 April and 12 April 2018. The BID is presented in Appendix F-v and the proof of distribution are included in Appendix F-vi.

Public meetings

Public scoping meetings

- The purpose of holding the public scoping meetings was to:
- to provide an overview of the project and related EIA process
- to provide an overview of the social and labour plan (SLP);
- to provide I&APs with an opportunity to:
    - raise any issues and concerns (both positive or negative)
    - provide input on any environmental sensitivities and potential impacts
- to record issues within the formal assessment process so that they can be addressed during the course of the EIA
- to outline the way forward.

The date, venue and time of the public scoping meetings are provided in Table 1.

Table 1: Public Scoping meetings

Date	Venue	Time
Tuesday 3 April 2018	Solplaatjie Hall, Solplaatjie	11h00
	E-Hall, Matholesville	17h00
Wednesday 4 April 2018	NG Kerk, Witpoortjie	17h00
Thursday 5 April 2018	Multi-Purpose Centre, Bram Fischerville	17h00
Friday 6 April 2018	Moses Kotane Primary School, Bram Fischerville	17h00

The meetings were held in English due to the diversity of languages present at the meetings. However, attendees were informed that they could ask questions in any language with which they were comfortable. Copies of the BID were made available to attendees at the meetings. Maps

indicating the local setting of the project were displayed on the walls at the meetings. Minutes of the meetings are included in Appendix F-vii.

Additional scoping meetings were held as presented below. Queries concerning the mining permits were also addressed at these meetings. The minutes of these meetings will be included in the final basic assessment report.

Table 2: Additional Public Meetings

Date	Venue	Time
Thursday 31 May 2018	Roodepoort City Hall, Roodepoort	18h00
Monday 4 June 2018	Tshepisong Multi-Purpose Centre	16h00

Focused meetings with community structures

A number of focused group meetings took place with individuals from municipal and community structures.

- Georginia South Residents Forum, Maxam Dantex, Harmony Gold and Rand Leases.

Review of the Draft Basic Assessment

I&AP review of Draft Basic Assessment Report

The Draft BAR and EMPR are herewith released for a period of 30 days from 21 June 2018 to 23 July 2018. Hard copies of the Draft BAR and EMPR are herewith submitted to all organs of state and relevant authorities. In addition copies are placed at the following locations as presented below:

- Roodepoort Civic Centre;
- Witpoortjie Library;
- Solplaatjie Hall;

An executive summary of the Draft Basic Assessment has been made available to I&APs:

- via email and post to registered I&APs on the I&AP database;
- via email to municipal structure; and
- hard copies were provided to ward councillors for distribution in their respective wards.

In addition, registered I&APs have been notified of the availability of the Draft Basic Assessment for review via SMS and E-mail notifications. Electronic copies of the Draft Basic Assessment will be made available on request.

Where meetings take place during the review period, hard copies of the executive summary will be provided.

Next Phase - Way forward

All comments received from I&APs and organs of state and responses sent will be included in the final BAR and EMPR to be submitted to the Competent Authority (CA).

DMR review of scoping report

On completion of the 30-day review period, a Final BAR will be compiled which will include comments received during the I&AP review period. The report will be submitted to the DMR for its review via the online.

Specialist studies

The following specialist studies have been conducted:

- Geo-hydrological impact Assessment
- Geo-chemical assessment;
- Terrestrial Ecology Impact Assessment
- Heritage impact assessment
- Noise Impact Assessment
- Air Quality Impact Assessment
- Traffic impact assessment;
- Closure Plans;
- Closure cost estimate;
- Vibration Statement; and
- Radiation Statement;

The main objective of the specialist studies is to provide independent scientifically sound information on issues of concern relating to the project proposal. The findings and recommendations identified by the various specialist studies undertaken, were incorporated into the Basic Impact Assessment and Environmental Management Programme (EMPr). Please see a summary of the specialist studies below.

Groundwater Assessment

Groundwater Basic Assessment Report for the Kimberley West Mining permit was completed by NOA Agencies (Pty) Ltd. Hydrogeological field investigations were performed to assess the local aquifer characteristics. The following key outcomes:

- The Witwatersrand and Ventersdorp formations (local aquifers) are least vulnerable.
- Based on the aquifer classification map published by the DWS in August 2012 the aquifer classification system defines the Witwatersrand and Ventersdorp as minor aquifers.
- Based on the susceptibility classification the Witwatersrand and Ventersdorp formations have a low susceptibility to contamination.

A project wide hydrocensus was completed in 2018 and 13 boreholes were identified, of which only 4 water levels could be measured. The number of measurable groundwater points raised a concern with regards to a gap in available groundwater levels and quality in or close to the Kimberley West Open Pit. Additional work (drilling and aquifer/water quality testing of 3 monitoring boreholes) are proposed before mining commences. The groundwater flow model should also be updated once this data becomes available. An additional 123 properties were assessed, however, the land owners indicated no boreholes are located on these properties.

Neighbouring mining monitoring data was not available at the time of reporting on the Kimberley West open pit proposed development. Water levels measured varied between 4.4 mbgl at WitBH6 to 36.2 mbgl at WitBH1 ~ the closest (2500 m east) of the Kimberley West open pit and WRD. Samples were taken at 6 boreholes and 4 surface water points. The samples indicated historical and present influences rendering the water unfit for human consumption. This indicated a high present impact on the baseline groundwater and surface water environments. Based on the SANS241 drinking water guideline the sampled groundwater and surface water is not fit for human consumption (unless treated).

The numerical groundwater flow model was constructed based on the available data. The groundwater flow model should be viewed as conceptual and qualified rather than calibrated due to the low density of data points in and around the proposed Kimberley West Open Pit area.

- The open pit is only 25 m deep. This is approximately 10m above the closest recorded water level (~2km east) at WitBH1. Due to the proximity of the Klip River (130m to the west of Kimberley West), seepage may occur in the vadose zone (perched aquifer) due to possible losing stream characteristics if the hydraulic gradient is reversed i.e. from the river to the pit. A monitoring point (groundwater borehole) should be installed between the open pit and the river to assess and monitor the water levels before any mining commence.

- The sampling of the waste rock was conducted by Shango Solutions (Pty) Ltd. A detailed report is available on the site and sample selection for analyses compiled by Prof Sybrand A. de Waal i.e. Note on the lateral lithological continuity of the Upper Witwatersrand Supergroup rocks. The following key conclusion is worth noting:
    - Sample Z8504 can reasonably be accepted to represent the Kimberley hanging wall at opencast area Kimberley West.
- The geochemical nature of the waste rock was assessed and reported on in detail in West Wits Mining MLI (Pty) Ltd: Kimberley West Open Pit Mine Geochemical Specialist Assessment, Robert N Hansen. May 2018. The following key conclusions from the report was considered with the mass transport simulations for the Waste Rock Dump:
    - Acid Mine Drainage: The acid base accounting and geochemical modelling have indicated that due to the absence of iron sulphide minerals the risk of the development of AMD conditions in the waste rock environment is negligible.
    - Leaching of metal(loid) contaminants: The leach test indicated that all by three potential contaminants are below detection in the waste rock leachate and the three that are above detection have concentrations significantly below the regulatory values. The geochemical model, which was developed to evaluate the leach test, also shows that the risk of leaching of contaminants, especially the metalloid arsenic, from the waste rock is negligible. This is also due to the absence of iron sulphide as well as the high stability of the minerals comprising the waste rock at the mining conditions.
    - Mitigation: Due to the negligible risk of the formation of AMD conditions as well as the negligible risk of the leaching of contaminants from the waste rock material, no mitigation measures are required for the waste rock material.
- For the mass transport simulations, due to the absence of any possible leachate, a conceptual mass transport simulation was conducted for management purposes and assist the client in monitoring the possible influence of the WRD during operations and the backfilled open pit during post operations. A conceptual background value of 5 mg/L was assigned to the host rock, and a potential leachate from the WRD of 100 mg/L (i.e. 100% of a possible certain mass originating from the WRD and open pit post closure). This simulation intends to assist the client in continuing the monitoring protocol suggested. Please note that the mass migration simulation is for management purposes and the chosen parameters (5% for background and 100% for source) simulate worst case scenario i.e. although the source term would remain 100%, the background value may alter to 10, 20 or 50%, influencing the mass migration potential.

Mine dewatering could be expected due to the Kimberley West open pit's proximity to the Klip river (<150m). Once the natural groundwater hydraulic gradient is reversed i.e. from the river to the open

pit, dewatering could occur that requires management. Peak volumes of between 350 and 700 m^3/d could report to the open pit. Mass migration simulations for operational and post operational was simulated to assess possible migration pathways originating from the WRD. Simulated mass migration is low during operations and within 3 years the potential seepage from the WRD decreased to less than 30%.

The possible impacts and mitigation measures were assessed, and key findings are as follows:

- Mine dewatering cannot be mitigated as this is a potential result of excavation and intersecting the groundwater table. Inflows will be generated which should be managed. Limiting the volume of water reporting to the open pit will limit the volume of water requiring treatment before disposing. Dewatering boreholes should be implemented between the Kimberley West open pit and the Klip river to the west to monitor the groundwater levels pre-mining, and if required, induce a water levels such that groundwater report to the dewatering boreholes and not the open pit. The water captured are classified as non-contact water (by means of the dewatering borehole) and could be managed accordingly – discharged back in the Klip River.
- Mass migration or the potential of the WRD to leach minerals into the receiving environment and negatively influencing the groundwater and surface water quality. The Kimberley West open pit will induce a hydraulic gradient from the WRD towards the open pit, effectively capturing any mass migration from the WRD during operations. Post operations, once the groundwater levels recovered, mass migration may be temporarily redirected down gradient i.e. south and towards the Klip River. However, the WRD will not continue to exist post closure and the material will be backfilled in the open pit during rehabilitation.
- Monitoring borehole (x3) should be implemented between the historical WRD location and the community to the south and the historical WRD/Open pit location and the Klip River as well as to the north of the open pit area (upgradient) Surface water samples should also be taken upstream and downstream of the Kimberley West open pit in the Klip River.

Decanting of the backfilled open pit was assessed post closure. With increased recharge simulated on the open pit post operationally, the water level stabilises at 1665 mamsl at the south western corner of the rehabilitated Kimberley West open pit. The surface elevation is at 1670 mamsl, 5 m above the groundwater level post closure ~ hence no decanting is expected.

Geo-chemical Assessment

GeoDyn Systems (GeoDyn) was requested to conduct a geochemical risk assessment for the proposed Kimberly West open pit gold mine waste rock material. The mine will only produce waste rock as a mineral waste as no processing plant will be on site and therefore there will also be no

tailings storage facility on site. The ore will be trucked to another processing facility.

A total of 5 samples were collected for this study, which were composited into 1 representative sample for laboratory analysis and an accredited laboratory. The sampling of the waste rock was conducted by Shango Solutions (Pty) Ltd. A detailed report is available on the site and sample selection for analyses compiled by Prof Sybrand A. de Waal i.e. Note on the lateral lithological continuity of the Upper Witwatersrand Supergroup rocks. The following key conclusion is worth noting:

- Sample Z8504 can reasonably be accepted to represent the Kimberley hanging wall at opencast area Kimberley West.

Planned Open pit	**Reef to be mined**	**Sample Description**	**Sampling Coordinate (WGS 1984)**		**Sample No**	**Photograph**
			Longitude	**Latitude**		
Kimberley West	Kimberley Reef	5-10cm long drillcore (RDT 003) samples taken at 1m intervals in the Bird Reef hangingwall quartzite	27.875965	-26.18868	Z8504	

The objectives of the geochemical assessment are to:

- Conduct a waste classification of the waste rock.
- Determine the likelihood of the development of AMD conditions from the waste material.
- Determine the likelihood of leaching of potential contaminants from the waste rock material.

The waste classified as Type 3, thus requiring a Class C engineered barrier system. However, none of the constituents in the leach test exceeded the regulatory guideline values. In addition, the geochemical model indicated that the waste rock is comprised of minerals which are very stable in the specific mining environment being considered. In addition, the waste rock itself as well as the secondary mineral products forming very slowly as the waste rock minerals weather have the capacity to remove contaminants from solution through the process of adsorption.

The waste rock material contains no iron sulphide minerals. Therefore, the risk of the formation of acid mine drainage conditions due to the waste rock material is negligible. The results indicate that the significance of both potential impacts rate as Very Low. The cumulative impacts of the impacts rate as Low. This is predominantly because of the fact that the development of AMD conditions as well as the leaching of contaminants from the waste rock is unlikely. The waste rock material is classified as Type 3 according to NEMWA Regulation 635. It is however recommended by the specialist, based on the results of the assessment, that the waste material class be reduced to Class 4.

Terrestrial Ecology Assessment

Scientific Terrestrial Services (STS) was appointed to conduct a terrestrial ecological sensitivity scan as part of the Mining Permit Application. Form the field assessment two habitat units were identified during the field assessment, namely Secondary Grassland Habitat and Transformed Habitat. Historic and ongoing disturbance to the Transformed Habitat Unit was evident, as building rubble and cleared areas were observed within the Kimberley West MP. Further, these on-site disturbances have resulted in alien and invasive plant proliferation within the Kimberley West MP area. No faunal SCC were observed during the field assessment and none are likely to occur within the proposed Kimberley West MP area.

The majority of the Kimberley West mining permit area is already modified because of anthropogenic activities and alien and invasive floral species proliferation. In order to identify possible sensitive habitat areas e.g. watercourses, that may potentially be impacted by the activities within the Kimberley West Mining Permit Application Area, a 500m “zone of investigation” was defined around the Mining Permit Application Area, in accordance with Regulation GN509 of the National Water Act, 1998 (Act 36 of 1998) promulgated in 2016. Assessing the wetland conditions, state and sensitivity did not form part of the scope of work for this assessment report, however the proximity of wetland features was highlighted as potential sensitive habitat within the investigation area.

No watercourses are located within the Kimberley West Mining Permit Application Area, however the Klip River (approximately 74m west of the proposed Mining Permit Application Area) and an associated channelled valley bottom wetland (approximately 383m north of the proposed Mining Permit Application Area) were identified within the Investigation Area around the Kimberley West Mining Permit Application Area.

Based on the findings of the ecological assessment, from a terrestrial ecological perspective, the proposed mining activity poses minimal risk to the faunal and floral resource management and conservation initiatives for the area, due to the significantly decreased ecological integrity and transformation of the area. However, in order that the significance of perceived impacts remain low, all essential mitigation measures and recommendations presented in this report must be adhered to so as to ensure that the ecology within the proposed Mining Permit Application Area, along with the surrounding zone of influence is protected or adequately rehabilitated where necessary, in order to ensure that the intended post closure land use objectives are met.

Heritage Assessment

PGS Heritage (Pty) Ltd was appointed to undertake a Heritage Impact Assessment (HIA) that forms part of the Basic Assessment Reporting process (BAR) for the mining permit application for the proposed opencast pit referred to as Kimberley West

The fieldwork findings confirmed that there are no identified heritage resources situated inside or adjacent to the Kimberley West foot print area. Since no heritage resources were identified within the Kimberley West opencast footprint area, the overall impact of the development on heritage resources is regarded as very low and no mitigation measures are required.

It is the specialist considered opinion that, based on the findings of the desktop research together with the fieldwork findings, the overall impact on heritage resources is acceptably low and the project can be approved from a heritage perspective.

Noise Impact Assessment

Airshed Planning Professionals (Pty) Ltd (Airshed) was commissioned to undertake a specialist environmental noise impact study for the Kimberly West Basic Assessment Report (BAR).

The main objective of the noise specialist study was to determine the potential impact on the acoustic environment and noise sensitive receptors (NSRs) as a result of the development of the proposed project and recommend suitable management and mitigation measures.

The main findings of the impact assessment are:

- The baseline noise levels (as measured during the survey) was 51.7 dBA during the day.
- The noise levels from the project operations exceed the selected noise criteria at the closest NSRs to the southwest of the project site with change in day-time noise from baseline conditions expected to be less than 10 dBA. According to SANS 10103 (2008); 'little' reaction with 'sporadic complaints' may be expected from the community for increased noise levels up to 10 dBA.
- Based on the noise sources inventory for the project the noise measured (at sources) at the equipment ranged from 118.6 dBA (Rock breaking) to 126.2 dBA (bulldozer).
- Construction and closure phase impacts are expected to me similar or slightly lower than simulated noise impacts of the operational phase.

The following key recommendation are made:

- A monitoring programme as per the requirements of the international finance corporation (IFC) and SANS 10103:
    - Annually during the operational phase at the closest NSR; and
    - In response to complaints received.

Based on the findings of the assessment and provided the measures planned and recommended are in place, it is the specialist opinion that the project may be authorised.

Air Quality Assessment

Airshed Planning Professionals (Pty) Ltd (Airshed) was appointed to undertake an air quality specialist study for the project as part of the Basic Assessment process.

The main findings from the impact assessment are as follows:

The main sources of dust emissions from the Kimberley West operations are likely to be materials handling of ROM and waste rock in the pit and of waste rock at the WRD and vehicle entrainment emissions from haul trucks and other mobile equipment. With no mitigation measures applied simulated highest daily PM_{10} concentrations exceed the NAAQS at the closest sensitive receptor locations to the south of the operations. With simple mitigation measures such as wet suppression of dust at material handling points and regular water sprays on haul roads, simulated incremental PM_{10} concentrations due to the Kimberley West operations are in compliance with the SA NAAQS at all sensitive receptor locations.

Even with no mitigation measures applied simulated inhalable particulate matter less than 2.5 µm in dimeter ($PM_{2.5}$), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and carbon monoxide (CO) concentrations are in compliance with the SA NAAQS for all averaging periods and simulated highest monthly dust fallout rates are in compliance with the SA National Dust Control Regulations (NDCR) residential limit at all sensitive receptor locations and in compliance with the SA NDCR non-residential limit at all off-site areas.

With no mitigation measures applied the incremental impact of the Kimberley West project on the receiving environment is expected to be medium. With 50% mitigation of material handling emissions (achievable with the mitigation measures recommended below) and 30% mitigation of vehicle entrained dust from unpaved roads, the incremental impact of the Kimberley West project is expected to be low. The cumulative impact during the mining phase (with mitigation measures applied) is expected to be medium, but the short life of the Kimberley West operations means that long term impacts (annual average pollutant concentrations) are unlikely to exceed the SA NAAQS.

Traffic Impact Assessment

Siyazi Gauteng Consulting Services (Pty) Ltd. was appointed to conduct a Traffic Impact Assessment (TIA) for the proposed Kimberley Reef West portion of the proposed West Wits Mining operation. The following scenarios were investigated as part of the TIA:

a. Scenario 1: 2018 peak hour traffic without background traffic growth, without the proposed mining development (status quo);

b. Scenario 2: 2019 peak hour traffic with background traffic growth, with the proposed mining development (operational phase);

Based on a site inspection of the existing road network adjacent to the site under investigation, traffic surveys, calculations and reference to the relevant traffic engineering guideline documents, the following findings and recommendations were made:

- Summary of Intersections that require improvements without and with the proposed mining development; and
- Need for improvements without and with the proposed mining development.
- Road markings, reflective road studs (LED), road signs, overhead lights should be provided and maintained at all the relevant intersections under investigation to ensure visibility during night time, proper visibility of intersection lane geometry and sufficient information to road users; and
- As part of the proposed mining development, it is recommended that ore haulage heavy vehicles avoid transporting ore during the relevant Am and PM peak periods.

In conclusion of the findings as part of the investigations, Siyazi Gauteng Consulting Services (Pty) Ltd is of the opinion that the proposed mining development would have a manageable impact on the relevant roads network as long as the mitigating measures are implemented as recommended and should thus be granted authorisation.

Closure Assessment

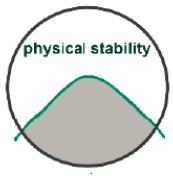
Golder Associates Africa (Pty) Ltd (Golder) was appointed to compile a Mine Closure Plan (Closure Pan) for the proposed Kimberley West opencast pit. The Closure Plan was compiled in alignment to the NEMA GN R. 1147 Regulations. Good practice measures widely adopted by the South African and international gold mining industry were incorporated where deemed necessary.

The approach adopted in undertaking closure planning for Kimberley West is founded on three key planning foci.

1. The application of an iterative closure planning / design process

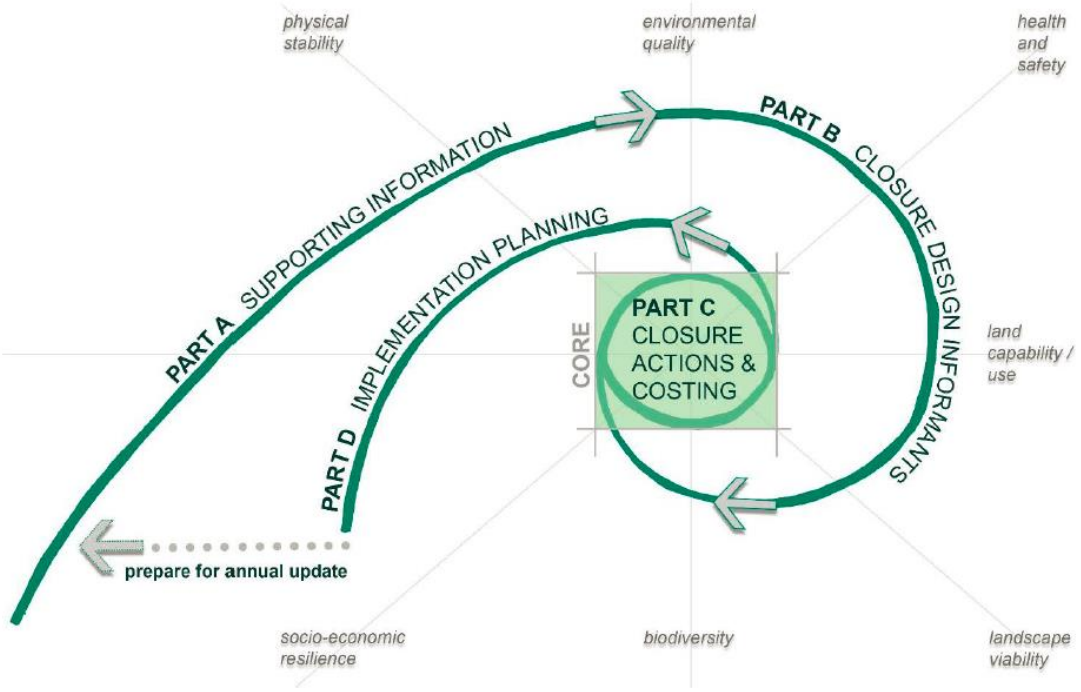
This iterative process underpins the principle that planning for closure should occur throughout the life of the mine, with solutions continually being refined via a cyclical process of survey, analysis and design.

2. An entrenchment of seven key closure objectives:

	To create a physically stable, safe, rehabilitated landscape that limits long term environmental degradation, erosion and failure / collapse of unavoidably remnant mining residue which are present on the mine site post closure, thus enabling the successful establishment of the planned post-mining land use
	To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contamination arising from the mine site or individual facilities, as well as to sustain catchment yield as far as possible after closure
	To limit the possible health and safety threats to humans and animals using the rehabilitated mine site as it becomes available
	To re-instate a suitable land capability over the mine site to facilitate the progressive implementation of the planned post-mining land use
	To create a landscape that is self-sustaining and over time will converge to the desired ecosystem structure, function and composition
	To encourage, where appropriate and as aligned to the planned post-mining land use, the re-establishment of native vegetation on the rehabilitated mine site such that the terrestrial biodiversity is largely re-instated over time in line with the housing development requirements.
	To ensure that there constructive engagement and alignment with local communities and regulatory authorities regarding the proposed end land use

3. The application of a tiered risk-based process to allow for a true understanding of the challenges and opportunities that needs to be addressed and refining, abstracting and prioritising essential issues.

The structure, development (intensification) and application of the above foci is illustrated below, with each section of the Closure plan described below.



Closure Cost Assessment

The summary of the scheduled closure costs calculated for the proposed Kimberley West opencast pit are indicated in the table below.

18102155 Kimberley West Opencast Pit Closure Costs, as at May 2018			
Closure components		Unscheduled Closure (2018)	Scheduled Closure (2019)
1	Infrastructural aspects	R -	R -
2	Mining aspects	R -	R 5,900,886.86
3	General surface rehabilitation	R -	R 106,764.51
	Sub-Total 1	**R -**	**R 6,007,651.37**
5	**Post-Closure Aspects**		
5.1	Surface water monitoring - 5 years	R -	R 229,346.30
5.2	Groundwater monitoring - 5 years	R -	R 313,004.50
5.3	Rehabilitation monitoring - 3 years	R -	R 211,722.00
5.4	Care and maintenance - 3 years	R -	R 298,579.72
5.5	Contingencies for post-closure aspects	R -	R 105,265.25
	Sub-Total 2	**R -**	**R 1,157,917.78**
6	**Additional Allowances**		
6.1	Preliminary and general	R -	R 600,765.14
6.2	Contingencies	R -	R 600,765.14
6.3	Additional studies	R -	R 208,792.50
	Sub-Total 3	**R -**	**R 1,410,322.77**
	Grand Total Excl. VAT. (Sub-total 1 +2 +3)	**R -**	**R 8,575,891.92**

Radiation

SciRAD consulting was appointed to provide a statement on Radiation impact for the West Wits – Kimberley West mining permit and the possible health risk for surrounding communities and workers. Uranium and Thorium and their daughter products (e.g. Radium and Radon) are the radioactivity found in the gold and uranium bearing ore. The radiation from the ore may present a health risk to the public living close to the mine. The risk to members of the public may come from various sources:

- Inhalation of radioactive dust and radon,
- Exposure to the radioactive dust deposited in the area as a result of the mining operations.

However, studies at a number of mines in the Witwatersrand area have shown that the radiation dose to members of the public is not expected to exceed the 250 microSievert (0.25 mSv/a) per year dose limit (for a single operation) set by the National Nuclear Regulator (NNR). In addition, for the Kimberley West operations, dust concentrations are expected to be low (refer to the Airshed Air Quality Assessment), groundwater in the area is not potable (refer to the Noa Agencies Groundwater Report) and tailings - that could potentially pollute the environment – will not be present. These aspects will contribute to a reduction in the radiation dose compared to other operations. It may therefore be concluded that radiation from the Kimberley West mining operations presents a very low health risk to members of the public.

The health risk for workers at the mine will be exposed to the same radiation sources as the public but at higher concentrations, due to closer proximity to these sources. Still, the worker doses are not expected to exceed the worker dose limit of 20 mSv/a (20 000 microSievert). The radiation from the Kimberley West mining operations may therefore present a low health risk to the workers on site.

Possible risk after closure. Remediation, from a radiological perspective, must be performed according to the NNR's Regulatory Guide – Site Remediation and Release from Regulatory Control (RG-0026). If remediation is done properly, the risk to the environment and the public is expected to be low.

Vibration Assessment

Cambria CC was appointed to assessment the possible impact associated with vibration during opencast mining at the West Wits – Kimberley West mining permit area. Vibration measures was undertaken at an existing opencast area (i.e. Sol Plaaitjie). No blasting will take place on site and rock breaking will be done through modern rock breaking methods (Xcentric rippers).

A White Industrial Mini Seis II seismograph was used to measure the disturbance levels. The seismograph is equipped with a tri-axial geophone and a microphone so it is capable of measuring vibration and noise simultaneously. The seismograph was initially set up at a distance of 15m from the ripper. The trigger levels were set to 0.762mm/sec for ground vibration and to 106dB for air disturbance (noise). Monitoring was carried out at both location for almost one hour. The seismograph was then moved to a second position 45m away from the ripper. The vibration trigger level was initially set to 0.254mm/sec and the air trigger was left at 106dB, which is the lowest possible trigger setting. The vibration trigger was then changed to 0.381mm/sec because of the number of haul trucks that were moving in the close proximity to the seismograph location.

Analysis of the ground vibration levels recorded at a distance of 15m from the ripper shows that 57% of the events recorded registered levels of less than 1.0mm/sec, 89% of the events recorded registered levels of less than 1.5mm/sec, 95% of the events registered levels of less than 2.0mm/sec and 100% of the events registered levels less than 2.5mm/sec.

The vibration levels were highest close to the ripper and the levels had attenuated significantly at a distance of 45m. The same was true for the air /noise disturbance. In the table below the ground vibration level reduces from 2.29mm/sec at 15m to 0.508mm/sec at 45m. The highest PPV level recorded at 15m from the ripper was utilised to model the possible impact of ground vibration with increase in distance. The results show how the PPV levels decrease rapidly with increase in distance. The results show how the PPV levels decrease rapidly with increase in distance. Based on the measurements made and the calculations performed the vibration levels at any distance greater than

100m from the pit will be imperceptible. If the calculated values are compared to the USBM and DIN recommended standards it is clear that they are well within the proposed limits. The results are presented below.

VIBRATION	
Distance increment metres	Vibration Level
Distance (m)	**PPV (mm/s)**
15	2.28
20	1.42
30	0.73
35	0.56
40	0.45
45	0.37
50	0.31
100	0.10
150	0.05
200	0.03
235	0.02

Despite the low levels predicted, the vibrations may still attract attention as the highest levels fall into the 'distinctly perceptible' human response category at distances starting at about 50m. The effect of ground vibrations on humans is summarised in the table below.

Effect on Humans	Ground Vibration Level in mm/sec
Imperceptible	0.025 – 0.076
Barely perceptible	0.076 – 0.254
Distinctly perceptible	0.254 – 0.762
Strongly perceptible	0.762 – 2.540
Disturbing	2.540 – 7.620
Very disturbing	7.620 – 25.400

Conclusion

The ground vibration levels were highest close to the Xcentric ripper's area of operation. The levels attenuated rapidly with increase in distance. Vibration levels at distances greater than 50m will be negligible in this geological environment. The ground vibration levels recorded in close proximity to the equipment were not high enough to cause damage to structures. The levels recorded at a distance of 45m were even lower and is within the lower end of the *Distinctly Perceptible* range. The vibration decreases to the imperceptible range within 100m from the activity. The close sensitive receptor to the proposed Kimberley West mining activity will be approximately 150m and based on the measurements will be in the imperceptible range. For a comprehensive noise assessment, refer to the noise impact assessment in Appendix G.

The Kimberley Reef rock in pit 3 was weathered and appeared to break very easily. The vibration levels will vary in response to how competent the rock mass is in a specific geological environment. The low levels recorded in pit #3 would not necessarily be the case in other areas where a more competent rock mass is encountered. Higher vibration levels should be expected when this occurs. It may be necessary to carry out control monitoring in the different mining areas as and when required.

Reasoned Opinion of the EAP

Based on specialist studies and the impact assessment undertaken no fatal flaws have been identified. However, several environmental and social impacts are envisaged from construction phase through to post-closure. The assessment of the proposed project presents the potential for highly negative impacts to occur on the geology and loss of resources before mitigation measures are implemented. The impact on the bio-physical, cultural and socio-economic environments is expected to be medium to low. With mitigation these potential impacts can be prevented or reduced to acceptable levels. If all the recommendations of the specialists and mitigation measures provided in the Environmental Management Programme (PART B of this report) is effectively implemented and based on the information contained in this report as obtained from specialist there is no environmental, social or economic impact that is of such significant that the project should not proceed.

Summary of Key Recommendations

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through physical measures, the recommendations from the basic assessment report are included within the Environmental Management Programme (EMPR). The EMPR is based on all the information contained within this report as well as all the specialists' reports. The following key recommendations have been made by the specialist.

Key specialist recommendations

- An updated hydrocensus should be completed in a 500m radius around the Kimberley West open pit project area. The data recorded should be used to update the monitoring protocol and the groundwater flow model and associated management scenarios.
- A detailed monitoring program should be initiated before mining commence:
    - An upstream and downstream surface water sample should be taken in the Klip River.
    - A monitoring borehole should be drilled between the open pit and the Klip River.
    - One monitoring borehole should be drilled between the WRD and the community to the south.
    - One monitoring borehole should be drilled to the north of the open pit.

- Proliferation of alien and invasive plant species are expected within any disturbed areas. These species should be eradicated and controlled, to prevent their spread beyond the proposed development footprint areas. Alien and invasive plant seed dispersal within the top layers of the soil within footprint areas must be controlled;
- Should any SCC or other threatened or protected faunal species be noted within the proposed boundary area, a suitable management plan must be determined with the assistance of a suitable qualified specialist
- In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into topsoil as per the protocols set out within the existing waste management program.
- Disturbed and cleared areas need to be revegetated with indigenous grass species in order to help stabilise the soil surface;
- A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area.
- A Noise monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103 to be establish (annually)
- A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns;
- Wet suppression techniques should be used to control dust emissions, especially in areas where dry material is handled or stockpiled.
- PM_{10} monitoring is recommended for the duration of the mining and rehabilitation phases. The recommended location for PM_{10} monitoring is at a suitable safe location on the northern edge of Bram Fishersville directly to the south of the operations.
- Develop and include a detailed topsoil balance for the site based on actual survey data to replace the current estimates;
- Capture the updated outcomes of the refined ground water model which will be updated with site specific monitoring data from the proposed boreholes;
- Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material.
- Radiological perspective, must be performed according to the NNR's Regulatory Guide – Site Remediation and Release from Regulatory Control (RG-0026).

- It is recommended that the next update of this closure plan be undertaken by 2019, based on a thorough assessment of the new regulations, namely GN.R. 1228, particularly with respect to the resolved contents for closure plans and the new requirements for risk assessments.

A variety of mitigation measures have been identified that will serve to mitigate the scale, intensity, duration or significance of the potential negative impacts identified. These include guidelines to be applied during all phases of the proposed mining activity. The EMPR contains detailed mitigation measures for all impacts identified. The proposed mitigation measures, if implemented, will reduce the significance and or probability of the identified impacts.

TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF TABLES

APPENDICES

ABBREVIATIONS

CA Competent Authority
CBA Critical Biodiversity Area

CoJ	City of Johannesburg
CoT	City of Tshwane
CSA	Constitution of South Africa (Act No. 108 of 1996)
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DTM	Dimensional Terrain Modelling
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPR	Environmental Management Programme
ESA	Ecological Support Area
ESM	Environmental Site Manager
GDARD	Gauteng Department of Agriculture and Rural Development
GDP	Gross Domestic Product
GPEMF	Gauteng Environmental Management Framework
GN	Government Notice
GIS	Geographic Information System
GPS	Global Positioning System
GSDF	Gauteng Spatial Development Framework
GVA	Gross Value Added
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
Mamsl	Metres above mean sea level
MHSA	Mine Health and Safety Act (Act No. 29 of 1996) [as amended]
MPRDA	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (as amended)
NEMA	National Environmental Management Act, 1998 (Act no 107 of 1998) (as amended)
NEMAQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004) (as amended)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act No. 59 of 2008) (as amended)
NNR	National Nuclear Regulator
NHRA	National Heritage Resource Act, 1999 (Act No. 25 of 1999)

NVFFA	National Veld and Forest Fire Act (Act No. 101 of 1998)
NWA	National Water Act, 1998 (Act No. 36 of 1998) (as amended)
PM	Public Meeting
PPE	Personal Protective Equipment
PPP	Public Participation Process
RWD	Return Water Dam
SAHRA	South African Heritage Resources Agency
SANS	South African National Standards
SAWS	South African Weather Service
SDF	Spatial Development Framework
SLP	Social and Labour Plan
SM	Site Manager

IMPORTANT NOTICE

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

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

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

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

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

Objective of the basic assessment process

The objective of the basic assessment process is to, through a consultative process—

(a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;

(b) identify the alternatives considered, including the activity, location, and technology alternatives;

(c) describe the need and desirability of the proposed alternatives,

(d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage , and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on the these aspects to determine:

(i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and

(ii) the degree to which these impacts—

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources; and

(cc) can be managed, avoided or mitigated;

(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—

(i) identify and motivate a preferred site, activity and technology alternative;

(ii) identify suitable measures to manage, avoid or mitigate identified impacts; and

(iii) identify residual risks that need to be managed and monitored.

PART A

SCOPE OF ASSSSMENT AND BASIC ASSESSMENT REPORT

1. Introduction

West Wits MLI (Pty) Ltd (West Wits) appointed Malan Scholes Consulting (Pty) Ltd (MSC) and not Malan Scholes Attorneys to facilitate the necessary regulatory processes that are required to form part of two (2) Mining Permit Applications and one (1) Mining Right Application.

West Wits Mining MLI (Proprietary) Limited (West Wits) has started the environmental assessment processes that form part of the two (2) mining permit applications to the Department of Mineral Resources (DMR) for the Kimberly West and Creswell Park opencast areas. The mining permit opencast areas would each be mined and rehabilitated within 1 to 2 years.

On behalf of West Wits, Malan Scholes Consulting (Pty) Ltd (MSC) appointed Elemental Sustainability (Pty) Ltd (Elemental-S) to undertake the Environmental Authorisation Application processes that form part of two (2) proposed opencast mining areas that are less than 5 hectares, namely the Kimberley West opencast pit and Creswell Park opencast pit. Elemental-S is the independent Environmental Assessment Practitioner (EAP) responsible for compiling the two (2) separate Basic Assessment Reports (BARs) and incorporating all necessary environmental specialist studies into the two (2) separate BARs, which are peer reviewed by Exigo Sustainability (Pty) Ltd an EOH Company. Whereas, SLR Consulting (South Africa) (Pty) Ltd (SLR) are playing a support role in the Public Participation Process.

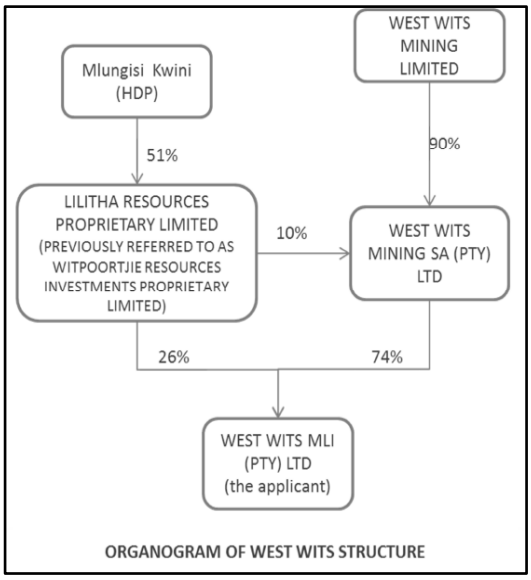
The proposed mining permit for Kimberley West will be located on a Portion of Portion 1 of the Farm Witpoortjie 245 IQ, a Portion of the Remainder of Portion 14 of the Farm Roodepoort 237 IQ, a portion of the waste rock dump will be located on a Portion of Portion 92 of the Farm Vlakfontein 238 IQ and the section of the access /haul road will be located on a portion of the Remainder of Portion 1 of the Farm Vlakfontein 238 IQ, Gauteng Province. The mining permit area will constituting an area of 4.9565 hectares (ha) and a total area of 8.95ha.

The study area (Kimberley West) is located within the City of Johannesburg Municipality and Roodepoort Magisterial district. The study area is approximately 10km North West from Krugersdorp, 12km west from Randfontein, 7km South from Soweto and 4km North East from Roodepoort. West Wits is an operating gold mining company and the resources will be accessed via opencast mining.

Introduction to West Wits

West Wits Mining Limited is an Australian listed exploration and development company. The directors include the Executive Chairman (Michael Quinert) and Non-executive Directors Hulme Scholes, Daniel Pretorius, Vincent Savage, Dr Andrew Tunks). Through its listing it is owned by a number of shareholders across the globe.

The South African subsidiary of the company is West Wits MLI (Pty) Ltd (West Wits). West Wits is 26% empowered. The empowerment company is Lilitha Resources Proprietary Limited, previously referred to as Witpoortjie Resources Investments Proprietary Limited.



ORGANOGRAM OF WEST WITS STRUCTURE

2. Contact Person and correspondence address

a) Details of: DuToit Wilken

i) The EAP who prepared the report

Name of The Environmental Assessment Practitioner: Mr. Du Toit Wilken (*Pr.Sci.Nat*)

Tel No.: +27(0) 11 718 4600
Fax No.:+27(0) 10 020 5034
e-mail address: dutoit@elemental-s.co.za

ii) The reviewers

Name of the external independent reviewer: Ms. C Da Camara (*Pr.Sci.Nat*)

Tel No.: +27 (0) 12 751 2160
Fax No.: +27 (0) 86 607 2406
e-mail address: catherine@exigo3.com

iii) Expertise of the EAP and reviewer

(1) The qualifications of the EAP

(With evidence attached as Appendix A)

	DuToit Wilken	Catherine Da Camara
Qualification	○ University of Pretoria, MSc Geography – 2015 ○ University of Pretoria, BSc Hon Environmental Science – 2010 ○ University of Pretoria, BSc Environmental Science – 2009	○ BSc. Hons (Animal, Plants and Environmental Sciences)
Registration	• Pr.Sci.Nat (Environmental Science) – 118911	• Pr.Sci.Nat (Environmental Science) • Environmental Assessment Practitioner

(2) Summary of the EAP's past experience.

(Attached the EAP and reviewer's Curriculum Vitae (CV) as Appendix B)

DuToit Wilken is the Environmental Assessment Practioner (EAP) for the project. He has more than 8 years of experience in applying the principles of Integrated Environmental Management, and in applying the Environmental Legislation to a number of development projects and initiatives in Southern Africa. DuToit Wilken holds an MSc degree in Geography (Coal Mine Rehabiliation) and is registered as a professional natural scientist (Environmental Science) with the SACNASP.

Mrs Catherine Da Camara started her career as an Environmental Assessment Practitioner in 2002 and is registered with SACNASP as a Professional Natural Scientist. She received her BSc Honours Degree (Animal, Plants and Environmental Sciences) from the University of the Witwatersrand in 1999. Projects she has worked on include Environmental Impact Assessments for the mining sector, residential and industrial developments. She has experience in compiling Environmental Management Plans, Waste License Applications, Water Use License Applications, Environmental Risk Assessments, Environmental Legal Compliance Audits and is well experienced in the front-end loading (FEL 1-3) study requirements (SSD). Catherine is qualified as a Carbon Footprint Analyst and is experienced in Geographic Information systems (GIS), public participation and general project management of environmental projects.

3. Location of the overall Activity

Table 3: Location of the Overall Activity

Farm Name:	The proposed project will be located on a Portion of Portion 1 of the Farm Witpoortjie 245 IQ, a Portion of the Remainder of Portion 14 of the Farm 237 IQ, a portion of the Remainder of Portion 1 and a Portion of Portion 92 of the Farm Vlakfontein 238 IQ.

Application area (Ha)	4.9565 Ha – Mining Permit Area. 8.95 ha – total area
Magisterial district:	Magisterial District of Roodepoort
Distance and direction from nearest town	The study area is approximately 10km North West from Krugersdorp, 12km west from Randfontein, 7km South from Soweto and 4km North East from Roodepoort.
21 digit Surveyor General Code for each farm portion	T01Q00000000024500001 T01Q00000000023700014 T01Q00000000023800092 & T01Q00000000023800001

4. Locality map

(Show nearest town, scale not smaller than 1:250000) - Refer to **Appendix C** for the locality map.

5. Description of the scope of the proposed overall activity

(Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities).

See **Figure 2** for an indication of the layout plan with areas of all listed activities.

Summary of Environmental Authorisation Required

Prior to the commencement of the proposed project environmental authorisations are required from the following competent authorities:

- Environmental authorisation from the DMR in terms of the NEMA. The proposed project incorporates several activities listed in Government Notice Regulation (GNR) 983, 984 and 985 of 4 December 2014, as amended. The EIA regulations being followed in this study are GNR 983 of 4 December 2014, as amended (EIA Regulations).
- A waste management license (WML) from the DMR in terms of the NEM:WA. The proposed project incorporates waste management activities listed in GNR 921 of 29 November 2013, as amended.
- A water use license (WUL) from the Department of Water and Sanitation (DWS) in terms of the National Water Act (No. 36 of 1998) (NWA). The proposed project incorporates water uses in terms of Section 21 of the NWA.

The applicable listed activities and water uses are listed in (Table 4 - 6) of this report. A mining permit application and integrated NEMA and NEM:WA application were lodged by West Wits with the DMR

on 10 April 2018. The WUL application will be submitted to the DWS towards the end of the EIA process. Additional permits or licenses that may be required for the project include:

- Approval from the relevant Department of Roads and Transport for upgrading any roads or intersections
- Permit in terms of the National Heritage Act, 25 of 1999, the Ordinance on Exhumations, 12 of 1980, and/or the Human Tissues Act, 65 of 1983 if any heritage sites (including graves) are damaged or removed (No Heritage areas was identified by the specialist)
- Certificate of registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material.

(i) Listed and specified activities

Table 4: Listed and specified activities

Description of activity	Extent of activity (ha)	Listed activity and/or water use
Site preparation and construction activities		
Selective clearing of vegetation	8.95 ha	Listing Notice 1: GNR 983 Activity 27
Stripping, handling and stockpiling of topsoil (in line with a soil management plan to be developed)	8.95 ha	Listing Notice 1: GNR 983 Activity 27
Cleaning, grubbing and bulldozing activities.	8.95 ha	Listing Notice 1: GNR 983 Activity 27
Establishing storm water controls (in line with a Regulation 704 compliant storm water management plan to be developed for the project).		Not Applicable
Bulk earthworks including trenches, berms. Establishing access and internal haul roads		Not Applicable
Establishing and using mine access roads mainly from the existing road networks.	0.93 ha	Not Applicable
Open pit Mining		
Mining comprising: - Establishing storm water controls (in line with a GN704 compliant storm water management plan to be developed for the project) - Clearing of vegetation (in line with a biodiversity management plan to be developed for the project) ahead of mining. - Stripping, handling and stockpiling of topsoil (in line with a soil management plan to be developed for the project) ahead of mining. - Bulldozing of illegally dumped general and hazardous waste material. - Establishing access and internal haul roads ahead of mining - Breaking of Rock (Xcentric Ripper)	4.9565 ha mining permit with a 3.22ha open pit	Listing Notice 1: GNR 983 Activity 21 and 27. NWA 21(a),(c), (g) and (i)

- Excavating waste rock and mineral resource - Stockpiling of run-of-mine (RoM) - Crushing - Loading RoM onto tipper trucks.		
Transportation		
Vehicle, machinery and/or material movement within the site boundary.		Not applicable
Use of access road and public roads for transporting staff, general/industrial waste and RoM.		Not applicable
Waste Rock Management		
Temporary storage/stockpiling of waste rock material (to be used to backfill pits)		NEM:WA GNR 921 A(15) NWA 21(c), (g), (i)
Waste Management		
Removal of waste by contractor for final disposal at permitted waste disposal facilities		Not applicable.
General Site Management		
Appointment of contractors		Not applicable
Site management (monitoring, inspections, maintenance, security and access control)	8.95 ha	Not applicable
Environmental awareness training and emergency response		Not applicable
Implementing and maintaining management plan	8.95 ha	Not applicable
Rehabilitation		
Backfill waste rock material into open pit (as part of rehabilitation)	4.9565 ha mining permit, 3.22ha open pit	Listing Notice 1: GNR 983 Activity 21 NEM:WA GNR 921 A(15); NWA 21(g).
Ripping compacted areas and replacing soil resources.	8.95 ha	Not applicable
Slope stabilisation and erosion control.	8.95 ha	Not applicable
Landscaping	8.95 ha	Not applicable
Alien invasive management.	8.95 ha	Not applicable
Restoration of natural drainage patterns as far as practically possible.	8.95 ha	Not applicable
Re-vegetation of disturbed areas.	8.95 ha	Not applicable

Maintenance and Aftercare		
Maintenance and Aftercare	8.95 ha	Not applicable

Table 5: Description of the EIA Regulations Listed Activities

Activity No	Listed activity	Applicability of the activity
NEMA Listing Notice 1 (GNR 983)		
21	Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	A mining permit is required for the project in terms of the MPRDA (Act 28 of 2002)
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation	Mining activities will require clearance of indigenous vegetation. The project footprint could trigger this activity.
NEM:WA Listed Activities (GNR 921)		
Category A (15)	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining permit in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	The project will require the establishment of waste rock dumps and re-use of waste rock to backfill open pits.

Table 6: Section 21 Water Uses that apply to the proposed project

NEMA Listing Notice 1 (GNR 983)		Applicability of the water use
21 (a)	Taking water from a water resource	Dewatering of the open pits may be required.
21 (c)	Impeding or diverting the flow of water in a watercourse	Mining activities may occur within regulated zones of a watercourse.
21 (i)	Altering the bed, banks, course or characteristics of a watercourse	
21 (g)	Disposing of waste in a manner which may detrimentally impact on a water resource	The project would require dirty water storage, waste rock storage/stockpiling facilities and backfilling of open pits and underground voids with waste rock.

(ii) Description of the activities to be undertaken

(Describe Methodology or technology to be employed, including the type of commodity to be prospected/mined and for a linear activity, a description of the route of the activity)

Background

West Wits Mining MLI (Proprietary) Limited (West Wits) was originally formed to explore, evaluate and extract gold and uranium from project areas situated in the Witwatersrand Basin, South Africa. The company is focused on developing its Soweto Cluster Project situated on previous mine lease areas between Soweto's borders and those of Roodepoort. The mining area consists of two historic mining centres, the Durban Roodepoort Deep (DRD) and the Rand Leases on the Northern Edge of the Witwatersrand Basin in the Central Rand Goldfield, immediately south west of the City of Johannesburg.

The area has a long-standing history, with mining activities having begun since the discovery of gold in 1886. During that time up to six different gold-bearing conglomerate horizons have been mined from surface down to a depth of 3100 metres. The mining targets are the auriferous conglomerates of the Central Rand Group, Witwatersrand Supergroup. These are the North Reef, Main Reef, Main Reef Leader, South Reef, Livingstone Reef, Bird Reef, Monarch Reefs, Kimberley Reefs, and Ventersdorp Contact Reef. The latter is situated at the base of the Ventersdorp Supergroup within the Venterspost Conglomerate Formation. The Central Rand Group is subdivided into the older Johannesburg (containing the Main, Randfontein, Luipaardsvlei, Krugersdorp, and Booysens formations) and the younger Turffontein (containing the Kimberley, Elsburg and Mondeor formations) subgroups.

West Wits intends to open a number of small surface operations to generate cash to fund more exploration and extensive development. The first mining operation opened in late 2016 at the Sol Plaaitjie Project. This project is currently being undertaken, as a consequence of a Directive received from the Department of Mineral Resources (DMR) and under the National Environmental Management Act (NEMA) (No 107 of 1998), for the landowner to clean up and rehabilitate the Sol Plaaitjie area to rid it of illegal mining.

The landowner is compelled to comply with the Directive, and in order to give effect to this NEMA Directive, the landowner appointed West Wits to remove the easily accessible opencast ore on the land which the illegal miners exploit, removing this ore will stop the illegal mining. As part of this process, West Wits is obliged to concrete over access adits to the old underground workings, to also prevent access by illegal miners. This rehabilitation operation is supported by the DMR and the South

African Police services (SAPS). This rehabilitation project is short term and the rehabilitated land will be used after removal of the ore which attracts the illegal miners, for a housing property development. Rehabilitation of this area pursuant to the NEMA Directive is therefore an essential requirement for the property development.

West Wits intends to apply for a mining permit in terms of the Mineral and Petroleum Resources Development Act (MPRDA) (No. 28 of 2002) for gold, uranium and silver over the West Wits prospecting right area (GP 30/5/1/1/2/10035 PR). Consent in terms of Section 11(2) of the MPRDA to cede a renewed prospecting right MPT No. 29/2016 from Mintails SA Soweto Cluster (Proprietary) Limited to West Wits was granted by the Department of Mineral Resources (DMR) in 2018.The West Wits Mining Permit (i.e. Kimberley West) will be located on a Portion of Portion 1 of the Farm Witpoortjie 245 IQ, a Portion of the Remainder of Portion 14 of the Farm Roodepoort 237 IQ, a portion of the waste rock dump will be located on a Portion of Portion 92 of the Farm Vlakfontein 238 IQ and the section of the access /haul road will be located on a portion of the Remainder of Portion 1 of the Farm Vlakfontein 238 IQ, Gauteng Province.

Construction phase

Establishment of the facilities required for the opencast mining activities will take place during the construction phase. It should be noted that the construction activities will also form part of the mining (operational) phase of the project and will include establishment of the following: Clearing of vegetation and removal of overburden. Vegetation will initially be removed, and topsoil will be excavated and hauled to an identified topsoil stockpile for used during rehabilitation. Access to the proposed site will be from the existing road network and internal haul roads will be linked up with access roads. Clearing and removal of rubble and rubbish illegally dumped on the proposed site will take place. Waste will be transported to identified waste disposal facilities.

Managerial and supervision during the construction and operational phase will be performed from the existing Sol Plaaitjie operation site. No additional infrastructure is therefore required. No processing infrastructure will be constructed as the product will be transported to an offsite processing facility.

Operational phase

Opencast mining activities would include the following: Topsoil will be excavated and hauled to an identified topsoil stockpile. Waste material below the topsoil will also be excavated and hauled to the identified waste rock storage facility. Ore will be excavated and hauled to an ore stockpile for initial crushing before transportation to the processing plant. Crushing of the ore will take place to a maximum lump size (P100) of 200mm. Breakage of any material that is not susceptible to free-dig

excavation will be enabled through excavators fitted with modern rock breaking technology and it is expected that no blasting will be required at any of the open pit targets.

Rock breaking will be done through the utilisation of Xcentric Rippers. The technology provides a safe alternative in the working field, without any of the environmental hazardous associated with blasting. The resources at the open pit targets are generally outcropping and production can commence at the onset of mining activities. Open pit mining activities will be performed by a mining contractor and production rate of approximately 15 000 tonnes per month is anticipated.

The conceptual flow diagram associated with the proposed project is illustrated below in Figure 1.

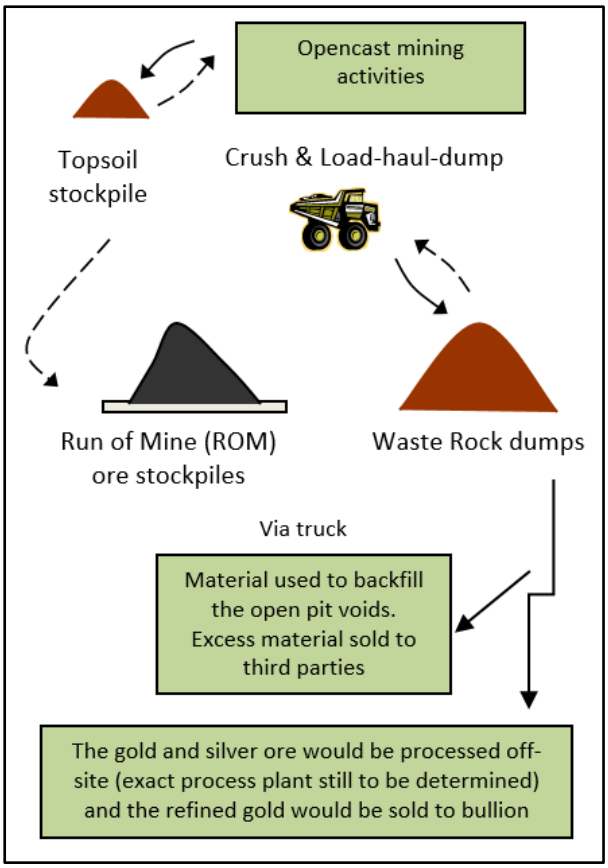


Figure 1: Conceptual flow diagram

The area demarcated for the mining permit of gold, uranium and silver covers an area of approximately 4.9565 ha (refer to Table 7 and Figure 2) and a total area of 8.95ha.

Table 7: Property name & coordinates

Property	Portion	Coordinates
Witpoortjie 245 IQ	A portion of Portion 1	S: -26.180765° E: 27.830288°
Roodepoort 237 IQ	A portion of the Remainder of Portion 14	S: -26.181531° E: 27.832395°
Vlakfontein 238 IQ	A portion of the Remainder of Portion 1; and A portion of Portion 92	S: -26.182597° E: 27.832848° S: -26.181493° E: 27.830643°

Mining Schedule

The schedule stretches over a period of 4 to 5 months at a ROM production rate of approximately 15 000 ton per month. Rehabilitation of opencast area will be concurrent with mining and final rehabilitation will be completed within 8 to 9 months (See Table 8).

Table 8: Mining Schedule

Pit	Mining	Rehab
Kimberley West	4 to 5 months	8 to 9 months

Mining Areas

The proposed opencast mining area will consist out of a single cut as presented in Figure 2. The proposed opencast area will target the auriferous conglomerates reef of the Kimberley subgroup located within the Central Rand Group, Witwatersrand Supergroup. The topsoil stockpile will be establish to the North of the proposed opencast area, with the waste rock dump to be establish to the South.

The proposed layout has been established through consultation with landowners, stakeholders, specialist inputs and the availability of a resource. As discussed in the section regarding alternatives a number of alternative layouts have been investigated.

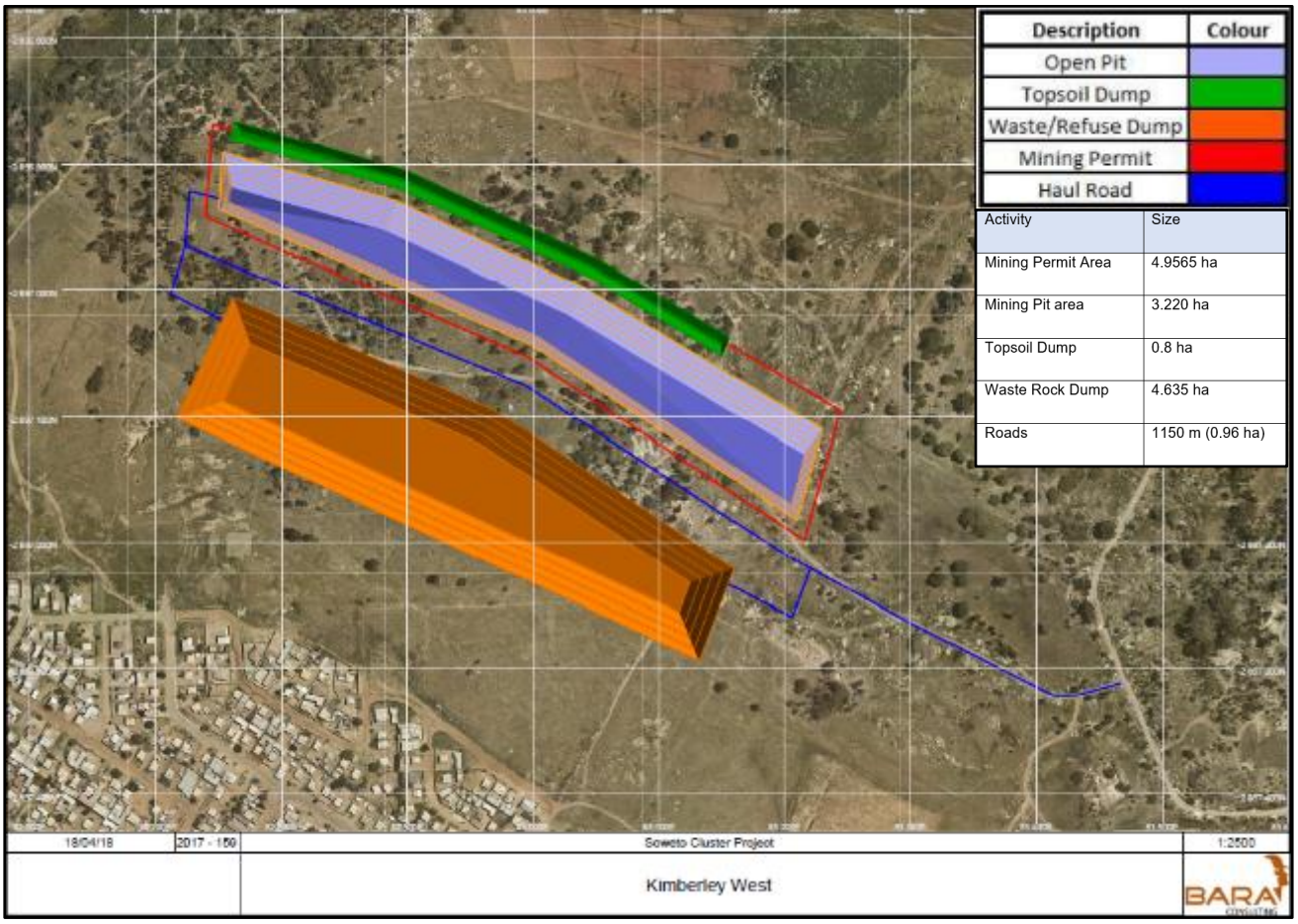


Figure 2: Proposed Mine Area Layout

Data on the proposed opencast with specific reference location, duration of operation and rehabilitation is provided in Table 9.

Table 9: Data on the proposed Mining Operation

Data on the Proposed Mining Operation	
Target commodities	Gold, uranium and silver
Estimated depth of resource	0 - 25m
Mineable resource	67 200 tonnes ore
Employment	Opencast mining operations: Contractor would require between 40 and 50 employees.
Operating hours	Opencast mining activities: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday

Open pits	Kimberley West – Mining permit
Location	See Appendix C
Size of mining permit area	4.9565 ha
Total Area	8.95 ha
Mining rate (per month)	15 000 tonnes
Pit depth	20 – 25m
Mineable resource (tonnes)	67 200 tonnes ore
Mining duration (including concurrent rehabilitation, season dependent)	~ 5 months
Final rehabilitation duration	~ 9 months
Waste rock dump volume	537 600m^3
Waste rock dump height	20 to 30 m

Equipment

Table 10 illustrates the basic fleet of equipment recommended for the Kimberley West opencast mining permit project.

Table 10: Basic Mining Equipment Fleet

Names	Number of Equipment
Bulldozers	2
Excavators	7
ADT's	8
Crusher	1
Tipper Trucks	2
Front Loaders	2
Water Trucks	2
LDV	6

Waste Stockpiles

No processing of any ore will take place on site, no tailings storage facility will be establish. No residual waste stockpile will remain after rehabilitation. The only waste material that will be produced during the mining process are subsoil and waste rock. Waste stockpiles are listed in the list of waste activities published in GN. No. R. 632 of 24 July 2015 in accordance with the National Environmental Management: Waste Act 59 of 2008. The area in **Figure 2** indicated the location of the waste rock

stockpile. The material will be utilised during the rehabilitation/decommissioning phase of the project to backfill the opencast area. No residual stockpile will remain after rehabilitation.

In terms of the regulations, mine waste residue stockpiles must comply with landfill requirements. Stockpiles must now also comply with the National Norms and Standards for the Assessment of Waste for Landfill Disposal, 2013; and National Norms and Standards for Disposal of Waste to Landfill, 2013.

The waste classified as Type 3, thus requiring a Class C engineered barrier system. However, none of the constituents in the leach test exceeded the regulatory guideline values. In addition, the geochemical model indicated that the waste rock is comprised of minerals which are very stable in the specific mining environment being considered. In addition, the waste rock itself as well as the secondary mineral products forming very slowly as the waste rock minerals weather have the capacity to remove contaminants from solution through the process of adsorption.

The waste rock material contains no iron sulphide minerals. Therefore, the risk of the formation of acid mine drainage conditions due to the waste rock material is negligible. The results indicate that the significance of both potential impacts rate as Very Low. The cumulative impacts of the impacts rate as Low. This is predominantly because of the fact that the development of AMD conditions as well as the leaching of contaminants from the waste rock is unlikely. The waste rock material is classified as Type 3 according to NEMWA Regulation 635. It is however recommended by the specialist, based on the results of the assessment, that the waste material class be reduced to Class 4.

Waste Management

Clearing and removal of rubble and rubbish illegally dumped on the proposed site will take place. Waste will be transported to identified waste disposal facilities. Any hazardous or general waste generated on the site will be collected and taken to the existing Sol Plaaitje facility from where the waste will be removed by a contractor to a waste disposal facility. No waste will be stored on site.

Stormwater Management

A stormwater managemenet plan will be developed for the mining area before commencement of the operation. The stormwater management will be in accordance with the requirements as set out in GNR 704 (NWA). Clean and dirty water sepperation will take place through the installation of cut off trenches and berms. No comtaminated stormwater will be discharged from the mining area without the required approval from the Department of Water Affairs.

Decommissioning phase:

Concurrent rehabilitation of the proposed opencast mining area to be undertaken with final rehabilitation taking place after the operational phase has been come completed. Backfilling of the final mining void when the Western portion has been mined out, is to utilise the adjacent overburden stockpile to construct a free draining post mining landform. Generally, backfilling is likely to be with a large tracked dozer – pushing/dozing the waste rock / overburden material over the highwall edge, into the worked out mine void.

Rollover dozing and backfill with waste rock, as an unconsolidated fill is likely to provide a variable foundation bearing capacity and result in non-uniform settlement. Any heavy or structural foundations on unconsolidated fills should be subjected to detailed geotechnical investigations, prior to determining their suitability for supporting any rigid or large structures. The final rehabilitation requirements will be establish through consultation with landowners.

The closure of the opencast mining will occur with the decommissioning of the mine in accordance with an applicable EMPR as part of a closure Environmental Impact Assessment to be conducted and also in accordance with any other closure plans pertaining to mining area. This phase starts at the end of the operational phase of the project and ends when the site obtains a Closure Certificate from the regulatory authorities, but may include a period where there is no activity on the site other than monitoring prior to closure being completed.

The schedule closure cost calculated for the proposed Kimberley West opencast pit are R 8 575 891.92 this cost includes post closure aspects:

- Surface water monitoring for 5 years
- Groundwater monitoring for 5 years
- Rehabilitation monitoring for 3 years
- Care and maintenance for 3 years; and
- Contingencies for post closure aspects

The cost also included the following additional allowances

- Preliminary and general (12%)
- Contingencies (10%); and
- Additional Studies.

Post closure phase

During the post closure phase of the project monitoring of aspect such as water quality, soil erosion and establishment of vegetation will be conducted. The requirements will be establish in the final closure plan.

6. Policy and Legislative Context

(a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)

Table 11: Policy and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
Constitution of South Africa, 1996 (Act No. 108 of 1996) [as amended] • *Section 24: Environment.-Everyone has the right-* *(a) to an environment that is not harmful to their health or well-being; and* *(b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that-* *i) prevent pollution and ecological degradation;* *ii) promote conservation; and* *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*	The proposed activity has the potential to harm the environment and poses a risk to the health and wellbeing of people. The Applicant has the overall responsibility to ensure that the rights of people in terms of Section 24 of the Constitution is protected in terms of the proposed Mining activity.
National Environmental Management Act (No. 107 of 1998) [as amended] • *Section 24: Environmental Authorisations* • *Section 28 (1): Duty of Care and responsibilities to minimise and remediate environmental degradation.*	The proposed activity is a listed activity in terms of the EIA Regulations and requires environmental authorisation. Overall responsibility of the mining rests with the Applicant, especially in terms of liabilities associated with the operational and closure phase
EIA Regulations, 2014 (Government Notices 982 - 984) [as amended in 2017] *Chapter 2: Timeframes for EIA processes* *Chapter 3: Duties of proponent* *Chapter 4: Application for Environmental Authorisation: Part 2: Basic Assessment* *Part 4: Environmental Authorisation* *Chapter 6: Regulation 39 to 44: Public Participation* *Appendix 1: Basic Assessment Report* *Appendix 4: Environmental Management Programme*	The EIA Regulations, 2014 [as amended] prescribes *inter alia*: - The manner in which public participation needs to be conducted - The requirements of a basic assessment process and content of a basic assessment report, Environmental Management Programme - The requirements and content of specialist reports. The regulations outlining the procedures required for authorisation are published in GNR 982 [Environmental

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
Appendix 6: Specialist Reports	Impact Assessment Regulations (EIA)] (4 December 2014). Listing Notice 1 identifies activities that require a Basic Assessment (BA) process to be undertaken, in terms of the EIA Regulations, Listed activities (Listing Notice 1) will be triggered by the proposed activity: - Activity 21: Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the MPRDA (Act 28 of 2002) - Activity 27: The clearance of an area of 1 ha or more, but less than 20 ha of indigenous vegetation.
Mineral and Petroleum Resources Development Act, 2002 (Act. 28 of 2002) [as amended]: *Chapter 2 (5): Legal nature of right holders;* *Chapter 4: Mineral and Environmental Regulation* *(9) Order of processing of applications* *(10) Consultation with Interested and Affected Parties;* *(11) Transferability and encumbrance of rights;* *(27) Mining permit application.* *(37) Environmental Management Principles* *(38) Integrated environmental management and responsibility to remedy*	The application is for a mining permit and therefore all regulations pertaining to the application process of a mining permit and environmental management is applicable to this application.
The National Environmental Management: Waste Act (Act No 59 of 2008) (NEM:WA) [as amended] • *Section 16: General duty in respect of waste management;* • *Section 17: Reduction, re-use, recycling and recovery of waste;* • *Section 21: General requirements for storage of hazardous and general waste.*	The proposed activities will produce general and hazardous waste which need to be managed and disposed of according to best practices such as recycling, safe storage, etc.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]. List of Waste Management Activities that have, or are likely to have a detrimental effect on the environment as promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended] Residue stockpiles or deposit areas: *Mining, exploration or production operation, resulting in the development of residue stockpiles and residue deposits"* *Prospecting, mining, exploration or production operation, resulting in development of residue stockpiles and residue*	Residue stockpile or deposit area Category A: - Activity 15: The establishment or reclamation of a residue stockpile or residue deposit resulting for activities which required a prospecting right or mining permit in terms of the Mineral and Petroleum Resources Development Act (Act No 28 of 2002).

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
deposits. The management and control of these wastes must take place in accordance with the regulations for management and control of residue deposits and residue stockpiles or an integrated environmental authorization as provided for in terms of NEMA.	
National Water Act, 1998 (Act No. 36 of 1998) [as amended] • *Section 3: Regulation of flow and control of all water* • *Section 19: Prevention of pollution to watercourses* • *Section 21: Water Use Activities* *The water use activities associated with the proposed development requires compliance with the requirements of the NWA as listed under GN No. 19182. An application for an integrated water use license is lodged in terms of Section 21 of the National Water Act, 1998 (Act 36 of 1998) [as amended].*	Stormwater management to be in line with the requirements of the Act, in order to achieve prevention of pollution and hazards. Water Use License application to be submitted to the competent authority (DWS) for section 21 water use activities trigger by the proposed activities
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) [as amended] • *Section 32: Control of dust* • *Section 34: Control of noise*	Impacts on surrounding landowners need to be managed through dust and noise monitoring and mitigation measures as presented in the Noise impact assessment (Airshed) and the Air Impact Assessment (Airshed).
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) [as amended] In terms of section 21 of the NEM:AQA a list of scheduled processes were published in GNR893 (November 2013).	None of the listed scheduled processes as public in GNR 893 are trigger by the mining permit application.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended] • *Section 9: Norms and standards* • *Section 27: Delegation of power and duties* • *Section 30: Financial accountability* • *Section 43: Biodiversity management plans.*	The management of sensitive indigenous vegetation is of the upmost importance. A Terrestrial Ecology and Wetland Assessment undertaken in May 2018 by a competent specialist from SAS Environmental Group observed that no sensitive vegetation is located on the proposed area. Management measures set out in the management plans developed for the proposed activity to be implemented.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996) [as amended] and associated regulations • *Chapter 2, Sections 2 – 4: Responsibilities of owner* • *Chapter 2, Sections 5 – 13:Responsibilities of manager;* • *Chapter 2, Sections 14 – 18: Documentation requirements;* • *Chapter 2, Section 19 – 20 and 22 to 24: Employee's rights and duties; and* • *Chapter 2, Section 21: Manufacturer's and supplier's duty for health and safety.*	The development activities will create an environment that may not be safe and healthy for workers or visitors to the site. The act provides for measures to prevent threats to the health and safety of humans in the mining area. *The Act will apply during the construction, operational and closure phase of the proposed project.*
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	Protection of indigenous heritage resources that may potentially occur on the property. A heritage impact

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
• *Section 34(1): Protection of structures older than 60 years* • *Section 38: Statutory Comments to be obtained from the South African Heritage Resources Agency (SAHRA)* • *Section 44 (1); Preservation and protection of heritage resources;* • *Section 3 Types and ranges of heritage resources (i);* *Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens*.	assessment was completed by heritage specialist from PSG Heritage in May 2018. No heritage resources were identified within the Kimberley West opencast footprint area, the overall impact of the development on heritage resources is regarded as VERY LOW and no mitigation measures are required. It is the considered opinion of the Heritage specialist that overall impact on heritage resources is acceptably low and that the project can be approved from a heritage perspective. Comments to be obtained from SAHRA on the Draft BAR and EMPR and Heritage impact assessment.
Conservation of Agricultural Resources Act (no. 43 of 1983) • *Section 5: Prohibition of spreading of weeds* • *Section 12: Maintenance of soil conservation works and maintenance of certain states of affairs* • *Section 16: Regional Conservation Committees*	Listed invader/alien plants occurring on site which requires management measures to be implemented.
National Nuclear Regulator Act (No. 47 of 1999) (NNR) • *Section 22: Certificate of registration, for the handling and management of gold and uranium containing material.*	Activities that require a Certificate of registration in terms of the NNR. Handling, transport and management of gold and uranium containing material.
Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) [as amended] • *Section 12 (1): Duty of the landowner to prevent fire from spreading to neighbouring properties.*	Cautionary steps in avoiding the spread of fires to and from neighbouring properties.
Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended] • *Section 2: Declaration of grouped hazardous substances;* • *Section 4: Licensing;* • *Section 16: Liability of employer or principle* • *Section 9 (1): Storage and handling of hazardous chemical substances;* • *Section 18: Offences*	The Applicant must ensure the safety of people working with hazardous chemicals (specifically fuels), as well as safe storage, use and disposal of containers during the on-site operational phase together with the associated liability should non-compliance be at the order of the day.
Gauteng Transport Infrastructure Act, 2001 (Act No. 8 of 2001) [as amended]; Where mining operations are to be undertaken, Section 49 of the Gauteng Transport Infrastructure Act, 2001 (Act No 8 of 2001) shall apply.	An application must be submitted to the Department for a way leave if any part of a proposed service falls within 95m (measured from the centreline of any of the Department's existing or future road(s)/railway line or within a 500 m radius of any intersection on said road(s)/railway line
Restitution of Land Rights Amendment Act, 2014 (Act 15 of 2014)	A land claim was lodged in term of the Restitution of Land Rights Amendment Act, 2014 on portion 92 of the

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
The act deals with Land claims.	Farm Vlakfontein 238 IQ. The mining permit area is not affected by the claim, however a portion of the waste rock dump and access/haul road will be located on the property. Where section 11(7) of Restitution of land Rights Amendment Act, 1994 applies, the land claim commission will be inform a month before any activity is undertake on the property.
Guideline on the need and desirability in terms of the Impact Assessment (EIA) Regulations, 2010, Notice 891 of 2014	This guideline has been taken into account as part of project planning.
Public Participation 2010, Integrated Environmental Management Guideline Series 7, DEA	This guideline has informed the public participation process for the project.
Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, 2015 (Notice 1147 of 2015) • *Regulation 5: Scope of financial provision* • *Regulation 6: Method for determining financial provision* • *Regulation 12: Preparation and submission of plans and reports*	An applicant must determine the financial provision through a detailed itemisation of all activities and cost, calculated based on the actual cost of implementation of the measures required.
Waste Classification and Management Regulations and Norms and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]; and Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation (GN R. 632 of 2015)	The construction and operational activities associated with the proposed activities shall be in accordance with the regulations and Norms and Standards. The waste rock need to be classified to determine the type of waste in order to establish which type of lining the required, if any. Waste classification was performed as part of the Geo-chemical assessment (GeoDyn Systems, 2018), the specialist recommended that the waste rock be re-classified as Type 4, which is inert. The waste rock dumps need to be planned and managed in terms of GN R.632 of 2015.
Regulations on use of Water for Mining and Related Activities Aimed at the Protection of Water Resources, 1999 (Notice 704 of 1999). • *Regulation 4: Restrictions on location of mining activities* • *Regulation 7: Protection of water resources* • *Regulation 12: Technical investigation and monitoring.*	Every person in control of a mine or activity must take measures to manage water in an effective manner as prescribe by the regulation.
National Dust Control Regulations, 2013 (Government Notice 827 of 2013) • *Section 3: Dust fall standard* • *Section 4: Dust fall monitoring program* • *Section 6: Measures for control of dust*	Dust fallout need to be monitored in accordance to the standards set out in the monitoring programme with the specified measures. This is a result of the Applicant being liable to offences and penalties associated with non-conformance to dust which may influence employees and surrounding landowners. Air quality

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
• *Section 7: Ambient air quality monitoring (PM10)* • *Section 8: Offences* • *Section 9: Penalties*	monitoring to be undertaken as recommended by the Air quality specialist study (Airshed, 2018)
(Government Notice 609 of 2017) Notice of the List of Protected Tree Species under the National Forests Act, 1998 (Act No. 84 of 1998).	It is the responsibility of the Applicant to avoid unnecessary removal of protected tree species. Should protected tree species need to be removed, a permit must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF). No protected tree species were identified by SAS Environmental during the Terrestrial Ecology Assessment.
Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2016 in terms of NEMBA (Government Notice 864 of 2016) • *Notice 2: Exempted Alien Species in terms of Section 66 (1)* • *Notice 3: National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-6 8 & 11* • *Notice 4: Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-6, 9 & 12*	It is the responsibility of the Applicant to ensure that all prohibited plant and animal species are eradicated as far as possible. During rehabilitation and aftercare the site should be inspected on a regular basis to ensure that no alien vegetation establishment takes place on the disturbed areas.
NWA: Government Notice 509 General authorisation for water use as defined in Section 21(c) and 21(i), July 2016.	The outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; In the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or A 500 m radius from the delineated boundary (extent) of any wetland or pan.
Hazardous Chemical Substances Regulations, 1995 (Government Notice 1179 of 1995) • *Section 4: Duties of persons who may be exposed to hazardous chemical substances* • *Section 9A (1): Penalties*	No Hazardous substances will be stored on the site.
NEMA: Government Notice. 805 Companion Guideline on the Implantation of the Environmental Impact Assessment Regulations, 2010, October 2012.	The application for Environmental Authorisation is submitted in terms of the EIA Regulations.
NEMA: GN. 807 Public Participation Guideline, October 2012.	Consultation with Interested and Affected Parties and Communities.
NEM:AQA : GNR 283. National Atmospheric Emissions Reporting Regulations, 2015.	Mines are classified under Group C of Annexure 1 of the regulations.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
For purposes of these Regulations, emission sources and data providers are classified according to groups A to D listed in Annexure 1 to these Regulations. Section 5(3): *For purposes of these Regulations, emission sources and data providers are classified according to groups A to D listed in Annexure 1 to these Regulations.*	Any person, that holds a mining right or permit in terms of the MPRDA. Emissions report must be made in the format required for NAEIS to the relevant air quality officer.
NEM:AQA: GNR 6. Declaration of greenhouse gasses as priority air pollutants. A list of persons that is required to submit a pollution prevent plan is provided in Annexure 1 of the regulation.	Gold mining is not listed under Annexure 1 of the regulation. The mining is not required to submit a pollution prevention plan in terms of these regulations.
National Development Plan 2030 (2012)	Land uses
National Framework for Sustainable Development (2008)	Land uses
National Strategy for Sustainable Development and Action Plan 2011 – 2014 (NSSD 1) (2011)	Land uses
Gauteng Spatial Development Framework (SDF)	Land uses
Gauteng Spatial Development Plan (SDP)	Land uses
Gauteng Province Environmental Management Framework, 2014 (GPEMF) *Zone 1*	The study area where the mining activity is proposed, is located within the Gauteng Province and falls within Control Zones 1 of the GEMF. The General Guidelines for this zones should be applied to the proposed mining activity. The guidelines should be implemented through the EIA process. According to the GEMF, the proposed activity or land use is in line with Zone 1. The intention with this zone is to streamline urban development activities in it and to promote development infill, densification and concentration of urban development, in order to establish a more effective and efficient city region that will minimise urban sprawl into rural areas.
Department of Mineral Resources Guidelines for the compilation of a Scoping Report with due regard to consultation with communities and Interested and Affected Parties.	Consultation with Interested and Affected Parties and Communities.
Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector (2013) (Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute.	The Guideline provides guidance on the impacts on biodiversity typically associated with mining as well as mitigation measures and strategies. The guideline is taken into consideration in this BAR and the development of the Environmental Management Programme.
Development Guidelines for Ridges (GDARD)	Ridges have been identified and delineated within the Gauteng Province by GDARD. No identified ridges are location on the proposed mining area.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
SANS 10103:2008 The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, and Annoyance and to Speech Communication.	Impacts on surrounding landowners need to be managed through noise mitigation measures.
National Ambient Air Quality Standard (NAAQS) (29 June 2012 (No. 35463)).	Standard for ambient air quality in South Africa. Monitoring requirements, limits and standards.
Vaal Triangle Priority Area (21 April 2006).	The location of the proposed Kimberley West operations within the Vaal Triangle Priority area might have several important implications for these operations. New developments which are associated with atmospheric emissions and hence the potential for contributing to air pollutant concentrations are being subject to intense scrutiny by national air pollution control officers. Emphasis is being placed on ensuring that best practice control measures are being proposed for implementation and that the development will not substantially add to the existing air pollution burden in the region.
SANS 1929: Ambient Air Quality – Limits for Common Pollutants	Impacts on surrounding landowners need to be managed through dust mitigation measures.
SANS 1137: Standard test method for the collection and measurement of dust fall (settleable particulate matter).	Impacts on surrounding landowners need to be managed through dust mitigation measures.
ASTM d 1739, 1970 or equivalent approved protocol for dust monitoring.	Impacts on surrounding landowners need to be managed through dust mitigation measures.
SANS 10228:2006 The Identification and Classification of Dangerous Goods for Transport	All dangerous goods to be transported to and from the site need to be managed according to these standards.
Gauteng Conservation Plan: Version 3.3	Identifies Critical Biodiversity Areas, Ecological Support Areas, and irreplaceable, protected and important areas.
All other relevant national, provincial, district and local municipality legislation and guidelines that may be applicable to the application.	

7. Need and desirability of the proposed activities

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

The main benefits associated with the proposed project are:

- Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees;

- Implementation of the proposed project will result in skills development associated with the mining method;
- To mine an existing reserve resource and to thereafter rehabilitate;
- The improvement of historical impacted land and newly impacted areas through rehabilitation and removal of rubble and rubbish illegally dumped.
- The availability of the economically mined and rehabilitated land being freed up for housing developments earmarked for the area, that aims to reduce the housing backlog experienced by the City of Johannesburg, while at the same time creating employment and extracting mineral resources for the benefit of the economy;
- Mined and rehabilitated land holds opportunity for spatial integration by reducing fragmentation and unlocking development potential in large areas;
- The eradication of access to dangerous historic workings targeted by informal miners (Zama Zamas), which are mainly illegal immigrants that pose a threat to the health and safety of the communities and themselves while mining illegally; and
- Short time period associated with the mining and rehabilitation of the area.

The project is aligned with the objectives of the MPRDA (Act 28 of 2002)

- To promote economic growth and mineral development in the Republic
- To promote employment and advance the social and economic welfare of all South Africans
- To ensure that the nation's mineral resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development; and
- To ensure that holders of mining rights contribute towards the social-economic development of the area in which they are operating.

The net benefit to South Africa as a whole is a product produced for the world commodity market, earning South Africa the necessary foreign exchange and capital needed for a healthy economy and further capital investments in development projects for the long-term future of the country.

Gold is a unique metal, used as bullion and in jewellery, glass and electronics devices production. Thanks to its unique properties, gold has remained a critical material in the electronics sector. The quantity of gold utilised are significant, in 2016 more gold was used in technical applications than either platinum or palladium, two metals commonly associated with the industrial sector, while the amount of gold used in technology was roughly equivalent to central bank gold purchases between 2010 and 2016. The geology of the area is known for gold bearing reefs, and from a mining perspective is ideal for the type of land use.

On the 20 October 2014, the Department of Environmental Affairs published a Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010, in Government Notice 891 of 2014. The key components are listed and discussed below:

- Securing ecological sustainable development and use of natural resources
- Promoting justifiable economic and social development.

Ecological sustainable developments and use of natural resources

Due to the nature of mining projects, impacts on biodiversity areas including aquatic ecosystems, linkages between biodiversity areas and related species and the role that they play in the ecosystem are probable.

The project area has been selected on the basis of the presence of economically mineable resources. The mining area would be located on land that has been impacted by historical and current mining activities, overgrazing, illegal dumping of waste and urbanisation. Sensitive ecological areas are associated with watercourses and more specifically the Klip River which runs along the western boundary of the mining permit application area (considered by the biodiversity specialist to be of moderate to low sensitivity).

The Transformed and Secondary Grassland Habitat Units as identified on the site have been significantly disturbed as a result of historic and on-going anthropogenic activities and the proliferation of alien and invasive plant species. The floral habitat within the Secondary Grassland Habitat Unit is already largely transformed and of decreased ecological integrity. No faunal or floral species of conservation concern were observed on the site and were determined during the assessment to have a low probability of occurrence within the Secondary Grassland Habitat.

Promoting justifiable economic and social development

Community/society priorities are officially expressed through public documents including the provincial growth and development strategy and spatial development framework documents. In this regard the West Wits mining right application falls within an area defined in the City of Johannesburg spatial development framework (SDF) 2040 as a Transformation Zone.

The project is in line with the objective of the Gauteng Spatial Development Framework (GSDF) and the Gauteng Provincial Environmental Management Framework (GPEMF). One of the opportunities as identified in the GSDF is that a rehabilitated mining belt holds opportunity for spatial integration. Mined and rehabilitated land being freed up for housing developments will improve fragmentation, unlocking development potential in large areas that can be used for future urban development and

infill. Where there is a mineral resource the DMR does not allow development that could result in sterilization of a minerals. Therefore if the mineral is mined it allows for the opportunity for development to take place.

The environment management zone for the proposed area in terms of the GPEMF is zone 1. The intention with this zone is to streamline urban development activities in it and to promote development infill, densification and concentration of urban development, in order to establish a more effective and efficient city region that will minimise urban sprawl into rural areas. The proposed mining activity is in line with the GPEMF zone as the mined and rehabilitated land will be freed up for housing development.

The proposed project will benefit society and the surrounding communities both directly and indirectly by generating additional employment at the proposed operation and through the extraction of mineral resources and beneficiation of mineral resources within Gauteng. Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees.

Prevention and mitigation measures as recommended by the specialists, were included in this Basic Assessment Report (BAR) and the Environmental Management Programme (EMPR). The implementation of the EMPR will ensure that impacts are effectively managed and kept to a minimal. The potential cumulative impacts were also assessed and found to be of low significance after mitigation for the mining period.

8. Motivation for the overall preferred site, activities and technology alternative including a full description of the process followed to reach the proposed preferred alternatives within the site

(NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.)

The overall mining permit area is indicated in **Appendix C** and **Figure 2**, with locations of the individual activities on site. Areas to be avoided in terms of sensitivities are also indicated on the sensitivity maps in this report (**Appendix E**).

The following alternatives were investigated as feasible alternatives:

ii) Details of all alternatives considered

The overall mining permit area is indicated in Figure 2, with locations of the individual activities on site. Areas to be avoided in terms of sensitivities are also indicated on the sensitivity maps in this report (Appendix E).

The following alternatives were investigated as feasible alternatives:

g) Location Alternatives proposed and preferred option.

Mining is determined by the present and availability of minerals. Minerals can only be mined where they exist. The location of the open pit mining areas was informed by the presence of economically mineable resources to which West Wits would have access. Extensive prospecting has indicated the presence of gold bearing reef on these properties. Therefore, the specific locations and extent of the mining activity is relatively set. The layout of the open pit operation has been designed to optimise the extraction of mineral resources. The topsoil and waste rock dumps have been positioned to create a safety, visual and/or noise berm between the mining operations and nearby receptors. Haul roads will be constructed, no other surface infrastructure is planned for the area.

The proposed property is in an area dominated by current and historical mining activities. The site is infested with alien vegetation, extensive illegal dumping of waste has taken place and illegal mining that is causing destabilisation of the area.

Minerals can only be mined where identified and economic viable, therefore it was not practical to select any other sites. No location alternatives was considered however a number of layout alternative and technology alternative were considered.

<u>Location Alternatives based on Residential development:</u>

The Environmental Impact Assessment is underway for the Living Africa – Spitz land Residential development. The proposed Spitz land mixed use housing development will be located on the Remaining Extent of Portion 14 of the Farm Roodepoort 237 IQ. A section of the proposed mining permit will be located on a portion of Portion 14 of the Farm Roodepoort 237 IQ. The southern section of the proposed residential development intersects the north eastern corner of the proposed mining area as presented in Figure 54.

The topsoil stockpile for the West Wits – Kimberley West mine section was re-designed to accommodate the proposed development. Due to the dire need for land for housing projects it was recommended that the placement of the topsoil stockpile is altered to minimise the impact on the proposed development.

The preferred alternative is to alter the placement of the topsoil stockpile not to intersect the proposed development.

h) The type of activity to be undertaken

The shallow or reserve that were identified during prospecting would be developed in the form of open pit mining, as the area cannot be accessed using underground mining methods. The open pit mining area will consist out of a single cut and mining operations will be undertaken using a conventional excavate, load and haul mining cycle. A number of activity alternatives were investigated as listed below:

Mining method alternatives:

Two mining methods were investigated, the first being drill and blasting and the second using modern technology (Xcentric rippers) for rock breaking. The use of modern rock breaking equipment was chosen as the preferred alternative over drill and blasting for the following beneficial reasons:

- Low ground vibration
- No air over-pressure shock waves
- No dangerous rock fly
- Low dust emissions
- No blasting fumes; and
- No leaching of chemical to receiving environment

The preferred alternative will be assessed in this report

Construction of Infrastructure

A number of layout alternatives were considered that included the placement of topsoil dumps, waste rock dumps and roads, the construction of infrastructure were also investigated. The preferred alternative regarding infrastructure is to utilise the existing infrastructure located at the Sol Plaatjies operation. No permanent infrastructure will be constructed on site.

Ore Processing and transporting alternatives

A number of alternative were investigated for the processing of ore. The construction of a process facility were investigated and found not to be feasible for this operation. The preferred alternative will be processing of ore at an establish facility off site. This will ensure optimisation of the current process facility and that no tailing storage facility will be constructed and operated in the area. This will have

a significant positive impact as no tailing storage facility will be constructed and operated as part of the mining operation and no treatment facility will be constructed. The use of an existing process facility will have a significant positive on resources as no additional resources (water, electricity, chemicals and disposal area) will be required for the project and the impact on air quality is limited to the mining operation.

No transport alternatives were investigated as a result of the distance to the facility, route alternative were investigated in the traffic impact assessment and the preferred route has been established. The ore will be transport by truck to the facility. West Wits has an existing toll agreement with Sibanye, alternative transport roots and toll treatment facilities are investigated by West Wits. For this application the alternatives are not assessed.

i) The design or layout of the activity

The design and layout of the mining activity is dependent on the mining plan. The mine planning is done in such a way to reduce the amount of material handling and to optimise the recovery of the resource. The topsoil and waste rock dumps have been positioned to create a safety, visual and/or noise berm between the mining operations and nearby receptors.

Various designs and layout for the mining operation has been considered and the final layout has been developed based on the availability of the gold reef as indicated by the prospecting conducted and a number of inputs from specialist studies, stakeholders and landowners. A number of alternatives for the placement of waste rock dumps, topsoil stockpiles and road network was investigated. The layout was finalised based on the following inputs:

- Availability of the resource;
- Sensitive areas;
- Specialist Studies ;
- Legislative requirements;
- Limiting material handling;
- Existing road network; and
- Comments from I&AP's and land owners;

The size and shape of the topsoil stockpile was altered as a result of input from stakeholders and landowners. The alteration decreased the area of the topsoil stockpile and increase the height of the stockpile. The stockpile will act as a visual barrier to opencast area. No infrastructure will be constructed on the site as existing infrastructure will be utilised. The layout has been finalised based on available information and therefore, no alternative layouts are assessed in this report.

j) The technology to be used in the activity

Two mining methods were chosen for investigation are proven mining methods within the industry and are currently being exploited at various mines around the country. Two mining methods were investigated, the first being drill and blasting and the second using modern technology (Xcentric rippers) for rock breaking. The use of modern rock breaking equipment was chosen as the preferred alternative over drill and blasting based on a vibration assessment undertaken. The preferred alternative will have a significant lower impact than drill and blasting and the following beneficial are associated with the preferred alternative:

- Low ground vibration
- No air over-pressure shock waves
- No dangerous rock fly
- Low dust emissions
- No blasting fumes; and
- No leaching of chemical to receiving environment

The modern rock breaking equipment (Xcentric Ripper) is the preferred alternative and no drill and blasting alterative will be assessed as an alternative. The method is less environmental, social intrusive and for this reason no alternatives to the will be assessed.

k) The operational aspects of the activity

No permanent services including water supply, electricity, or sewerage facilities are required. All infrastructure to be developed will be mobile and temporary including generators, portable toilets, crushers and water tanks. Alternatives for layout, site location, mining activities and transportation, processing of ore are discussed above.

l) The option of not implementing the activity

The "*no-go*" alternative refer to the option of not going ahead with the proposed project. This would mean that there would be no change to the current status of the site and the positive social-economic and other benefits of the proposed project would not be realised. The "no-go" alternative will result in the sterilisation of the resource by leaving the valuable resource in the ground. Implementation of the "no-go" alternative will lead to the following potential positive impact will not taking place.

- Direct economic benefits associated with wages, taxes and profits. Indirect economic benefits associated with the procurement of goods and services and the spending power of employees.
- The improvement of historical impacted land and newly impacted areas through rehabilitation and removal of rubble and rubbish illegally dumped.

- Freed up land for housing developments earmarked for the area, that aims to reduce the housing backlog experienced by the City of Johannesburg,
- Creating employment and extracting mineral resources for the benefit of the economy;
- Improving spatial integration by improve fragmentation, unlocking development potential in large areas; and
- The eradication of access to dangerous historic workings targeted by informal miners (Zama Zamas), which are mainly illegal immigrants that pose a threat to the health and safety of the communities and themselves while mining illegally.

According to Section 24 of the Constitution, a development must be ecologically sustainable and also support socio-economic development. The proposed mining activities has the potential to have a negative impact on the ecological environment as well as the social environment of the area. These impacts, however, can potentially be prevented, minimised, mitigated and managed to low and very low levels, as shown through the impact assessment.

iii) Details of the Public Participation Process Followed

(Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land)

A joint Public Participation Process is undertaken for the proposed mining permit. The process is undertaken to ensure compliance with regard to the requirements in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended] (MPRDA), the National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended] (NEMA), the National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) [as amended] (NEMWA), the National Water Act, 1998 (Act No. 36 of 1998) [as amended] (NWA) and Environmental Impact Assessment Regulations (2014) [as amended].

Details of the Public Participation process followed

A Public Participation Process is undertaken for the Environmental Authorisation for the mining permits. The process is undertaken to ensure compliance with the requirements in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [as amended] (MPRDA) and the Environmental Impact Assessment Regulations (2014) [as amended]. This section describes the public participation process (PPP) undertaken to date in line with Chapter 6 of the EIA

Regulations (2014) [as amended]. The intention of the PPP was to inform Interested and Affected Parties (I&APs), in sufficient detail, of the proposed project in order that I&APs may contribute meaningfully to the EIA process. SLR Consulting (South Africa) (SLR) has been appointed to play a support role in the Public Participation Process.

The PPP to date has included notification of I&APs through distribution of a Background Information Document (BID), placement of newspaper advertisements, placement of site notices, distribution of flyers, radio announcements, focussed engagement and meetings with community structures and public open meetings. A key aspect of public consultation is the notification of landowners, occupier and users within and adjacent to the application area. More detail in this regard to the process followed is provided below.

Interested and affected party (I&AP) database

As part of the PPP an I&AP database has been developed for the project. I&APs identified for the project include:

- landowners, lawful occupiers and ward councillors within and adjacent to the mining permit application area
- ratepayer organisations, community leaders and community structures
- non-government organisations and associations working in the area
- mines, industry and businesses in the area
- parastatals
- commenting authorities:
    - Gauteng Department of Agriculture and Rural Development (GDARD)
    - Department of Water and Sanitation (DWS)
    - Department of Agriculture, Forestry and Fisheries (DAFF)
    - Department of Rural Development and Land Reform (DRDLR): Land Claims Commissioner
    - Department of Roads and Transport (DRT)
    - South Africa Heritage Resource Agency (SAHRA)
    - Provincial Heritage Resources Authority Gauteng (PHRAG)
    - Department of Economic Development
    - City of Johannesburg Health Department
    - City of Johannesburg Metropolitan Municipality
    - Roodepoort Magisterial District Municipality
    - Krugersdorp Magisterial District Municipality.

I&APs who attended meetings and /or submitted contact details have been registered on the I&AP database. The latest copy of the database is included in Appendix F-i. The database will be updated on an on-going basis throughout the process.

Comments for the two (2) Mining Permit Applications: (namely Kimberley West opencast pit and Creswell Park opencast pit)

- Elemental-S is the lead EAP with SLR play a supporting role in the Public Participation Process
- The BARs have not yet been placed out for public review yet, as the independent specialists have not yet completed their assessments
- The review periods for Kimberley West will be from 21 June and 23 July 2018;
- The review period for the Creswell Park permit application is anticipated in July 2018 and August 2018.
- Please send all comments to projects@malanscholesconsulting.co.za and/or to 720.13087.00001@slrconsulting.com

Comments for the one (1) Mining Right Application:

- SLR is the lead EAP and is responsible for all Public Participation
- Please find the link to the Scoping Report for the West Wits Mining Project on SLR's website: https://slrconsulting.com/za/slr-documents/scoping-report-for-the-west-wits-mining-project
- A copy of the scoping report has been made available for a 30-day review and comment period, as from 17 May 2018 to 17 June 2018
- Please send all comments to mmedallie@slrconsulting.co.za and/or 720.13087.00001@slrconsulting.com

Registration of any I&AP's can take place by registering on the I&AP's database, by sending details of the I&AP to MSC and or SLR. Please feel welcome to contact us should you have further queries or would need additional clarification.

Advertisements and site notices

During the initiation of the PPP, advertisements were placed in the following newspapers:

- Daily Sun on Thursday 22 March 2018 (national newspaper);
- Roodepoort Record on Friday 23 March 2018 (local newspaper);
- Dobsonville Urban News on Friday 30 March 2018 (local newspaper).

A copy advertisements placed are included in Appendix F-ii.

Site notices (400) in a mixture of English, Afrikaans, Zulu and Sotho were placed in key conspicuous positions in and adjacent to the greater mining right application area and mining permit area (between 23 and 28 March 2018). Where requested by ward councillors additional notices were provided as A4 handouts to the councillors for distribution in their wards. A copy of the site notices are presented in Appendix F-iii with the location of the notices presented in Appendix F-iv.

Further Advertisements and site notices

In May, further advertisements were placed in the following newspapers:

- Roodepoort Record on Friday 4 May 2018;
- Roodepoort Record on Friday 11 May 2018;
- Daily Sun on Friday 18 May 2018;
- Roodepoort Record on Friday 18 May 2018; and
- Soweto Urban Dobsonville on Friday 18 May 2018.

A copy of the further newspaper advertisements are included in Appendix F-viii.

Further site notices (in English) were placed at key locations in and adjacent to the mining right application area and mining permit area and flyers containing the same information were handed out (between 11 and 17 May 2018). The following further site notice and flyers were distributed specifically for the Kimberley West mining permit.

- Tshepisong (Ward 128) 10x site notices and 200x flyers
- Leratong Village (Ward 127) 10x site notices and 200x flyers
- Bram Fischerville (Ward 49) 15x site notices and 300x flyers
- Witpoortjie (Ward 71) 10x site notices and 200x flyers

A copy of the site notices are presented in Appendix F-ix with the location of the notices presented in Appendix F-x. The flyers distributed are presented in Appendix F-xi.

Radio Announcements

Radio announcements were also made on Jozi FM on Friday 18 May 2018.

Background Information Document (BID)

A BID document was compiled for the proposed project. The purpose of the BID was to inform I&APs about the proposed project, the EIA process, environmental attributes, possible impacts and means

of providing input into the EIA process. The BID was made available in English and included details of the public scoping meetings. The BID was distributed by email, at the public scoping meetings and by hand (starting on 23 March 2018). Hand delivery of BID's were again undertake on 11 April and 12 April 2018. The BID is presented in Appendix F-v and the proof of distribution are included in Appendix F-vi.

Public meetings

- The purpose of holding the public scoping meetings was to:
- to provide an overview of the project and related EIA process
- to provide an overview of the social and labour plan (SLP);
- to provide I&APs with an opportunity to:
    - raise any issues and concerns (both positive or negative)
    - provide input on any environmental sensitivities and potential impacts
- to record issues within the formal assessment process so that they can be addressed during the course of the EIA
- to outline the way forward.

The date, venue and time of the public scoping meetings are provided in Table 12.

Table 12: Public Scoping meetings

Date	Venue	Time
Tuesday 3 April 2018	Solplaatjie Hall, Solplaatjie	11h00
	E-Hall, Matholesville	17h00
Wednesday 4 April 2018	NG Kerk, Witpoortjie	17h00
Thursday 5 April 2018	Multi-Purpose Centre, Bram Fischerville	17h00
Friday 6 April 2018	Moses Kotane Primary School, Bram Fischerville	17h00

The meetings were held in English due to the diversity of languages present at the meetings. However, attendees were informed that they could ask questions in any language with which they were comfortable. Copies of the BID were made available to attendees at the meetings. Maps indicating the local setting of the project were displayed on the walls at the meetings. Minutes of the meetings are included in Appendix F-vii.

Additional scoping meetings were held as presented below. Queries concerning the mining permits were also addressed at these meetings. The minutes of these meetings will be included in the final basic assessment report.

Table 13: Additional Public Meetings

Date	Venue	Time
Thursday 31 May 2018	Roodepoort City Hall, Roodepoort	18h00
Monday 4 June 2018	Tshepisong Multi-Purpose Centre	16h00

Focused meetings with community structures

A number of focused group meetings took place with individuals from municipal and community structures.

- Georginia South Residents Forum
- Maxam Dantex
- Rand Leases
- Harmony Gold; and
- Other land owners

Review of the Draft Basic Assessment

I&AP review of Draft Basic Assessment Report

The Draft BAR and EMPR are herewith released for a period of 30 days from 21 June 2018 to 23 July 2018. Hard copies of the Draft BAR and EMPR are herewith submitted to all organs of state and relevant authorities. In addition copies are placed at the following locations as presented below:

Table 14: Draft BAR for Public Review

Name and Location	**Physical Address**
Roodepoort Civic Centre	100 Christiaan de Wet Road, Florida Park, Roodepoort
Witpoortjie Library	22 Payne Street, Witpoortjie, Roodepoort
Solplaatjie Hall	1960 Motlaka Street, Solplaatjie

An executive summary of the Draft Basic Assessment has been made available to I&APs:

- via email and post to registered I&APs on the I&AP database;
- via email to municipal structure; and
- hard copies were provided to ward councillors for distribution in their respective wards.

In addition, registered I&APs have been notified of the availability of the Draft Basic Assessment for review via SMS and E-mail notifications. Electronic copies of the Draft Basic Assessment will be made available on request. Where meetings take place during the review period, hard copies of the executive summary will be provided.

Next Phase - Way forward

All comments received from I&APs and organs of state and responses sent will be included in the final BAR and EMPR to be submitted to the Competent Authority (CA).

DMR review of scoping report

On completion of the 30-day review period, a Final BAR will be compiled which will include comments received during the I&AP review period. The report will be submitted to the DMR for its review via the online SAMRAD system.

Summary of Issues raised

A high level summary of the issues/concerns raised during the public meetings (see Table 12 and Table 13) are presented below.

- Illegal mining
    - Safety concern
    - How will illegal mining be stopped by the legal mining
- Health issues
    - Air Pollution from dumps/ stockpiles
    - Air pollution from mining – dust
    - Noise impact
    - Radiation concerns
    - Water Quality – pollution of resource
- Jobs creation
    - Benefit to the community, Skills development
- Safety concern with mining
    - Open pits
    - Sink holes (not applicable to the area)
- Damage to Houses – Cracks
- Sasol /Transnet pipelines (not applicable to the area)
- Relocation of communities
- Rehabilitation of pits - Loss of biodiversity

- Traffic impacts
    - Capacity of roads
- Procurement requirements of West Wits
- Logistics (transportation, electrical, plumbing and building infastructures)
- Empolyement and the number of employees (Empowerment).

- **Summary of issues raised by I&APs**

(Complete the table summarising comments and issues raised, and reaction to those responses)

PLEASE SEE APPENDIX F – Public Participation. A summary will be included after the 30 day public review period.

Table 15: Summary of issues raised

Interested and Affected Parties **List the names of persons consulted in this column and mark with an X where those who must be consulted were in fact consulted.**		**Date Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Consultation Status (consensus dispute, not finalised, etc)**
<u>AFFECTED PARTIES</u>					
Landowner/s					
Lawful occupier/s of the land					
Landowners or lawful occupiers on adjacent properties					
			.		
Municipal councillor					
Local Municipality – City of Johannesburg					
District Municipality – Roodepoort					
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS etc.					

Interested and Affected Parties List the names of persons consulted in this column and mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc)
Communities					
			.		
Dept. Land Affairs					
Traditional Leaders					
.			.		
Dept. Environmental Affairs					
Other Competent Authorities affected					
<u>OTHER AFFECTED PARTIES</u>					
<u>INTERESTED PARTIES</u>					

9. The Environmental attributes associated with the alternatives

(The environmental attributes described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

Baseline Environment

South Africa's gold mining industry had commenced in the 1880s and played a strong role in creating some of the country's most important historical milestones, while shaping certain sectors of South African society. Mining in the Central Basin of the Witwatersrand Goldfields started 132 years ago after the discovery of gold in 1886. The Central Basin stretches approximately 47 km from Roodepoort in the west to Germiston in the east. The basin straddles the North West, Gauteng and the Free State Provinces and is of the same period as the Vredefort impact of 2.023 Ga ago, and the Bushveld Igneous Complex. The Witwatersrand Basin holds the world's largest known gold reserves with nearly half of all the gold ever mined has come from the extensive Witwatersrand Basin, The basin have produced over 1.5 billion ounces. The gold occurs in reefs, or thin bands, that are mined at depths of down to 4,000 metres (m). The Wits Basin gold occurs almost exclusively within quartz pebble conglomerates. Although many of the older mines are now exhausted, the Witwatersrand Basin still produces most of South Africa's gold and much of the total world output.

The study area (Kimberley West) is located within the City of Johannesburg Municipality and Roodepoort Magisterial district. The Wes Wits project area is located approximately 15 kilometres (km) west of Johannesburg, approximately 10km North West from Krugersdorp, 12km west from Randfontein, 7km South from Soweto and 4km North East from Roodepoort. A residential area of low-cost housing is located immediately south of the proposed opencast footprint area, approximately 120m of the proposed waste rock dump boundary. The entire footprint area is also covered by extensive dumping of building rubble and general waste (**Figure 3** to **Figure 6**).

According to the regional land claims commissioner (Gauteng) no land claims has been lodged against Portion 1 of the Farm Witpoortjie 245 IQ, Remainder of Portion 14 of the Farm Roodepoort 237 or Remainder of Portion 1 of the Farm Vlakfontein 238 IQ. However a claim has been lodged in terms of the Restitution of Land Rights Amendment Act, 2014 (Act no 15 of 2014) for Portion 92 of the Farm Vlakfontein 238 IQ. The mining right will not be affected by the land claim as only a section of the waste rock dump will be located on this portion.

Figure 3: Pit area - General view of grass, trees and dumping

Figure 4: Pit area - View of extensive dumping of rubble and general waste

Figure 5: Pit area - View of the linear excavation from old diggings

Figure 6: Pit area - View showing old soil dumps

Opencast mining of gold, uranium and silver by West Wits is taking place in the existing Sol Plaaitjie operation site. Operation of the proposed site will be undertaken from the existing infrastructure and no additional infrastructure is therefore required for the opencast mining area. The current surrounding land uses in the region includes mining, historical mine residue deposits and residential communities.

The project is located in the Upper Vaal Water Management Area (WMA 08), within quaternary catchment C22A which has a gross total catchment area of 548 km^2. The Klip River drains the catchment in a southerly direction and flows along the western boundary of the proposed mining area. Various tributaries of the Fleurhof Dam (located in the east of the project area) are located within the area. Surface water flow on the proposed mining areas drains in a North West and west direction towards the Klip River.

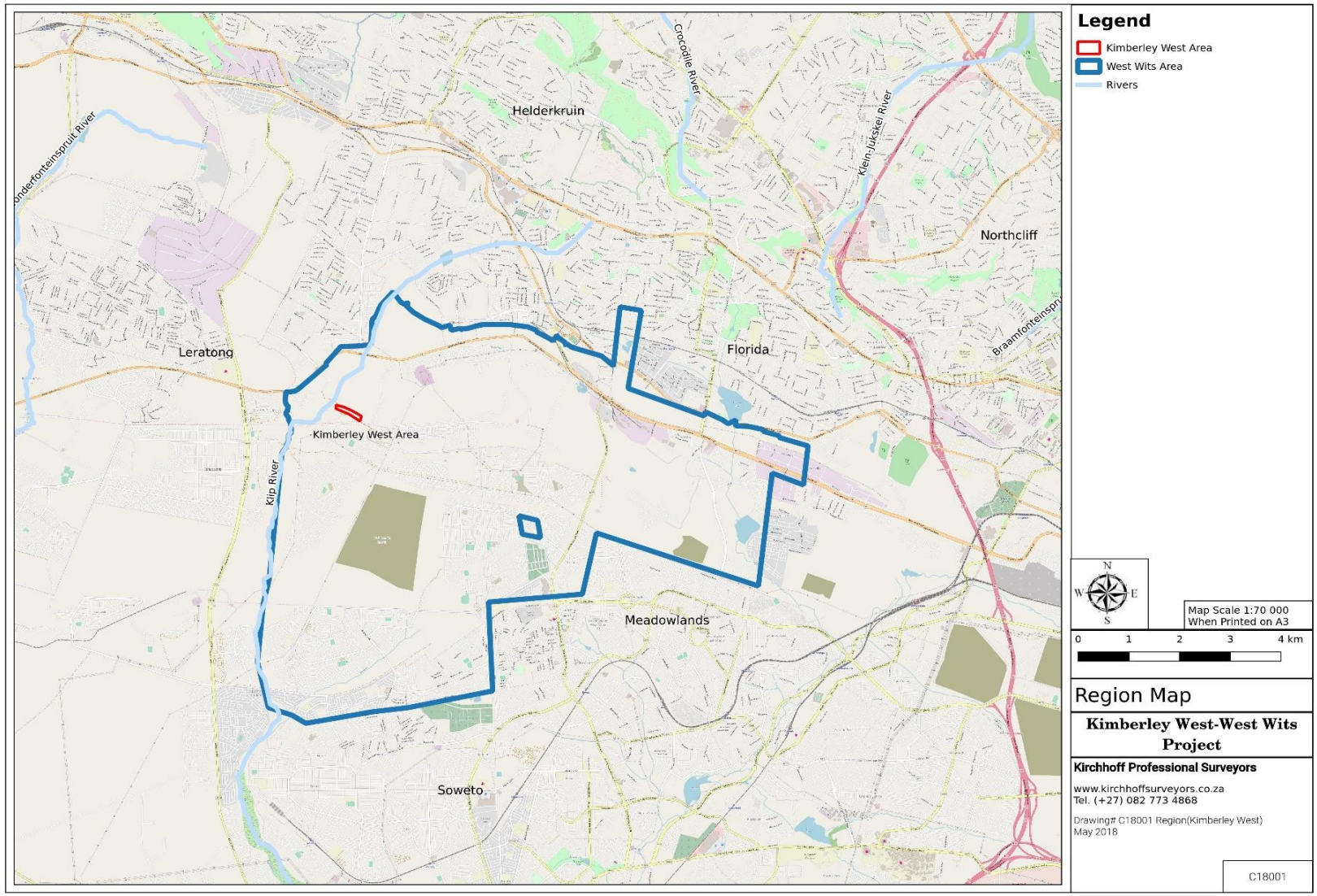


Figure 7: Regional Locality Map of the Study Area

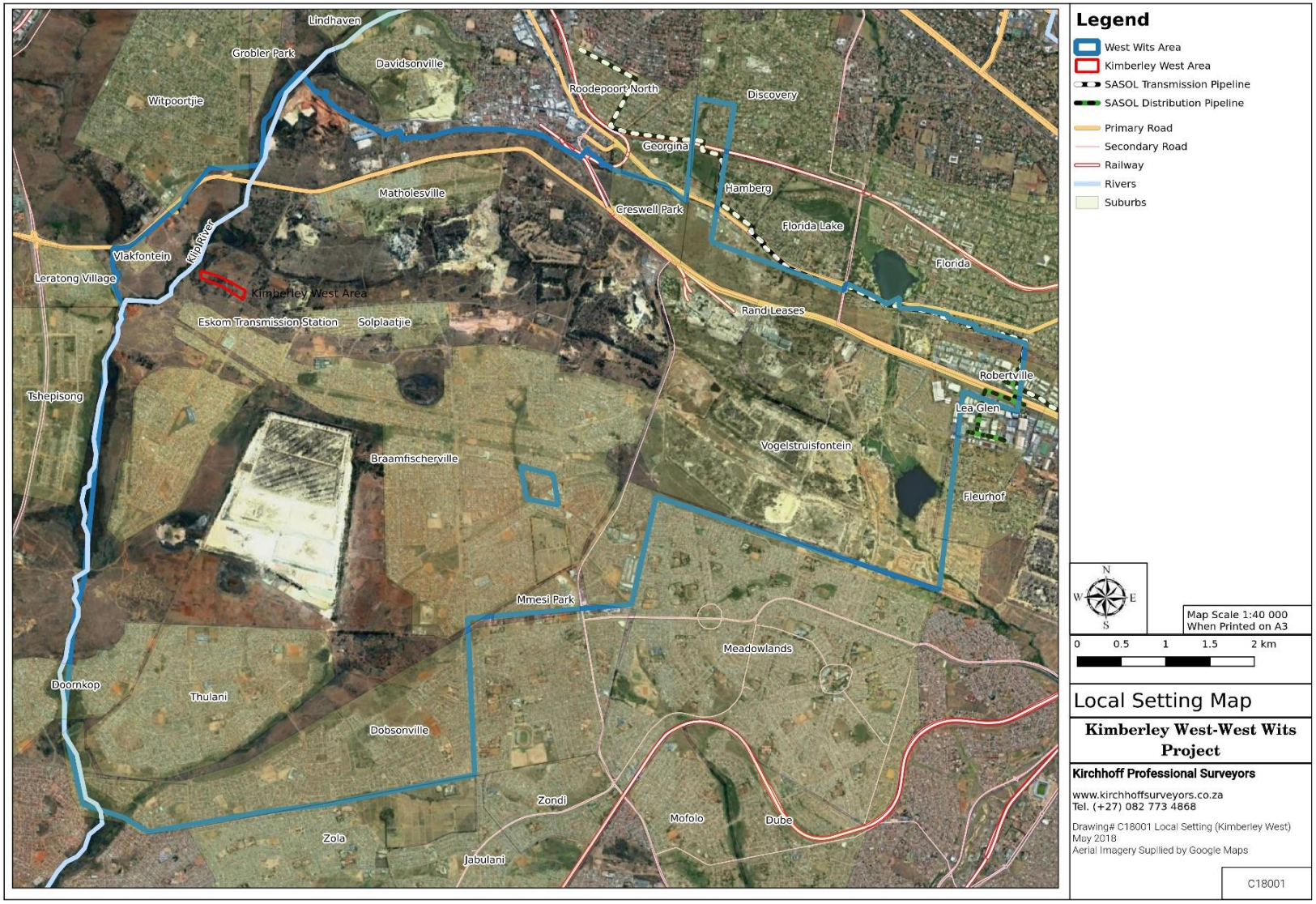


Figure 8: Locality Map of the Study Area

(a) Type of environment affected by the proposed activity.

(Its current geographical, physical, biological, socio- economic, and cultural character)

Climate

Regional Climate

The study area is characterised by a Highveld climate, with summer rainfall in the form of high intensity thunderstorms. The summer months (September to April) are characterised by hot days, summer thunderstorm activity and cool evenings. Winter (May to August) days are dry and nights are cold. Rain hardly falls in winter and the temperature occasionally drops to below zero at night, causing frost.

Ambient Temperature

Monthly mean, maximum and minimum temperatures are given in **Table 16**. Diurnal temperature variability is presented in **Figure 9**. Temperatures ranged between 2.7°C and 32.9°C. During the day, temperatures increase to reach maximum at about 15:00 in the late afternoon. Ambient air temperature decreases to reach a minimum at between 06:00 and 07:00.

Table 16: Monthly temperature summary (WRF data, January 2015 to December 2017)

Monthly Minimum, Maximum and Average Temperatures (°C)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	13.7	14.1	12.3	9.7	6.5	5.3	2.7	5.8	7.0	7.7	9.1	10.9
Average	21.7	22.0	21.1	18.4	15.2	12.7	12.1	14.5	16.9	18.9	20.5	22.1
Maximum	31.1	32.5	30.8	29.1	25.3	23.1	22.8	26.7	27.8	31.1	31.9	32.9

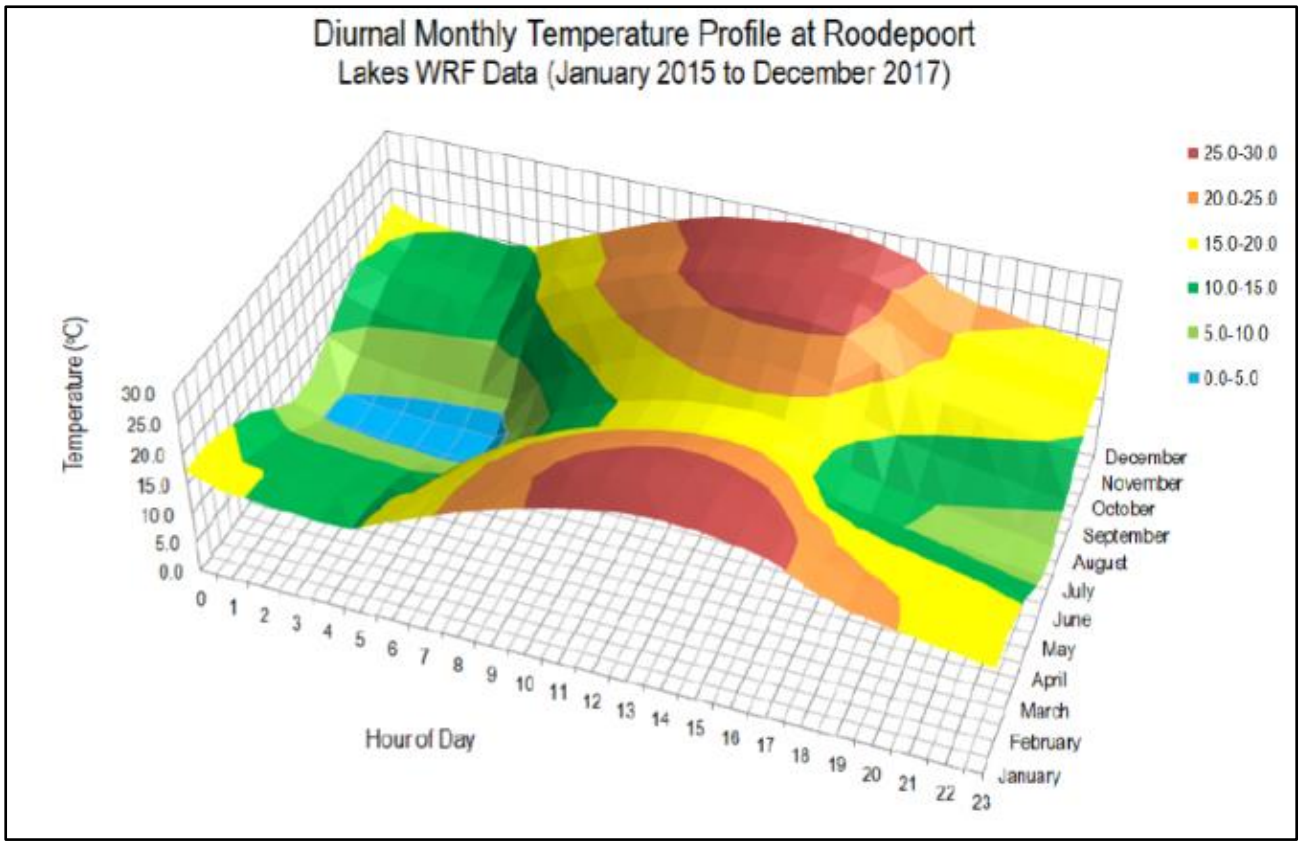


Figure 9: Diurnal temperature profile (WRF data, January 2015 to December 2017)

Local Wind Fields

The period wind field and diurnal variability in the wind field are shown in **Figure 10**, while the seasonal variations are shown in **Figure 11**. The wind regime for the area is dominated by north-north-easterly flow fields. The northerly wind flow is more dominant during day-time conditions, with north-north-easterly wind flow more dominant during the night. Calm conditions occurred 2 % of the period summarised.

During the summer and spring months, wind from the north sector dominates, with stronger winds of more than 6 m/s occurring. Infrequent winds occur from the southern sector. During autumn, the winds increase in frequency from the southern sector. Winter months reflect an increase in flow from the south.

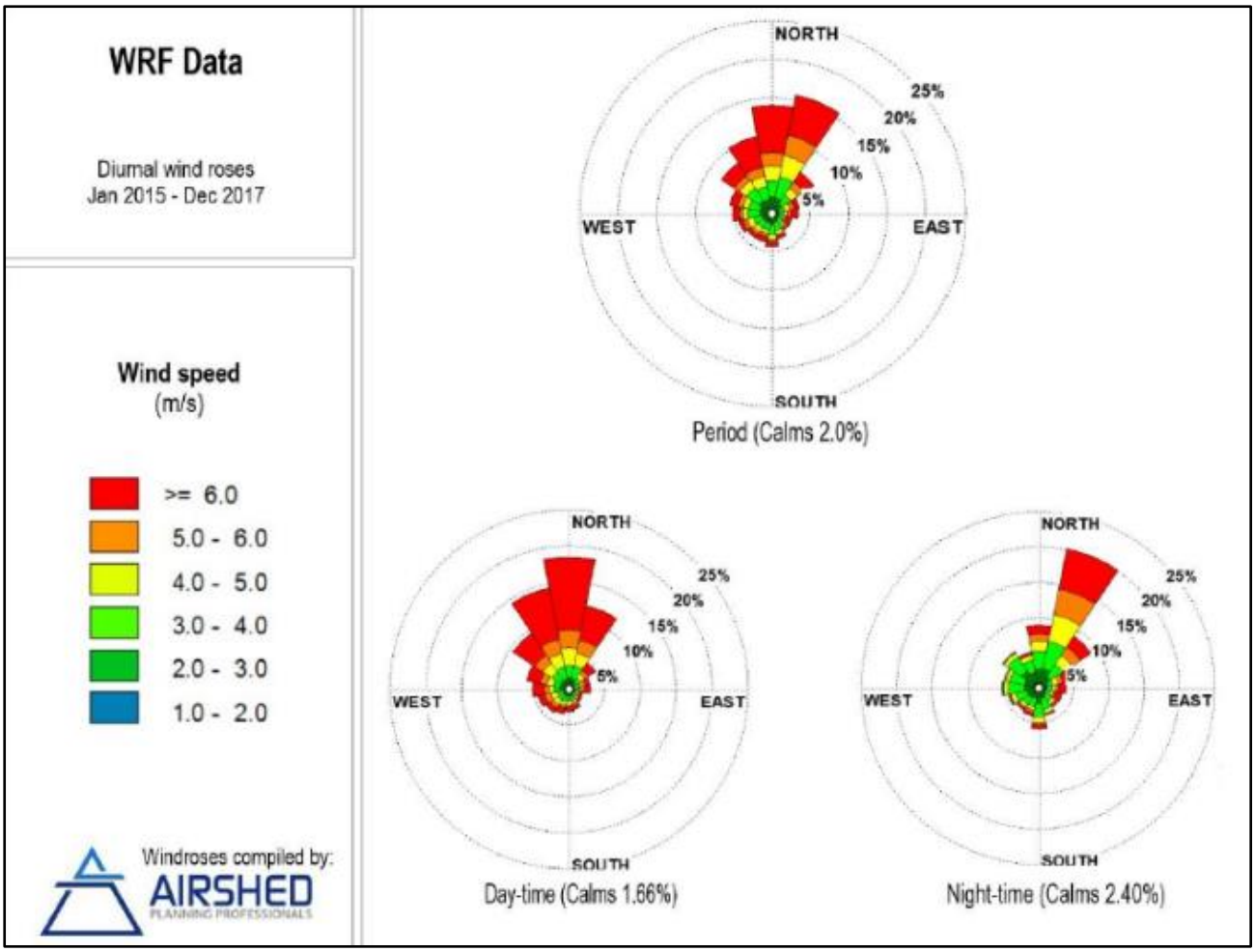


Figure 10: Period, day and night-time wind roses (WRF data, January 2015 to December 2017)

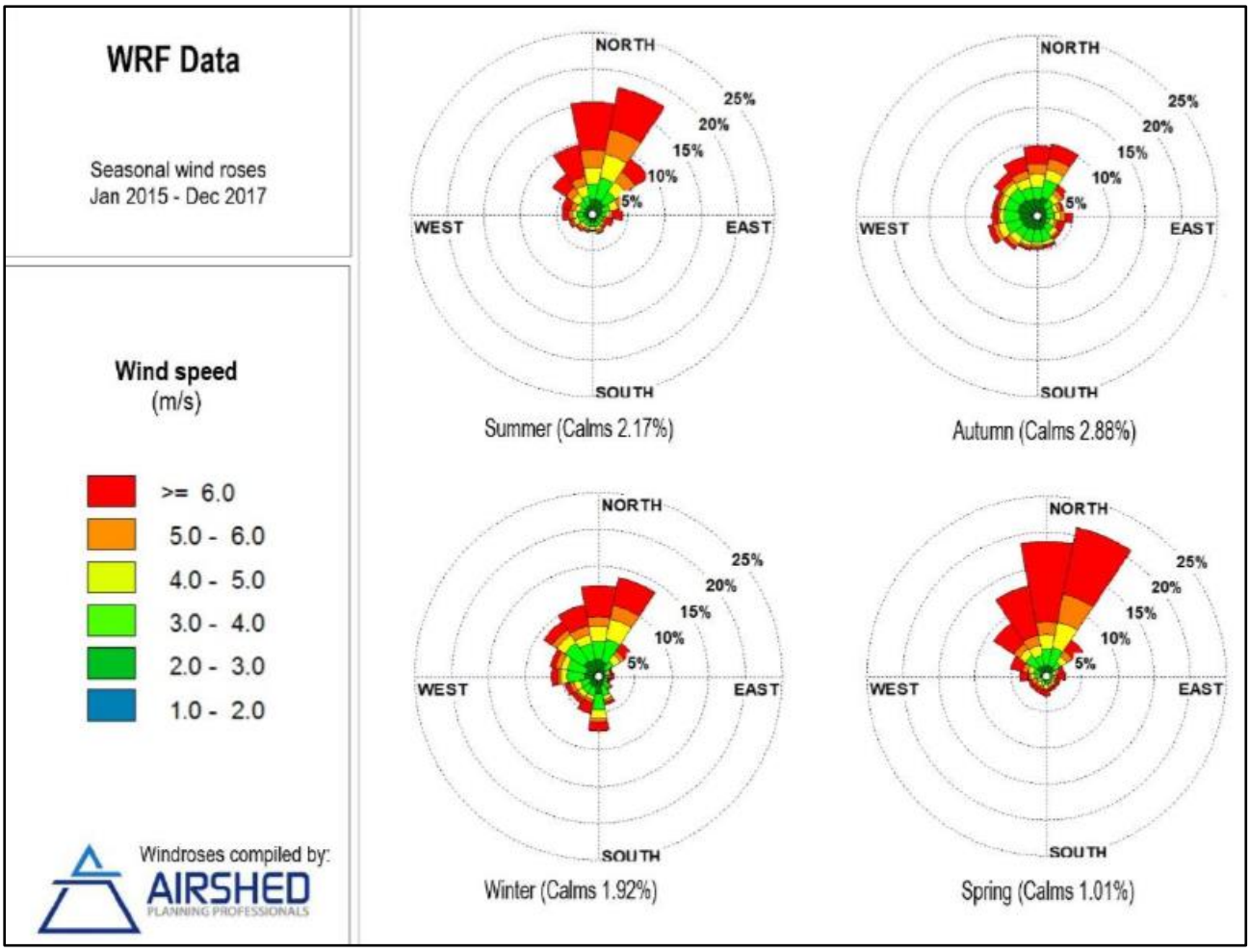


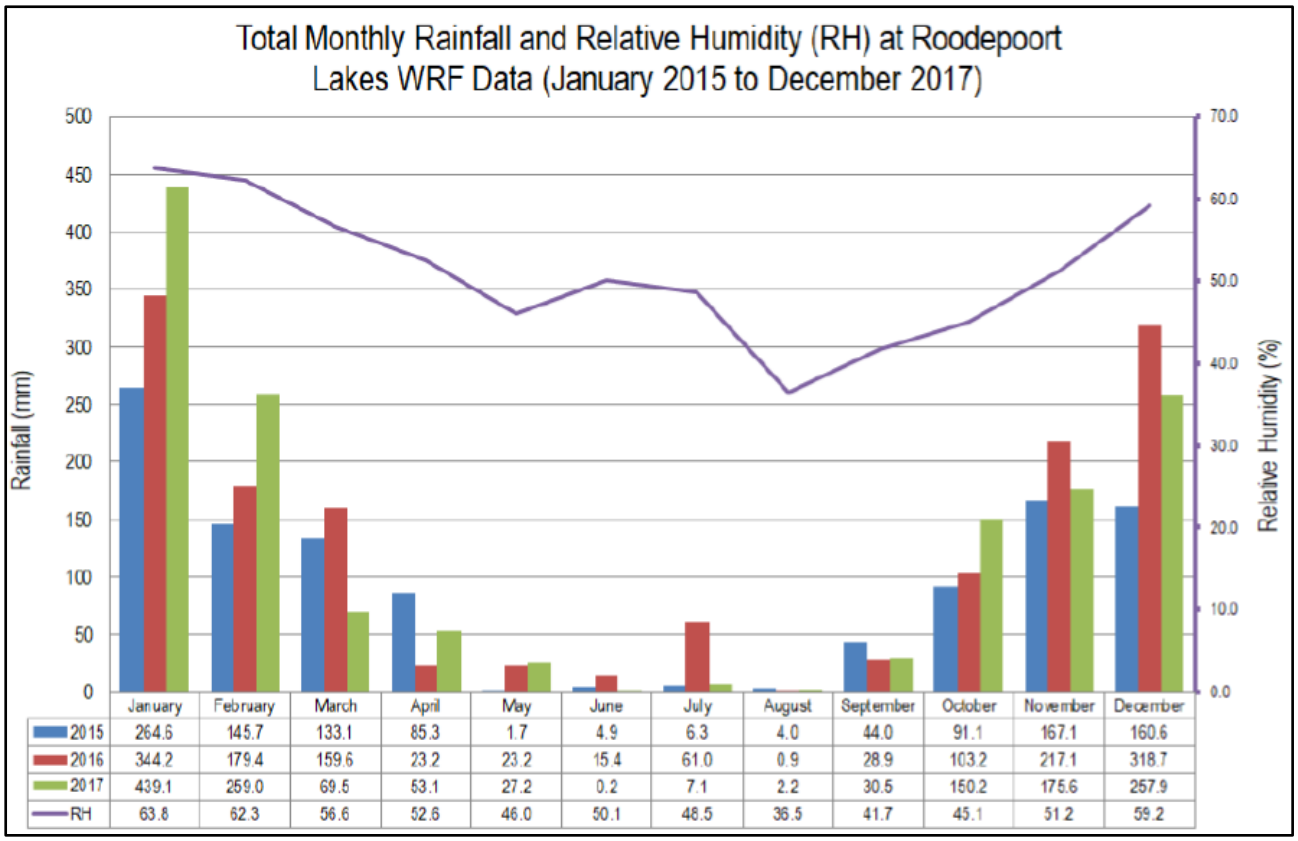
Figure 11: Seasonal wind roses (WRF data, January 2015 to December 2017)

Precipitation

Precipitation represents an effective removal mechanism of atmospheric pollutants. Precipitation reduces wind erosion potential by increasing the moisture content of materials. Rain-days are defined as days experiencing 0.1 mm or more rainfall. The rainfall provided by the WRF data set for the period 2015 to 2017 ranged between 1108 and 1474 mm per year.

Evaporation

The mean annual evaporation for the area is averaged at 1,650 mm.



	January	February	March	April	May	June	July	August	September	October	November	December
2015	264.6	145.7	133.1	85.3	1.7	4.9	6.3	4.0	44.0	91.1	167.1	160.6
2016	344.2	179.4	159.6	23.2	23.2	15.4	61.0	0.9	28.9	103.2	217.1	318.7
2017	439.1	259.0	69.5	53.1	27.2	0.2	7.1	2.2	30.5	150.2	175.6	257.9
RH	63.8	62.3	56.6	52.6	46.0	50.1	48.5	36.5	41.7	45.1	51.2	59.2

Figure 12: Monthly rainfall as obtained from the WRF data for the area (2015-2017)

Geology

Regional Geology

The mining targets are the auriferous conglomerates of the Central Rand Group, Witwatersrand Supergroup. These are the North Reef, Main Reef, Main Reef Leader, South Reef, Livingstone Reef, Bird Reef, Monarch Reefs, Kimberley Reefs, and Ventersdorp Contact Reef. The latter is situated at the base of the Ventersdorp Supergroup within the Venterspost Conglomerate Formation. The Central Rand Group is subdivided into the older Johannesburg (containing the Main, Randfontein, Luipaardsvlei, Krugersdorp, and Booysens formations) and the younger Turffontein (containing the Kimberley, Elsburg and Mondeor formations) subgroups.

The reginal geology is of the site and surrounding area is illustrated in **Figure 13**. To the north of the proposed mining area approximately follows the outcrop of the Johannesburg Subgroup, Central Rand Group. This package is overlain towards the south by strata of the Turffontein Subgroup. To the southwestern of the proposed mining area are volcanic rocks of the Ventersdorp Supergroup outcropping. A circular outcrop comprised of Transvaal Supergroup sedimentary rocks is found in to the south of the proposed mining area. These rocks predominantly consist of dolomite, with the Black Reef present at its base. Chert-rich dolomite have good groundwater potential, i.e. the Monte Christo

and Eccles Formations. Constant re-circulation of groundwater is also causing enlargement of fractures and cavities, thus enhancing groundwater potential.

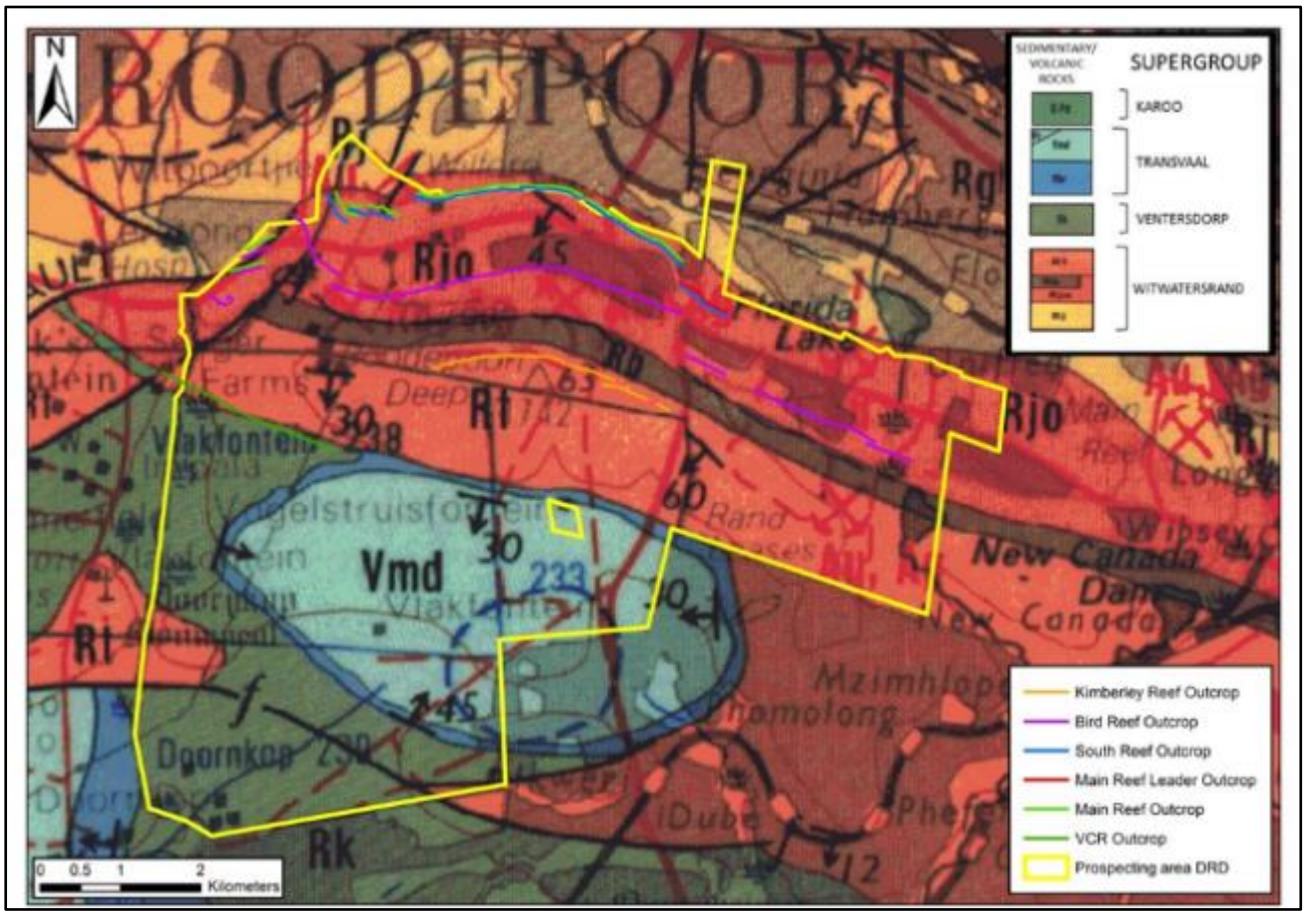


Figure 13: Regional Geology

The Wits Basin gold occurs almost exclusively within quartz pebble conglomerates. While the origins of the sedimentary layers of the Wits Basin are generally agreed upon, there remains much contention as to how the gold itself got there.

Dotted outside the basin are older Archaean granites of between 3 and 3.2 Ga, some of which are exposed while the much younger Karoo System cover others. The Witwatersrand System is a sequence of shale, quartzite and conglomerates ranging in age from 2.7 Ga for the Hospital Hill subgroup to 2.4 Ga for the Turffontein subgroup (Figure 14). The Lower Witwatersrand is composed mainly of argillaceous clays and shale with occasional banded ironstone, a tillite and an intercalated lava flow, while the Upper Witwatersrand consists almost entirely of quartzite and conglomerate, with its own volcanic horizon.

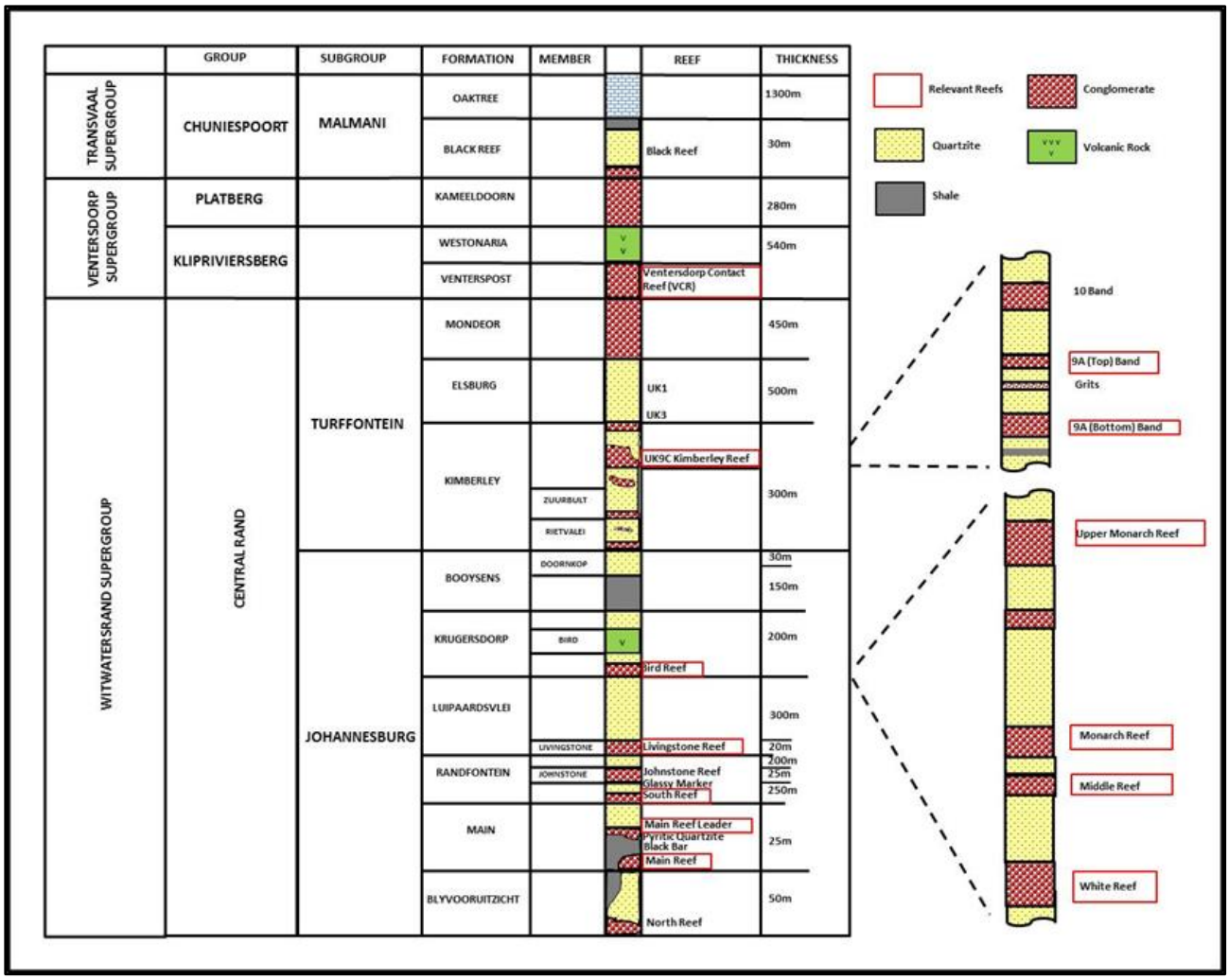


Figure 14 Stratigraphic column of the Central Rand Group in the Central Rand Goldfield

The dolomite within the regional geology and within the greater prospecting area of West Wits proposed area belongs to the Malmani Subgroup of the Transvaal Sequence. They comprise of four Formations, with the subdivision being based on chert content and presence/absence and type of algal structures. From a groundwater perspective, the chert content is the most important, with the chert-rich formations forming the main aquifers.

A characteristic of the area is a series of cross-cutting lineaments representing faults and dykes. The dykes are not 100% impermeable, but are at least several orders of magnitude less permeable than the dolomite. They therefore divide the dolomite into a series of characteristic compartments. Of relevance to the proposed mining area are the Zuurbekom and Upper Klip River dolomitic compartments. The Klip River dyke bisects the proposed mining area. It runs from the centre of Roodepoort, across the circular dolomitic deposit and down to the centre of Lenasia. The dolomite to the east of the dyke is known as the Upper Klip River Compartment and to the west as the Zuurbekom Compartment.

The dolomite owes its permeability mainly to secondary fissures such as faults, joints and bedding planes which have provided easy access to circulating groundwater, thus promoting deep weathering of the dolomite, largely by carbonate solution or karstification. The residues of this weathering are mainly brown clays and wad with chert rubble and boulders. The depth of weathering/superficial deposits varies up to approximately 150 m, but is very unpredictable and pinnacles of fresh dolomite are commonplace adjacent to deeply weathered zones. One of the most important controls on zones of deep weathering is tensional fractures.

These dykes are of diabase or composite syenite-diabase and are associated with the Pilansberg Dykes (Day, 1980). These N-S dykes occupy major tensional features. They form barriers to groundwater flow of varying effectiveness. A third structural feature controlling groundwater occurrence are axes of local folding. Flexure of the formations caused a network of fissures which radiate upwards from the axes of these distortions. Such localised folding is mainly detected from detailed exploration borehole records where the boreholes penetrate through the rock.

Regional Soils

Typical soils associated with regional geology and the area include Hutton, Bainsvlei, Avalon and Longsland soil types. Soils are red, yellow or greyish in colour with shallow horizons. These soil types are associated with a moderate arable land potential and a moderate to low grazing potential. The soils and land capability within the proposed project area have been influenced by residential activities, historical mining, historical residue mine dumps, illegal mining and dumping of waste.

Topography

The greater West Wits area is dominated by rolling plains with interspersed hills, with a dominant hill crest in the north where previous mining activities have impacted on the outcrop. The average height above sea level for the area ranges from 1 650 – 1 850 m. Historical mining activities have altered the natural topography of the area. The Kimberley West opencast footprint area consists of relatively flat terrain covered with secondary grassland with an average elevation is 1690 mamsl. The natural high point (1700 mamsl) of site is located on south eastern boundary with the slope dipping towards the North West and north. The lowest point (1680 mamsl) of the site is located on the north western boundary.

Surface Hydrology

The proposed mining area is in the Upper Vaal Water Management Area (WMA 08), in quaternary catchment C22A. The Klip River drains the catchment in a southerly direction and flows along the western boundary of the proposed mining area. The Klip River Forum is constituted in terms of the

National Water Act, 1998 (Act 36 of 1998) and is a non-profit organisation consisting of stakeholders actively participating in sustainable water resource management of the Klip River Catchment and its associated tributaries. Under this Klip River Forum, there are in-stream water quality objectives (WQO) which have been set up to assist with water resources management.

The C22A quaternary catchment's climate and runoff parameters for have been extracted from the Water Research Commission (WRC) water resources studies and presented in Table 17 (WRC, 2005).

Table 17 Precipitation and Evaporation of the C22A Quaternary Catchment

Quaternary Catchment	Total Area (km^2)	MAP (mm)	MAE (mm)	Rainfall Zone	Evaporation Zone
C22A	548	695	1,650	C2B	11 A

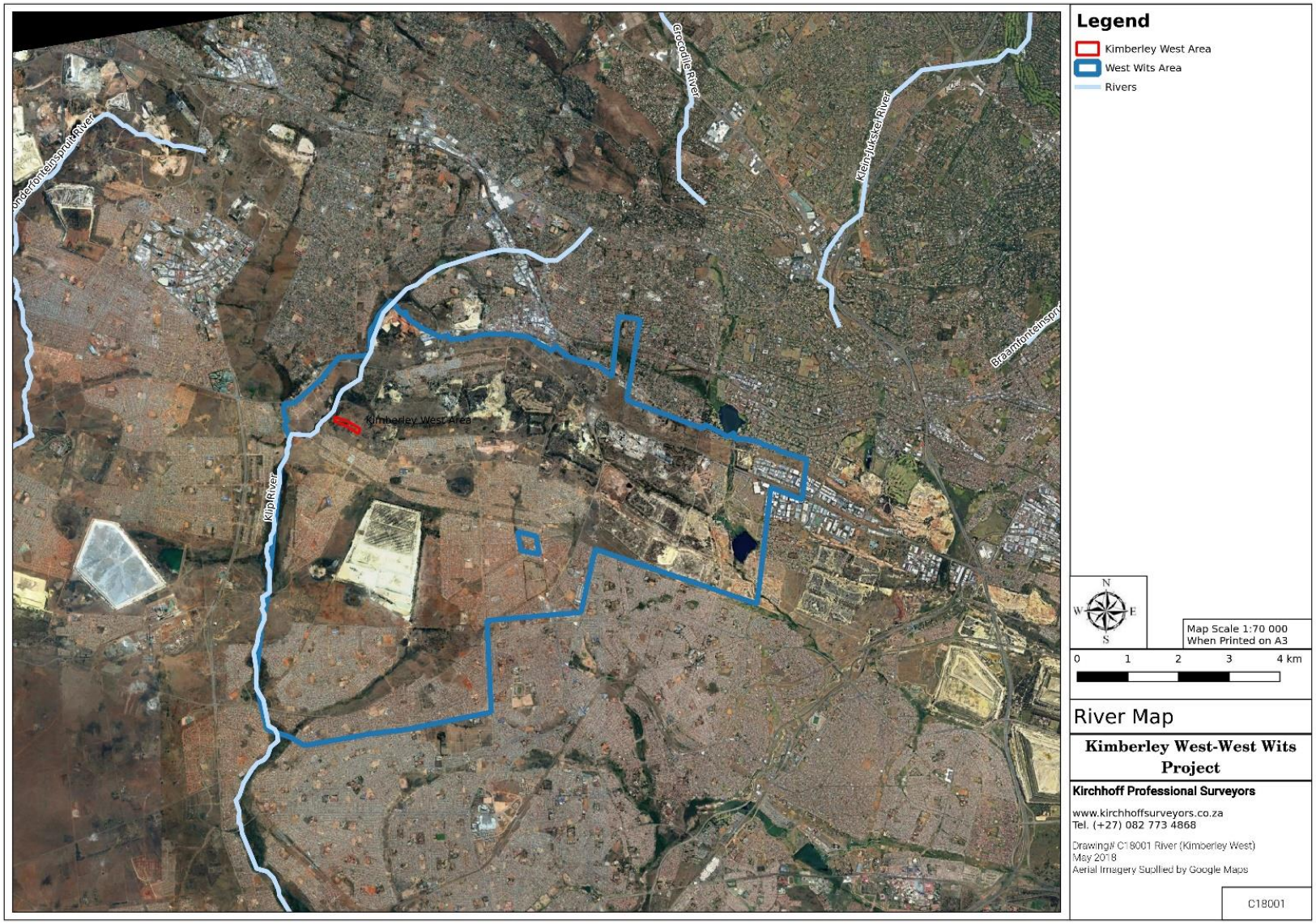


Figure 15: Drainage basins from hydrologic modelling

Hydrogeology Assessment

The information in this section has been obtained from the Groundwater Report (Noa Agencies (Pty) Ltd, May 2018). For full report please refer to Appendix G-i.

Regional Groundwater

Groundwater occurrence in the Witwatersrand and Ventersdorp rocks or the quartzite are generally associated with zones of deep weathering, or faulting and jointing. The depth of weathering is not known due to a lack of information. Groundwater is often encountered in both the saturated weathered material below the regional groundwater rest level and in the transition zone between weathered and fresh formations.

The local weathered aquifers generally support moderate yielding boreholes (less than 1 L/s). Most fault and joint zones in the deeper fractured aquifers are steeply dipping structures that tend to narrow and even pinch out at depth, with a corresponding decrease in permeability. The porosity is usually less than 1% while the fresh rock may be regarded as impermeable.

The groundwater table on site is located approximately 25 to 30 meters below ground level (mbgl). Groundwater movement often mimics the topography and generally flows towards the south; the Roodepoort residential areas are thus located upstream from the proposed mining areas and the Bram Fischerville, Soweto residential areas and the dolomites downstream.

The dolomitic zone is characterised by highly fractured chert layers. The dissolution of calcite along fractures, together with folding and faulting, resulted in well-developed aquifers in the dolomite, with a high transmissivity and large storativity.

Dolomite has a reputation for its excellent water bearing properties. The development of secondary porosity within the dolomite is largely responsible for the permeability that it possesses. Circulating groundwater has further developed fractures and solution features of structural origin by carbonate solution. Large scale leaching and karstification of dolomite can result in very substantial storage of groundwater. The closest dolomite monitoring point is, located approximately 7.5 km southwest from the mining area.

Hydrocensus

A hydrocensus was conducted across the Project area during March 2018. The survey included the proposed mining footprint areas and adjacent properties and concentrated on identifying existing boreholes to enhance the knowledge of the groundwater systems and current groundwater use.

During the 2018 hydrocensus 13 boreholes were identified. Another 123 properties were assessed, but the land owners indicated no boreholes, most sites receive their water from municipal supply. Groundwater level measurements were possible from four boreholes. The 13 sites included:

- Three boreholes which are in use;
- One borehole where the equipment broke in 2000 and has not been used since;
- One open / capped borehole;
- One monitoring borehole;
- One borehole where the owner did not want to share the borehole information; and
- Six boreholes where access was not granted and information is thus unknown.

Groundwater levels

The groundwater level varied from 4.4 mbgl at borehole WITBH 6, to a maximum depth of 36.2 m bgl at borehole WITBH 1. The locations of the boreholes are presented in **Figure 16**. The hydrocensus data plus the information collected from the DWS's NGA indicate groundwater levels between 4.5 m and 12 m in the upgradient Roodepoort residential areas. Groundwater in the Klip River area can be divided into numerous small compartments based on groundwater levels. These compartments appear to be in connection with the Klip River. Gradients vary from approximately 0.1% to approximately 0.2% (DWS, 2006).

Groundwater level data was sourced for 18 monitoring sites – 4 boreholes are in the Upper Klip River compartment and 14 boreholes in the Zuurbekom compartment. In terms of the proposed mining project the Zuurbekom compartment would have reference. The closest dolomite monitoring point is C2N0023, located approximately 7.5 km southwest from the big TSF located in Bram Fischerville and approximately 2 km east of the Cooke Plant. These dolomite monitoring stations are far from the proposed development and should not be impacted by any of the proposed mining activities.

Groundwater Quality

Groundwater samples were collected from six boreholes and four streams during the 2018 hydrocensus survey. Water quality was compared against the SANS 241:2015 Drinking Water Standards as well as the Klip River WQO (For results refer to Appendix G-i– Groundwater Report).

Based on the water quality results the following conclusions were drawn:

- Groundwater sampled from 5 of the 6 boreholes are not suitable for human consumption. It was only WITBH 5 that presented element concentrations below the chronic / acute health

limits. Manganese was slightly elevated in borehole WITBH 5, but the concentration (0.12 mg/L) is only of aesthetic concern.

- Borehole WITBH 1 – this borehole is not currently in use. It was recently drilled for use at the Blueprint facility. The water quality does indicate high concentrations of sulphate, lead, manganese, nickel and dissolved uranium. These elements are present in concentrations exceeding the chronic / acute health limits. The pH was very low (3.4), with aluminium, calcium and ammonia also present in elevated concentrations.
- Borehole WITBH 2 – this borehole is used at the Golf Club as water supply to the toilets. The water quality does indicate high concentrations of sulphate, nickel and dissolved uranium. These elements are present in concentrations exceeding the chronic / acute health limits. The pH was near neutral (6.6) and calcium, magnesium, manganese and zinc were present in elevated concentrations. Poor water quality at boreholes WITBH 1 and WITBH 2 potentially reflects historical and current mining and industrial impacts.
- Borehole WITBH 3 – this borehole is currently the only source of water to this private property. The water quality does indicate very high concentrations of E. coli. The bacteria concentrations exceed the acute health limits. The rest of the elements were recorded in concentrations below the drinking water limits. The cause is unknown and could relate to the nearby stream and wetlands or septic tanks and sewage present in the local aquifers.
- Borehole WITBH 4 – the use of this borehole is currently not known as the owner of this private property did not want to share the information. The water quality does indicate very high concentrations of E. coli and nitrate. The bacteria concentrations exceed the acute health limits. The rest of the elements were recorded in concentrations below the drinking water limits. The borehole is located close to a local cemetery.
- Borehole WITBH 6 – this borehole is used for garden irrigation in the Hamburg residential area. The water quality does indicate high concentrations of dissolved uranium. The uranium is present in concentrations exceeding the chronic health limits. Calcium was also present in elevated concentrations.

- The four surface water samples indicate water that is not suitable for human consumption. Sampling point WITstream 2 indicates high E. coli, but the rest of the elements are within drinking water limits. This sampling points is along the upper reaches of the Klip River, where it passes under the R41, Randfontein Road.

- Surface water WITstream 1 – this sampling point is in the tributary flowing westwards from the Golf Course area. The water quality does indicate high concentrations of sulphate, manganese, nickel and dissolved uranium. These elements are present in concentrations exceeding the chronic / acute health limits. The pH was very low (4.5), with aluminium, calcium and ammonia also present in elevated concentrations.
- Surface water WITstream 3 – this sampling point is in a tributary flowing eastward through the Vogelstruisfontein area and draining the proposed mining area. The water quality does indicate high concentrations of sulphate, lead, manganese, nickel, nitrate and dissolved uranium. These elements are present in concentrations exceeding the chronic / acute health limits. The pH was very low (3.4), with aluminium, calcium, iron, magnesium, potassium and ammonia also present in elevated concentrations.
- Surface water WITstream 4 – this sampling point is in a tributary flowing eastward through the Vogelstruisfontein area and draining the proposed mining area. The sampling point is upstream from sampling point WITstream 3. The water quality does indicate high concentrations of sulphate, lead, manganese, nickel and dissolved uranium. These elements are present in concentrations exceeding the chronic / acute health limits. The pH was very low (3.3), with aluminium, calcium, iron, magnesium, potassium and ammonia also present in elevated concentrations.
- The two tributaries draining the proposed mining area are contaminated by historical and possibly current mining and industrial activities and the water must not be used unless treated. A possible source of the poor-quality water is the old tailings facilities in this area

Based on the SANS241 drinking water guideline the sampled groundwater and surface water is not fit for human consumption (unless treated). When the water quality is compared to the Klip River Water Quality Objectives standards the conclusions remain the same and highlights the poor quality of the water resources.

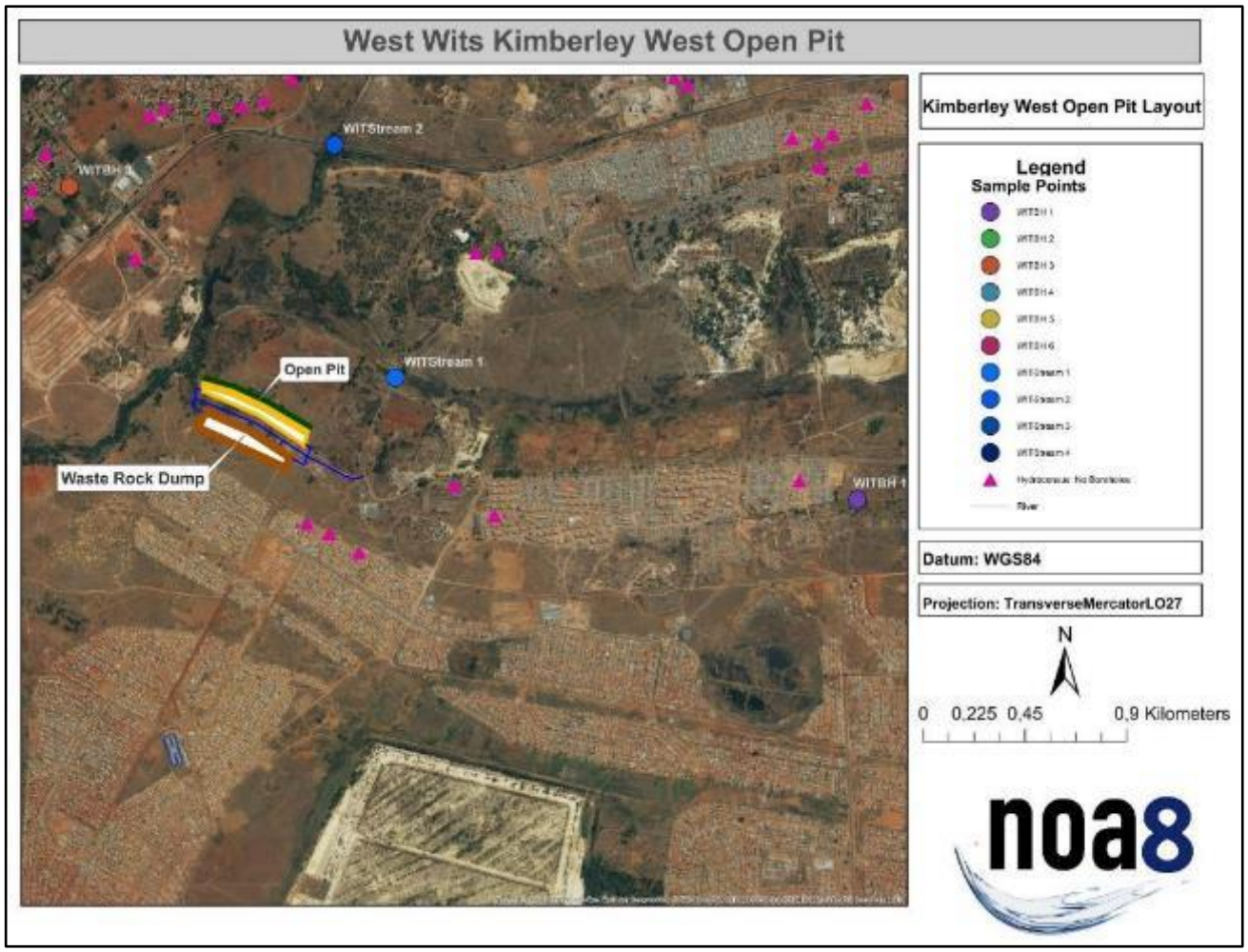


Figure 16: Kimberley West and recorded hydrocensus locations

Numerical Model

The numerical model was constructed as a 2D model to simulate the potential impact on the receiving environment associated with the open pit mining and the proposed Waste Rock Dump (WRD). The Kimberley West open pit is approximately 25 m deep and will be mined in 5 months, with rehabilitation scheduled to take another 9 months.

The closest borehole recorded with a water level is WitBH1, located 2500 m east of the open pit, with a recorded water level of 36.215 mbgl. The recorded water level at WitBH1 is 10m below the bottom of the Kimberley West open pit, however, due to the proximity of the open pit to the drainage to the west (approximately 130m), possible seepage may be encountered during the mining.

The numerical mesh is shown in Figure 17 and the geological input and calibration boreholes used in Figure 18. The mesh was discretised such that the number of obtuse angles i.e. to ensure that

violating Delauney criteria is less than 5% - assisting in mathematical and numerical computing and stability of the model.

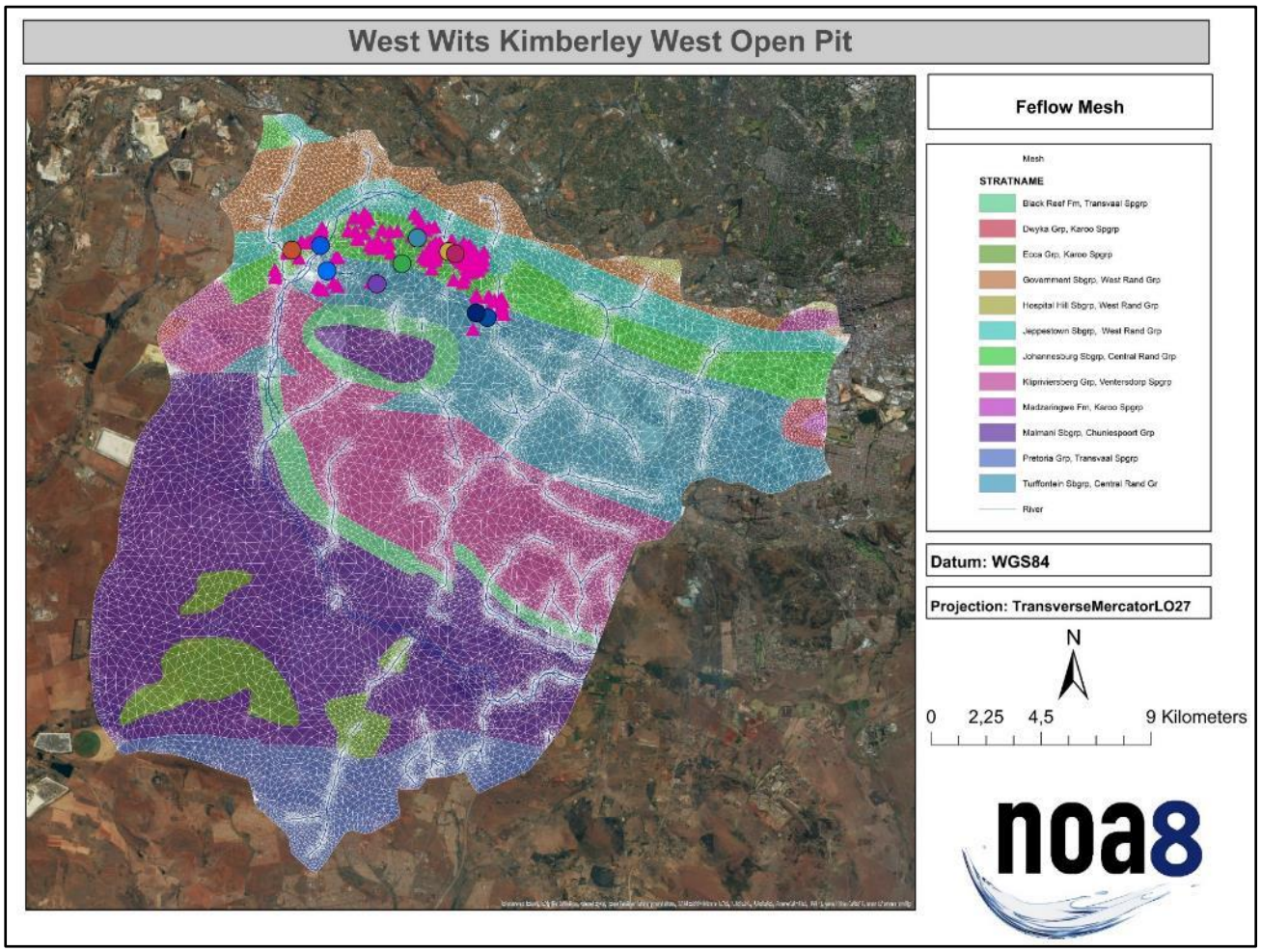


Figure 17: Model Mesh and boundary

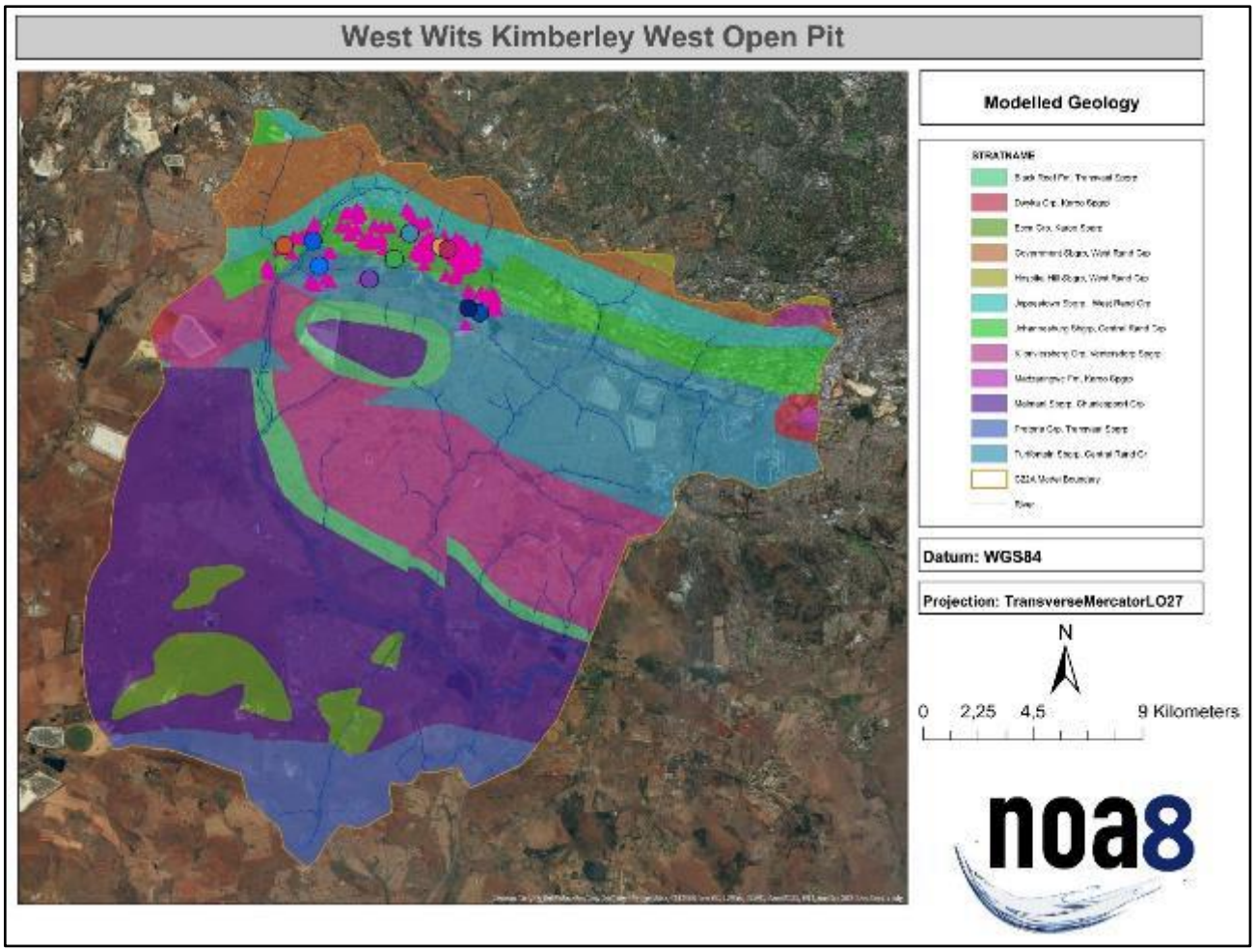


Figure 18: Modelled geology

Simulation scenarios

Various simulations are required to use the numerical flow model as a tool in water supply and potential impact assessments. The recent and historical data is used to calibrate the model, always an iterative process. The calibration process was completed in steady state (time independent and only hydraulic conductivity and recharge parameters adjusted).

The following scenarios were simulated and discussed next:

1. Steady state calibration: Status Quo groundwater flow
2. Predictive scenarios:
    a. Mine dewatering from Kimberley West open pit and mass transport associated with the WRD for 5 months.
    b. Post operation mass transport: 1 year, 5 years, 10 years and 100 years.

The objective of the steady state model calibration was to reproduce measured water levels at observed heads. The steady state calibrated groundwater levels are presented in Figure 19.

The minimum calibration error is 1.48 m and the maximum error 6.97m. General standard practice for calibration evaluation is to obtain a Root Mean Square Error (RMSE) of such a value, that when compared with the head difference measured in the modelled area, should not exceed 5%. In this case, the RMSE correlates to approximately <5% measured against the water levels change over the model domain.

The groundwater flow model should be viewed as/at a conceptual level and qualified rather than calibrated due to the limited number of groundwater sites available to populate the numerical groundwater flow model, and the absences of local groundwater sites at the proposed Kimberley West open pit. The groundwater flow model should be updated once more data becomes available.

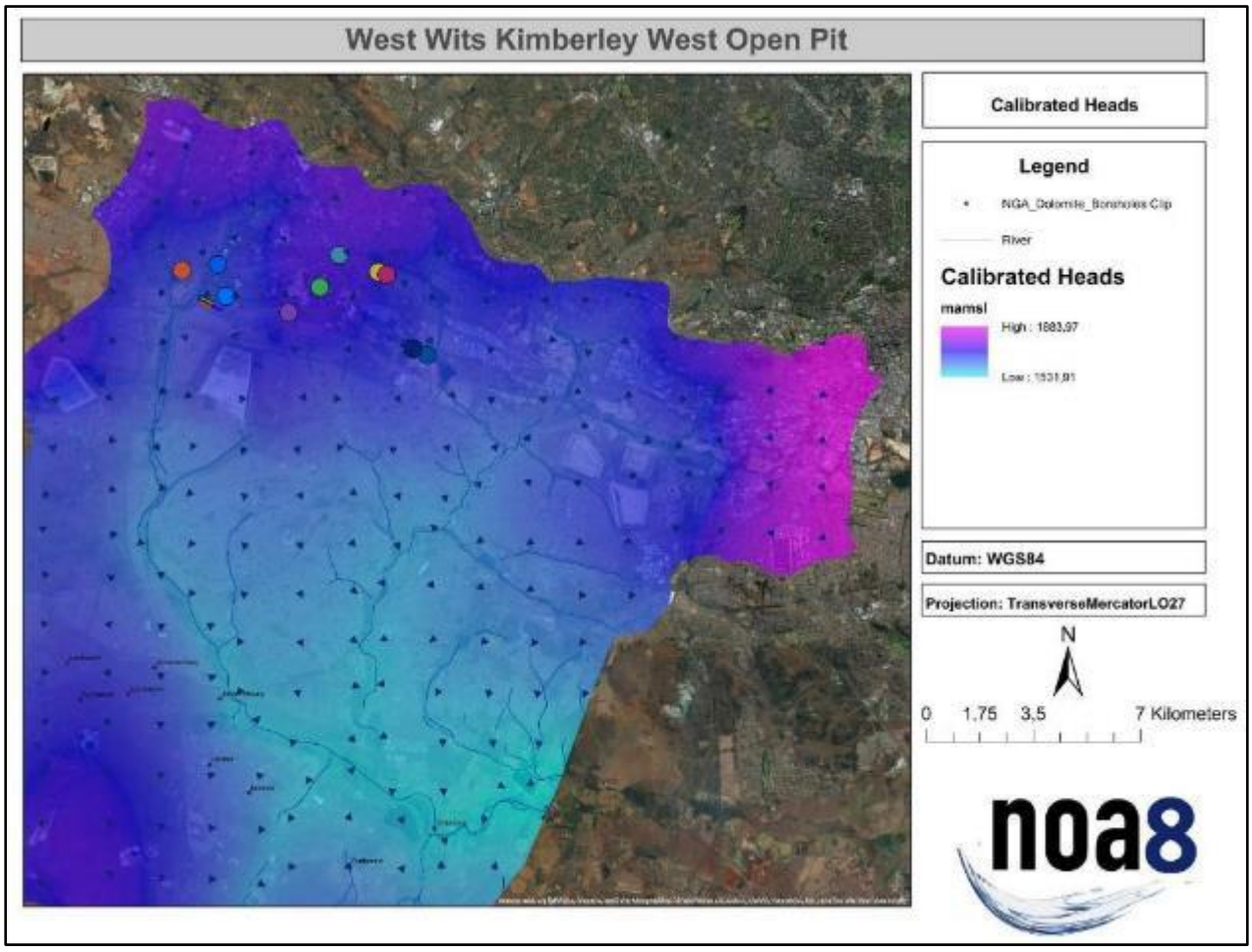


Figure 19: Steady State Calibration Groundwater Levels

Predictive Model

Mine dewatering and mass transport

The Kimberley West open pit was included as designed up to 25 m deep (below surface elevation). The mining sequence was activated for 150 days (approximately 5 months Life of Mine) and the simulated impact assessed. The potential dewatering volumes associated with the mining at Kimberley West open pit with time is provided in **Figure 20**.

The dewatering rates simulated during the numerical groundwater flow model is not subjected to evaporation, hence an envelope of inflows provided for management purposes. Between 350 m^3/d and 700 m^3/d could report to the open pit (with no mitigation measures installed) at the end of the 5-month mining cycle.

Due to this, a water monitoring point should be installed between the Kimberley West open pit and the Klip River. This water monitoring point will provide water level data before mining commence and should be drilled such that dewatering could be commissioned at this point. The abstracted from the monitoring/dewatering borehole should be pumped back in the Klip River.

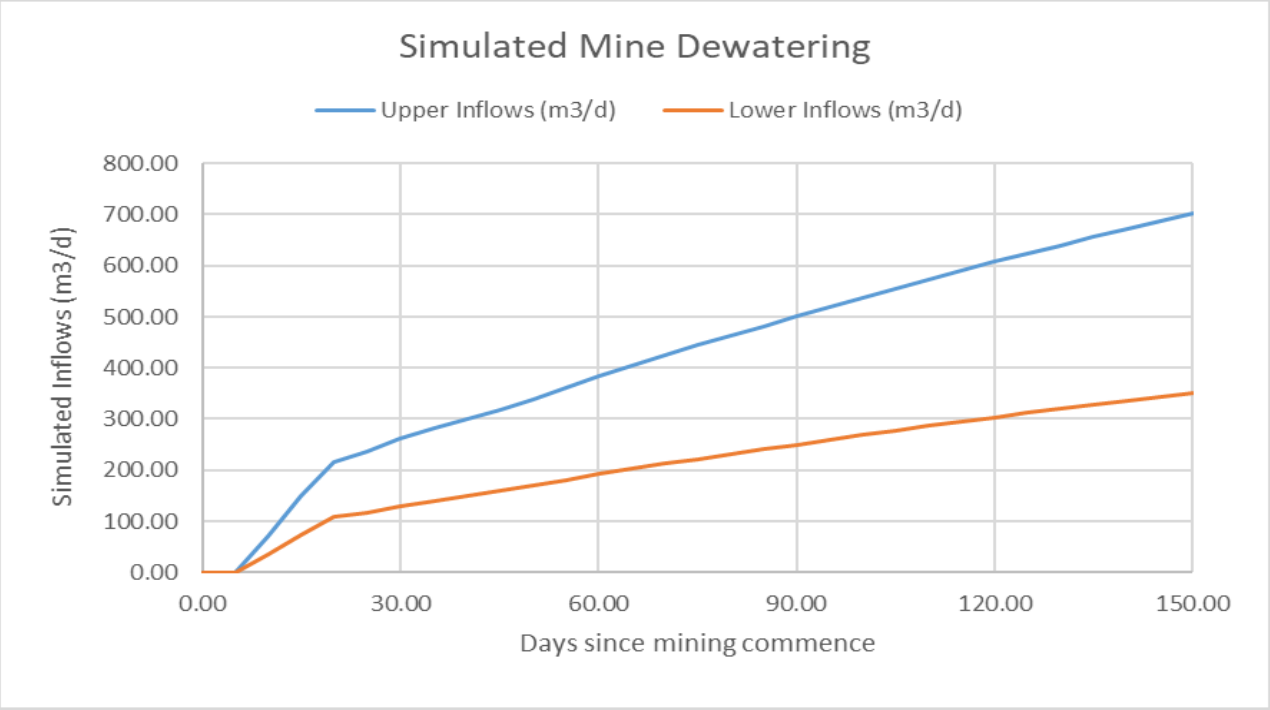


Figure 20: Simulated inflows reporting to the Kimberley West open pit during mining

The simulated Zone of Influence (ZOI) and the potential mass migration from the Waste Rock Dump (WRD) is provided in Figure 21. The calibrated groundwater levels in the vicinity of the Kimberley West open pit were approximately 5 mbgl, ensuing a maximum drawdown due to mining of 25m at

the open pit location, and extending a maximum distance of 330 m from the open pit towards the west and the north.

The potential mass distribution from the WRD during operations indicate a possible migration from the WRD south approximately 100 m during the 150 days LoM. One monitoring point should be installed south of the WRD between the WRD and the community and one monitoring point to the north of the open pit (upstream). The monitoring point should confirm the geochemical results i.e. no leachate potential from the waste and no AMD formation. The monitoring should commence prior to any mining activities and continue in post operational phase during rehabilitation of the WRD and the open pit, at least 2 years post operation.

The post operations simulations indicated that by year 1 post operation with rehabilitation concluded, minimising the recharge on the open pit (revegetated) and no more WRD, a <30% chance of increased mass transport from the rehabilitated WRD area and backfilled open pit extends beyond the limits of these infrastructure footprints.

One should take note that the geochemical assessment concluded no leachate from the waste material analyse was deemed possible – this is for management and mitigations measure implementation to monitor and confirm the assessments. After 10 years post mining, the percentage possibility for leachate from the WRD and open pit exiting the facility boundaries decreased and increased in possible spread due to dilution and migration (Figure 22 and Figure 23). This confirms the mitigation need to monitor post closure to confirm the geochemical assessment results of little to zero possible leachate from the sampled waste material used in the WRD and backfilled open pit.

Decanting of the backfilled open pit was assessed post closure. With increased recharge simulated on the open pit post operationally, the water level stabilises at 1665 mamsl at the south western corner of the rehabilitated Kimberley West open pit. The surface elevation is at 1670 mamsl, 5 m above the groundwater level post closure ~ hence no decanting is expected.

Water balance

The water balances associated with the simulated scenarios is provided below;

1. Steady State Qualification
    a. Recharge from precipitation accounts for 86 233 m^3/d over the entire modelled domain, with in and outflows along rivers/drainages accounting for 6 151 m^3/d and 92 384 m^3/d respectively.
    b. No additional flow components focusing on the Kimberley West Open pit area during steady state calibration

2. Operational Phase
    a. Potential recharge of 484 m^3/d on the entire WRD footprint due to precipitation and increased recharge coefficients.
    b. Peak dewatering simulated at 702 m^3/d during the open pit mining. The dewatering rates should still be subjected to evaporation which will decrease the volumes substantially.
3. Post Operational Phase
    a. The only additional flow component is the increased recharge simulated on the rehabilitated open pit footprint of 100 mm/a (approximately 15% of MAP). This amounts to 10 m^3/d.

Figure 21: Simulated Zone of influence (ZOI) due to mining and potential mass migration from Waste Rock Dump (WRD) during operations

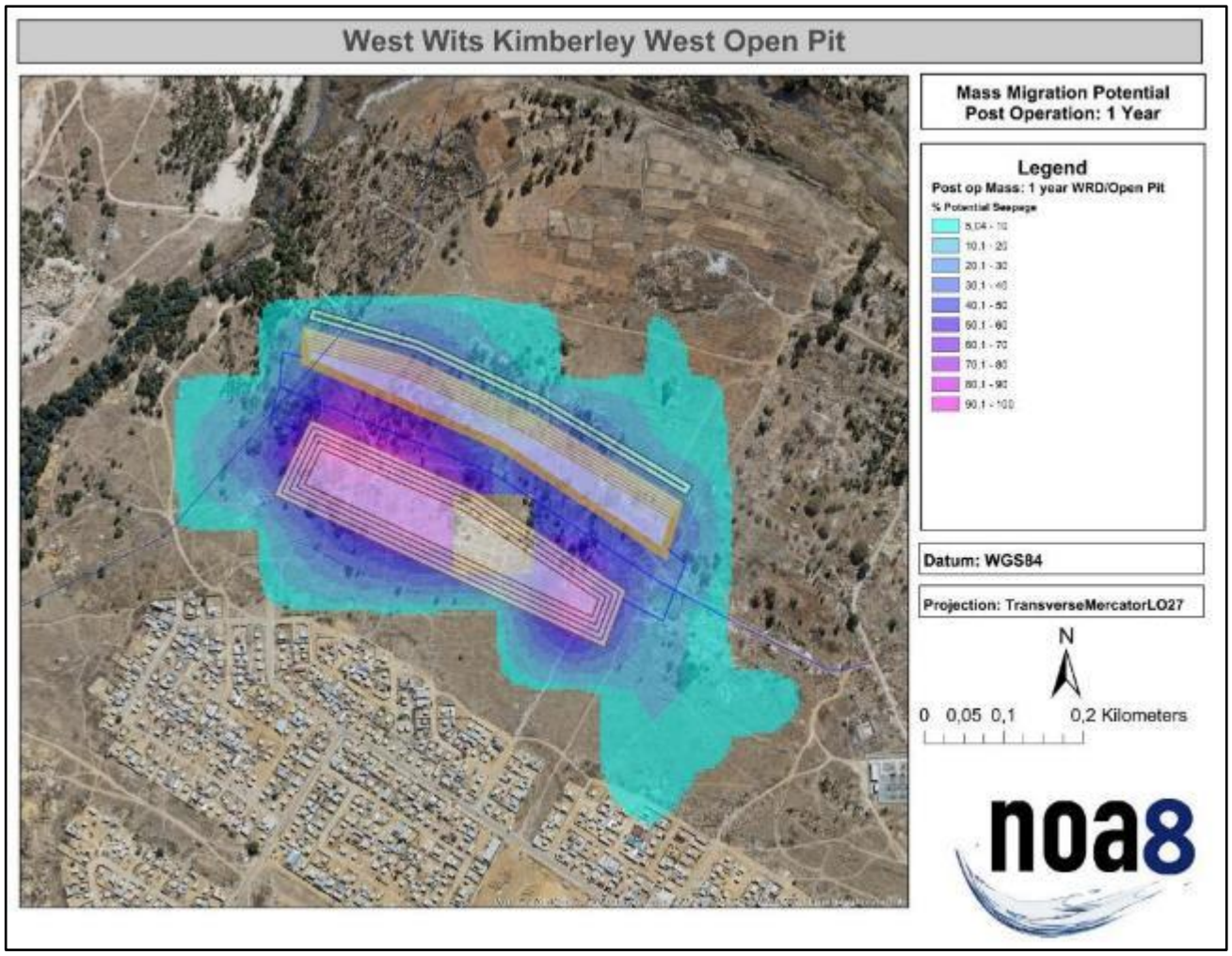


Figure 22: Post operation potential mass percentage migration: 1 year post mining

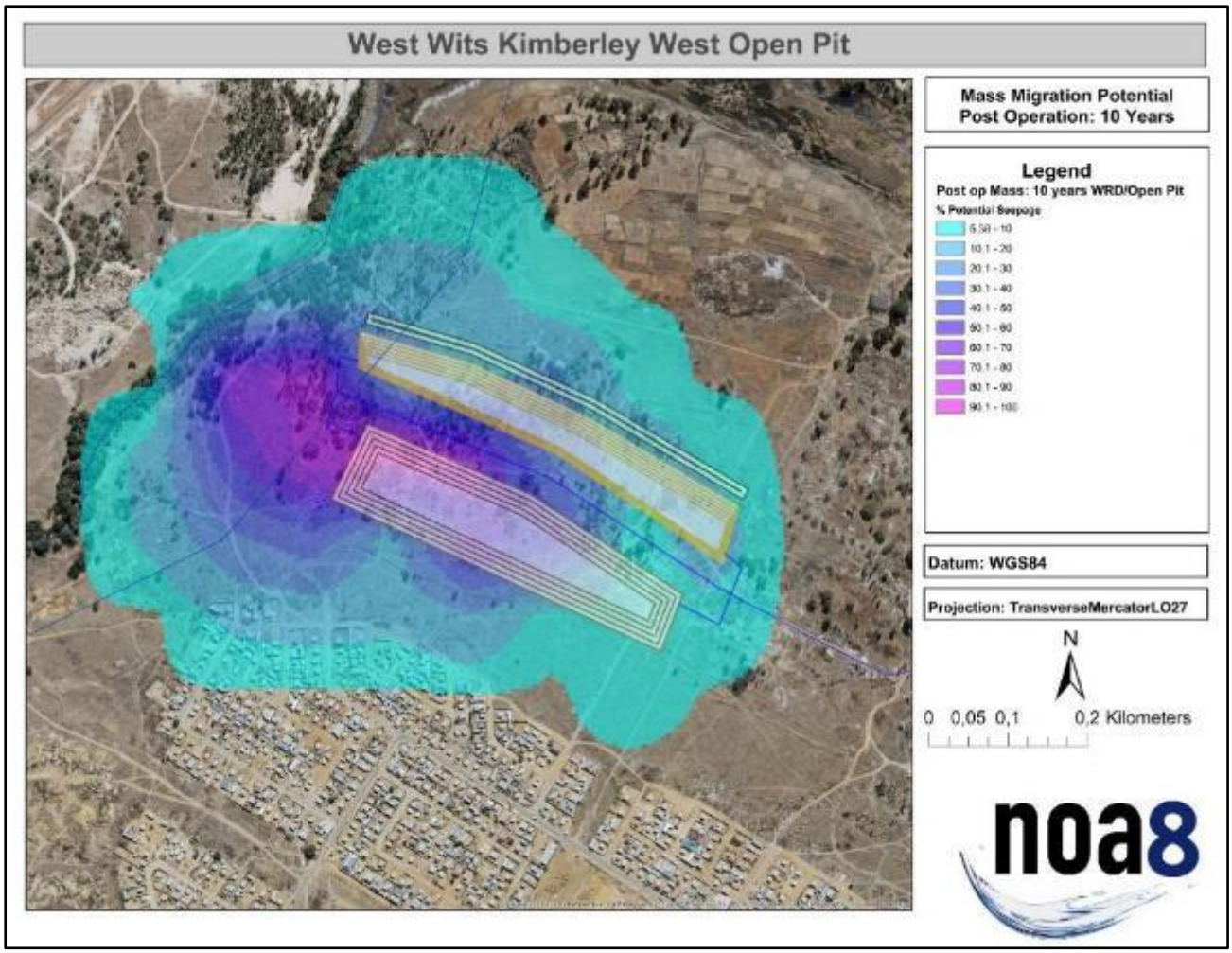


Figure 23: Post operation potential mass percentage migration: 3 years post mining

Identified Environmental Impact

Impact Identified: The potential of the open pit to dewater volumes of groundwater and create a zone of influence impacting neighbouring groundwater users and sensitive receptors ultimately reducing available groundwater quantities.

Impact Identified: The potential of the WRD to leach minerals into the receiving environment and negatively influencing the groundwater and surface water quality.

Impact Identified: The potential of the backfilled open pit to leach minerals into the receiving environment and negatively influencing the groundwater and surface water quality.

The results of the assessment indicate that the significance of potential impacts rate as Very Low. The cumulative impacts of the impacts rate as Low. This is predominantly because the development of AMD conditions as well as the leaching of contaminants from the waste rock is unlikely and that no recorded groundwater users will be affected by the possible zone of influence due to mining. The

dewatering zone of influence indicates little to no impact on recorded users (to be updated with the hydrocensus before mining commences) and rate Very Low.

Conclusion

- The groundwater flow model should be viewed as/at a conceptual level and qualified rather than calibrated due to the limited number of groundwater sites available to populate the numerical groundwater flow model, and the absences of local groundwater sites at the proposed Kimberley West open pit.
- The groundwater numerical model was used to simulate the potential impact of the open pit mine on the local groundwater regime and the WRD on the local groundwater quality.
- Mine dewatering could be expected due to the Kimberley West open pit's proximity to the Klip river (<150m). Once the natural groundwater hydraulic gradient is reversed i.e. from the river to the open pit, dewatering could occur that requires management. Peak volumes of between 350 and 700 m3/d could report to the open pit.
- The geochemical analyses results indicated the waste associated with the Kimberley West open pit is benign. However, for management purposes. Mass migration simulations for operational and post operational was simulated to assess possible migration pathways originating from the WRD. Simulated mass migration is low during operations and within 3 years the potential seepage from the WRD decreased to less than 30%.

Recommendations

- An updated hydrocensus should be completed in a 500m radius around the Kimberley West open pit project area. The data recorded should be used to update the monitoring protocol and the groundwater flow model and associated management scenarios.
- A detailed monitoring program should be initiated before mining commence:
    - An upstream and downstream surface water sample should be taken in the Klip River.
    - A monitoring borehole should be drilled between the open pit and the Klip River.
    - One monitoring borehole should be drilled between the WRD and the community to the south.
    - One monitoring borehole should be drilled to the north of the open pit.
    - All boreholes should be subjected to aquifer tests to assess aquifer properties to be used in the model update. All boreholes should be sampled and analysed for the full spectrum of metalloids, Uranium and Thorium as well as micro and macro chemical parameters. The results should be recorded as the baseline against which all future possible impacts be measured and managed.

    - Monitoring (water levels and quality) during mining should be performed monthly due to the short Life of Mine (5 months). Post operational monitoring should be conducted quarterly.
    - A monitoring borehole should be drilled into the rehabilitated open pit and included in the post operational monitoring protocol. Water levels and water quality should be monitored on a quarterly bases.
    - Monitoring should continue for at least 2 years post rehabilitation of the Kimberley West project area.
- Any water reporting to the open pit or storm water management areas should be kept in a closes system (classified as contact water) and not be discharged into the environment before treatment to the specific catchment Target Water Quality Guideline (TWQG) standards. Contact water can be recirculated and used in a closed system according to GN704 Best Practise Guideline.
- The back filled open pit should be covered with pre-stripped top soil and revegetated to decrease potential recharge from precipitation.
- The groundwater flow model should be updated once the hydrocensus and monitoring data is updated and monitoring points installed.

Geochemical – Waste Classification

The information in this section has been obtained from the Geochemical Specialist Study (GeoDyn Systems, May 2018) and from the Geological Statement – Geochemical Samples (Shango Solutions, April 2018). For full specialist study refer to Appendix G-ii

A geochemical risk assessment for the proposed Kimberly West open pit gold mine waste rock material with the following objectives was completed by GeoDyn Systems (GeoDyn).

Objectives of the geochemical assessment:

- Conduct a waste classification of the waste rock.
- Determine the likelihood of the development of acid mine drainage (AMD) conditions from the waste material.
- Determine the likelihood of leaching of potential contaminants from the waste rock material

The National Environmental Laws Amendment Act (NEMLAA, Act 25 of 2014) requires that waste from mining activities be classified according to Regulation 635 of NEMWA. To conduct the waste classification leach tests and a total analysis needs to be conducted. The leach test entails the leaching of a solid sample of waste with reagent water and the subsequent analysis of the leachate for specific components. The total analysis entails the analysis of the solid material for the total

concentration of specific components that are present in the waste sample. The results of these two tests are compared to regulatory criteria and a classification is done based on the results of this comparison.

As part of the waste classification and assessment of the risks from a particular waste, the DEA subscribes to the source-pathway-receptor analysis methodology, which is international best practice. The use of this assessment methodology allows the analysis of the full cycle of a potential contaminant to be evaluated within the proper scientific framework so that risks can be realistically assessed and proper mitigation measures proposed.

For the quantification of medium to long term geochemical risks associated with the waste material, i.e. mine tailings and overburden, numeric geochemical modelling is used as a tool. This modelling entails the use of established thermodynamic and kinetic principles to calculate risks over time. The internationally validated geochemical modelling software package PHREEQC is used for this purpose.

A total of 5 samples were collected for this study, which were composited into 1 representative sample for laboratory analysis and an accredited laboratory. The sampling of the waste rock was conducted by Shango Solutions (Pty) Ltd. A detailed report is available on the site and sample selection for analyses compiled by Prof Sybrand A. de Waal i.e. Note on the lateral lithological continuity of the Upper Witwatersrand Supergroup rocks. The following key conclusion is worth noting:

- Sample Z8504 can reasonably be accepted to represent the Kimberley hanging wall at opencast area Kimberley West.

Planned Open pit	**Reef to be mined**	**Sample Description**	**Sampling Coordinate (WGS 1984)**		**Sample No**	**Photograph**
			Longitude	**Latitude**		
Kimberley West	Kimberley Reef	5 to 10cm long drill core (RDT 003) samples taken at 1m intervals in the Bird Reef hangingwall quartzite	27.875965	-26.18868	Z8504	

The following laboratory analyses were conducted to for the waste classification, assessment of the likelihood of acid mine drainage (AMD) and the leach potential of contaminants from the waste rock dumps:

- Acid Base Accounting (ABA) analysis
- Net Acid Generation (NAG) analysis
- Sulphur speciation analysis
- Carbon speciation analysis
- Leach test according to R635
- Whole rock analysis (Aqua Regia) according to R635
- Mineralogical analysis (X-Ray Diffraction)

Waste Classification

Leachate analysis indicates that none of the parameters analysed is leached in concentrations that exceed the regulatory values of R635. The total concentration analysis indicates that only arsenic concentrations in the Kimberly West waste rock exceeds the TCT0 value, but is less than the TCT1 value, of R635. Based on the criteria in Section 7 of R635, the Kimberly West waste rock is classified as Type 3, which according to R636 requires a Type C engineered barrier system.

Environmental Impacts

The acid base accounting and geochemical modelling indicated that due to the absence of iron sulphide minerals the risk of the development of AMD conditions in the waste rock environment is negligible.

The leach test indicated that all three potential contaminants are below detection in the waste rock leachate and the three that are above detection have concentrations significantly below the regulatory values. The geochemical model, which was developed to evaluate the leach test, also shows that the risk of leaching of contaminants, especially the metalloid arsenic, from the waste rock is negligible. This is also due to the absence of iron sulphide as well as the high stability of the minerals comprising the waste rock at the mining conditions.

***Conclusion and Recommendations of the* Geochemical Assessment**

The waste classified as Type 3, thus requiring a Class C engineered barrier system. However, none of the constituents in the leach test exceeded the regulatory guideline values. In addition, the geochemical model indicated that the waste rock is comprised of minerals which are very stable in the specific mining environment being considered. In addition, the waste rock itself as well as the secondary mineral products forming very slowly as the waste rock minerals weather have the capacity to remove contaminants from solution through the process of adsorption.

The waste rock material contains no iron sulphide minerals. Therefore, the risk of the formation of acid mine drainage conditions due to the waste rock material is negligible. The results indicate that

the significance of both potential impacts rate as Very Low. The cumulative impacts of the impacts rate as Low. This is predominantly because of the fact that the development of AMD conditions as well as the leaching of contaminants from the waste rock is unlikely. The waste rock material is classified as Type 3 according to NEMWA Regulation 635. It is however recommended by the specialist, based on the results of the assessment, that the waste material class be reduced to Class 4.

Government Notice 634 – 635 of 2013

- The Waste classification and Management Regulations were published in 2013 and prescribed the classification and liner requirements for solid waste to be disposed of. These regulations consist of the following GNR Notices:
- GNR 634 National Environmental Management Waste Act (59/2008): Waste Classification and Management Regulations;
- GNR 635 National Norms and Standards for the assessment of waste for landfill disposal; and
- GNR 636 National Norms and Standards for the Disposal of Waste to Landfill.

The results must be assessed against the four levels of thresholds for leachable and total concentrations, which in combination, determines the Risk Profile of the waste.

Table 18: Waste Classification Abbreviations

Abbreviation	Definition
LC	Leachable Concentration of a particular contaminant in a waste, expressed as mg/l.
TC	Total Concentration of a particular contaminant in a waste, expressed as mg/kg.
LCT	Leachable Concentration Thresholds for particular contaminants in a waste (LCT0, LCT1, LCT2 and LCT3).
TCT	Total Concentration Thresholds for particular contaminants in a waste (TCT0, TCT1 and TCT2).

Liner Requirements - GNR 636 National Norms and Standards

The standard containment barrier design and landfill disposal requirements for the different waste types as per the GNR. 635 of 2013 are presented in **Table 19**.

Table 19: Waste Types

Waste Type	Description
Type 0	The disposal of Type 0 waste to landfill is not allowed. The waste must be treated and reassessed in terms of the Standard for Assessment of Waste for Landfill Disposal to determine the level of risk associated with disposing the waste to landfill.
Type 1	Type 1 waste may only be disposed of at a Class A landfill designed in accordance with Section 3(1) and 3(2) of these Norms and Standards, or, subject to Section 3(4), of the Norms and Standards, may be disposed of at a landfill site designed and operated in accordance with the requirements for a H:h / H:H landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).
Type 2	Type 2 waste may only be disposed of at a Class B landfill designed in accordance with Section 3(1) and 3(2) of these Norms and Standards, or, subject to Section 3(4), of the Norms and Standards, may be disposed of at a landfill site designed and operated in accordance with the requirements for a GLB+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998)
Type 3	Type 3 waste may only be disposed of at a Class C landfill designed in accordance with Section 3(1) and 3(2) of these Norms and Standards, or, subject to Section 3(4), of the Norms and Standards, may be disposed of at a landfill site designed and operated in accordance with the requirements for a GLB+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998) Liner requirements are shown in Figure 20.
Type 4	Disposal allowed at a landfill with a Class D landfill designed in accordance with Section 3(1) and 3(2) of these Norms and Standards or, subject to Section 3(4) of the Norms and Standards, may be disposed of at a landfill site designed and operated in accordance with the requirements for a GSB- landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).

A representation of a Class D liner is presented n Figure 24. The liner is based on the recommendation of the Geochemistry Assessment that the waste material class be reduced to Class 4 based on the results of the assessment.

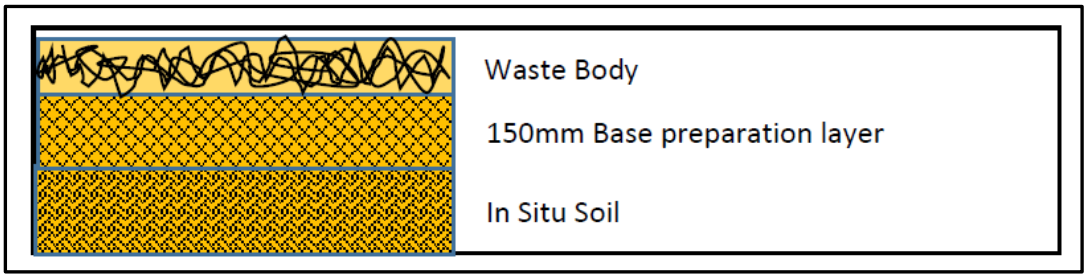


Figure 24: Proposed Class D landfill liner system

Terrestrial Ecology

The information in this section has been obtained from the Terrestrial Ecological Scan (Scientific Aquatic Services (SAS), May 2018). For full specialist study refer to Appendix G-iii.

The table below is a summary of the details of the study area in terms of Mucina and Rutherford (2012). It is important to note, that although all data sources used provide useful and often verifiable high-quality data, the various databases do not always provide an entirely accurate indication of the Kimberley West mining permit area actual biodiversity characteristics. For this reason a field assessment has been undertaken to confirm the assumptions made during consultation of maps and to determine the ecological status of the study area.

Table 20: Summary of the conservation characteristics of the study area (QDS 2627BB)

DETAILS OF THE STUDY AREA IN TERMS OF MUCINA & RUTHERFORD (2012)		
Biome	According to Mucina and Rutherford (2012), proposed open cast area (Kimberly West) is located in the Grassland Biome.	
Bioregion	Kimberley West proposed open cast area is located in the Mesic Highveld Grassland Bioregion.	
Vegetation Type	The proposed open cast area (Kimberley West) is located in the Soweto Highveld Grassland Vegetation type.	
Climate Information	Summer-rainfall region	
	MAP* (mm)	662
	MAT* (°C)	14.8
	MFD* (Days)	41
	MAPE* (mm)	2060
	MASMS* (%)	75
Altitude (m)	1 420–1 760 m	
Distribution	Mpumalanga, **Gauteng** (and to a very small extent also in neighbouring Free State and North-West) Provinces	
Geology, Soils & Hydrology	Shale, sandstone or mudstone of the Madzaringwe Formation (Karoo Supergroup) or the intrusive Karoo Suite dolerites which feature prominently in the area. In the south, the Volksrust Formation (Karoo Supergroup) is found and in the west, the rocks of the older Transvaal, Ventersdorp and Witwatersrand Supergroups are most significant. Soils are deep, reddish on flat plains and are typically Ea, Ba and Bb land types.	
Conservation	Endangered. Target 24%. Only a handful of patches statutorily conserved (Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand, and Rolfe's Pan Nature Reserves) or privately conserved (Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas and Avalon Nature Reserves, Heidelberg Natural Heritage Site).	
Vegetation & landscape features	Gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus, Eragrostis racemosa, Heteropogon contortus* and *Tristachya leucothrix*. In places not disturbed, only scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover.	
CONSERVATION DETAILS PERTAINING TO THE STUDY AREA (VARIOUS DATABASES)		

NBA (2011)	The proposed open cast mining areas (Kimberley West) falls within an area that is currently not protected. Ecosystem types are categorised as not protected, poorly protected, moderately protected and well protected based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act, and compared with the biodiversity target for that ecosystem type. Ecosystems not occurring within any protected area, or where less than 5% of the biodiversity target has been met, the area is considered not protected. The study area does not fall within a focus area as per the National Protected Areas Expansion Strategy (NPAES, 2009), and as such are not earmarked for conservation within the near future.
Threatened Ecosystems (2011)	According to the National Threatened Ecosystem (2011) database, the majority of the Kimberley West open cast area falls within the remaining extent of the critically endangered Klip River Highveld Grassland Ecosystem
NPAES (2009) and SACAD (2018) -Figure 26	According to the NPAES (2009) dataset, the Kloofendal Municipal Nature Reserve is situated 6.3 km northeast of the Kimberley west open cast area. Both the NPAES (2009) and SACAD (2018) indicated the Walter Sisulu National Botanical Garden to be situated 8.4 km north of the Kimberley West open cast area. There are no other protected or conservation areas situated within 10 km of the open cast areas.
IBA (2015)	There are no IBAs within 10 km of the open cast areas, with the nearest IBA situated ± 11.5 km to the north, namely the Magaliesberg
IMPORTANCE OF THE STUDY AREA ACCORDING TO THE MINING AND BIODIVERSITY GUIDELINES (2013) – Figure 27	
Highest Biodiversity Importance	The majority of the Kimberley West MP open cast area is classified as being of Highest Biodiversity Importance. **Biodiversity priority areas:** Critically endangered and endangered ecosystems, Critical Biodiversity Areas (or equivalent areas) from provincial spatial biodiversity plans, River and wetland Freshwater Ecosystem Priority Areas (FEPAs), and a **1km buffer** around these FEPAs, Ramsar Sites. **Risk for mining:** Highest risk for mining. **Implications for mining:** Environmental screening, EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision making for mining, water use licences, and environmental authorisations. If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significance of the biodiversity features in these areas and the associated ecosystem services. These areas are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being. An environmental impact assessment should include the strategic assessment of optimum, sustainable land use for a particular area will determine the significance of the impact on biodiversity. This assessment should fully take into account the environmental sensitivity of the area, the overall environmental and socio-economic costs and benefits of mining, as well as the potential strategic importance of the minerals to the country. Authorisations may well not be granted. If granted, the authorisation may set limits on allowed activities and impacts and may specify biodiversity offsets that would be written into licence agreements and/or authorisations.
Moderate Biodiversity Importance	Various small portions, particularly in the western portion of the Kimberley West MP open cast area is classified as being of Moderate Biodiversity Importance **Biodiversity priority areas:** Ecological support areas, vulnerable ecosystems, focus areas for protected area expansion (land based and offshore protection). **Risk for mining:** Moderate risk for mining. **Implications for mining:** These areas of moderate biodiversity value. EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, identifying features (e.g. threatened species) not included in the existing datasets, and on providing site-specific information to guide the application of the mitigation hierarchy. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations.
GAUTENG CONSERVATION PLAN (C-PLAN V3.3, 2011) - Figure 28	

Critical Biodiversity Areas (CBAs)	A small portion on the western side of the proposed Kimberly West open cast area falls within a Critical Biodiversity Area (CBA). The northern portion is considered to be an Irreplaceable CBA. The CBAs are considered important for red and orange listed plant habitat and for primary vegetation. CBAs include natural or near-natural terrestrial and aquatic features that were selected based on an areas' biodiversity characteristics, spatial configuration and requirement for meeting both biodiversity pattern and ecological process targets.
Ecological Support Areas (ESA)	The majority of the proposed Kimberly West MP open cast area falls within an Ecological Support Area (ESA). ESAs are natural, near-natural, degraded or heavily modified areas required to be maintained in an ecologically functional state to support CBAs and/or Protected Areas.

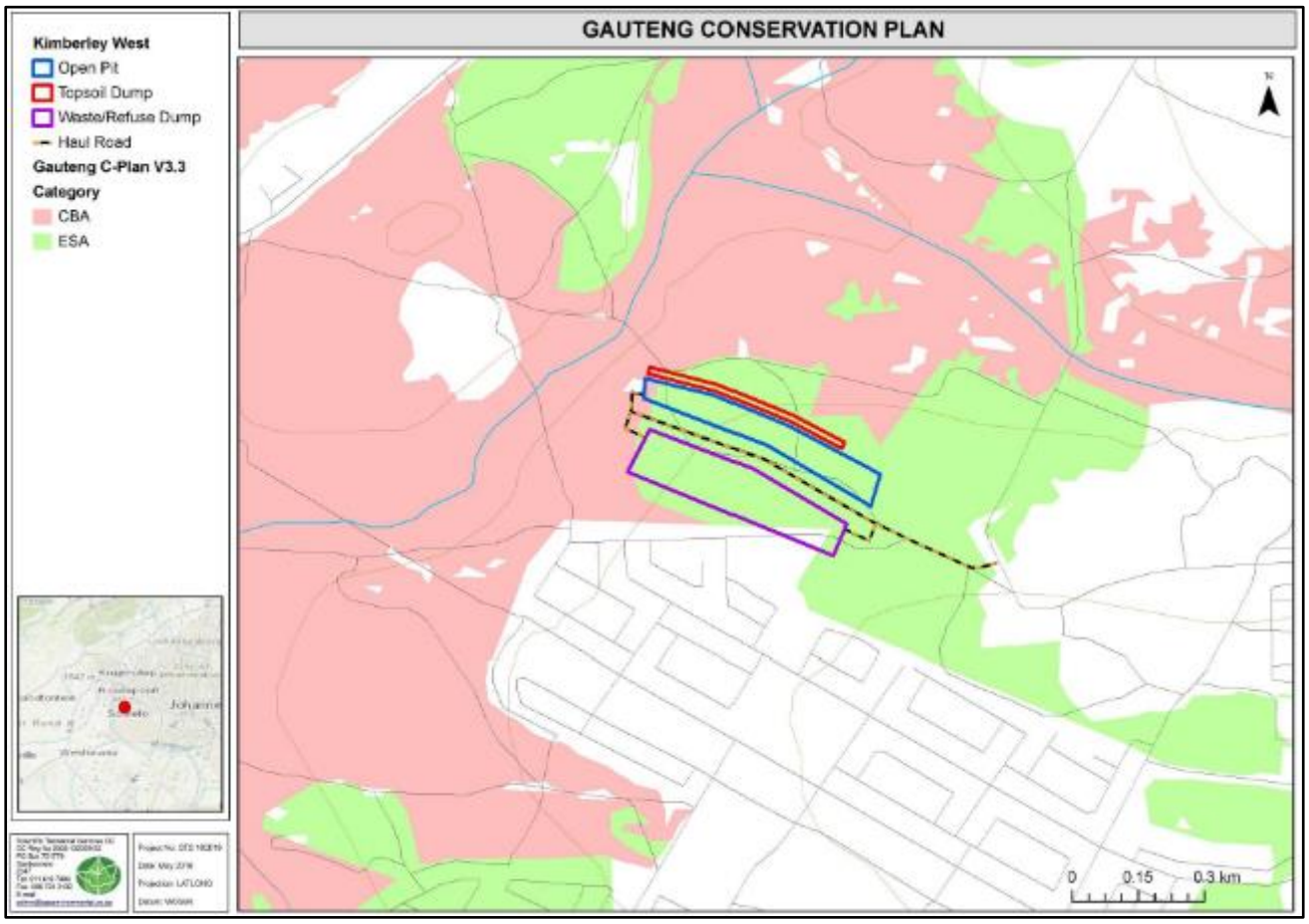


Figure 25: CBAs and ESAs associated with the Kimberley West mining permit area as identified in the Gauteng Conservation Plan v3.3 (2011).

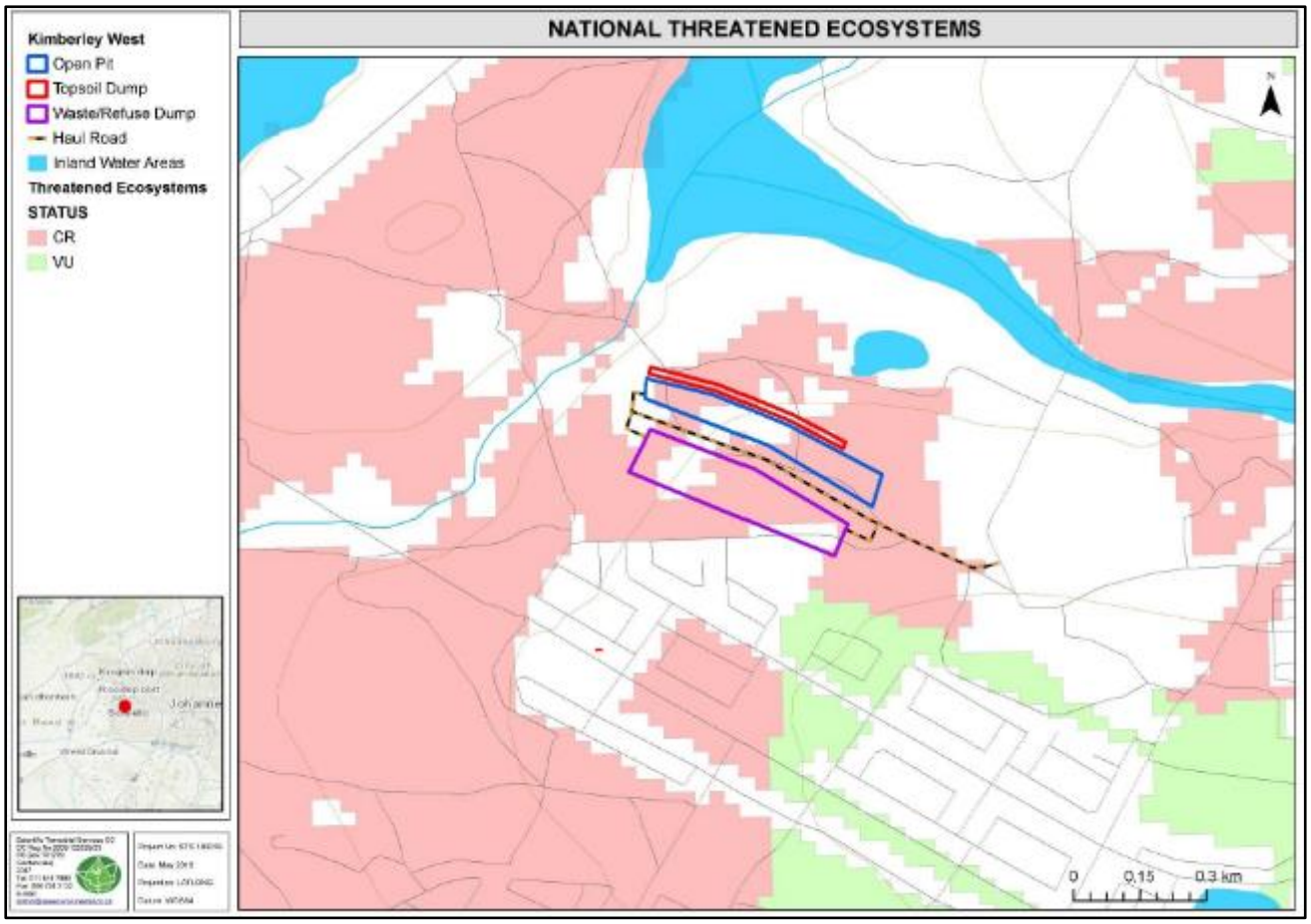


Figure 26: Endangered ecosystems associated with the Kimberley West mining permit area according to the National Threatened Ecosystem Database (2011).

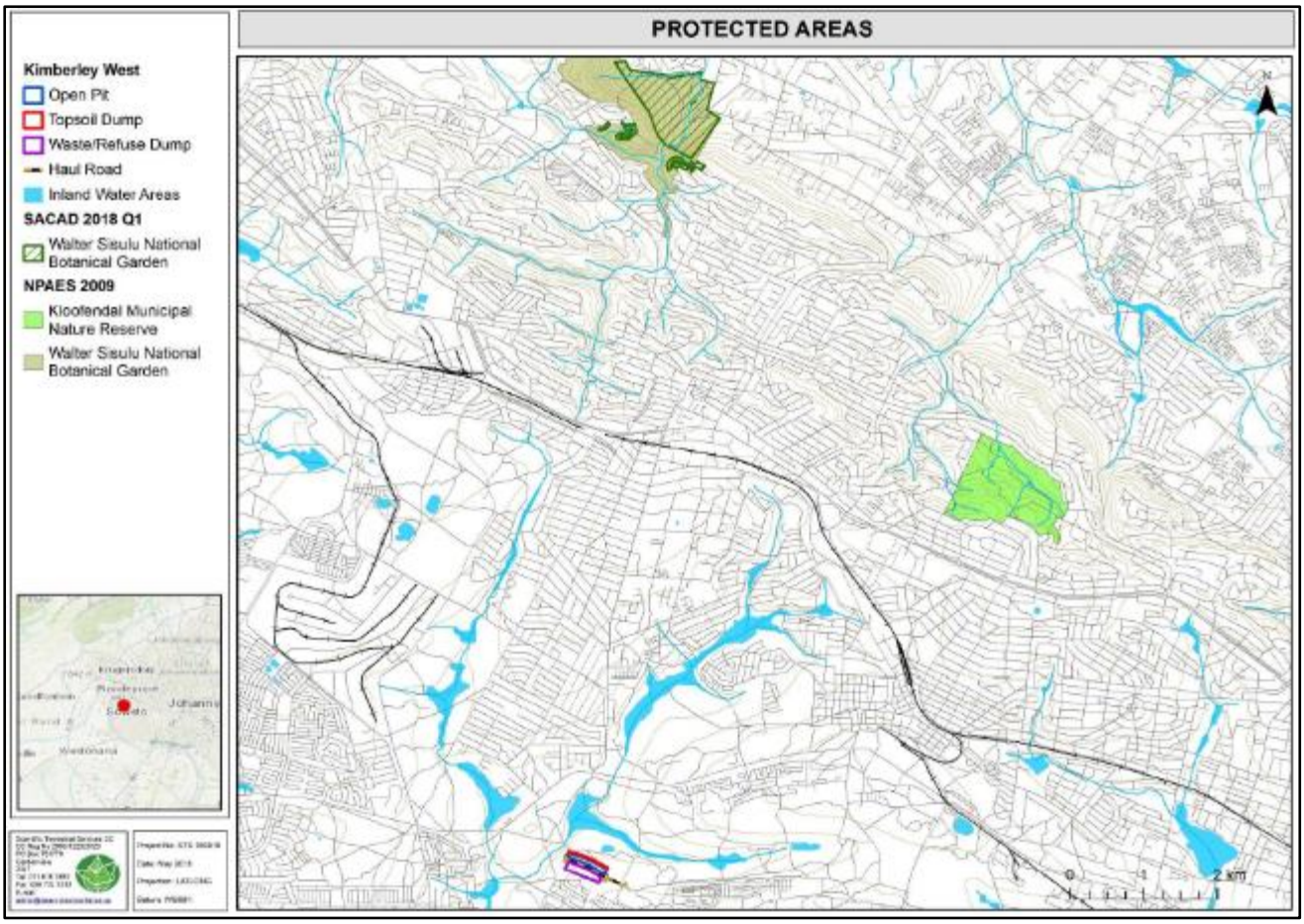


Figure 27: The location of the Kimberley West mining permit area in relation to several protected areas identified in the SACAD, SAPAD and NPAES databases.

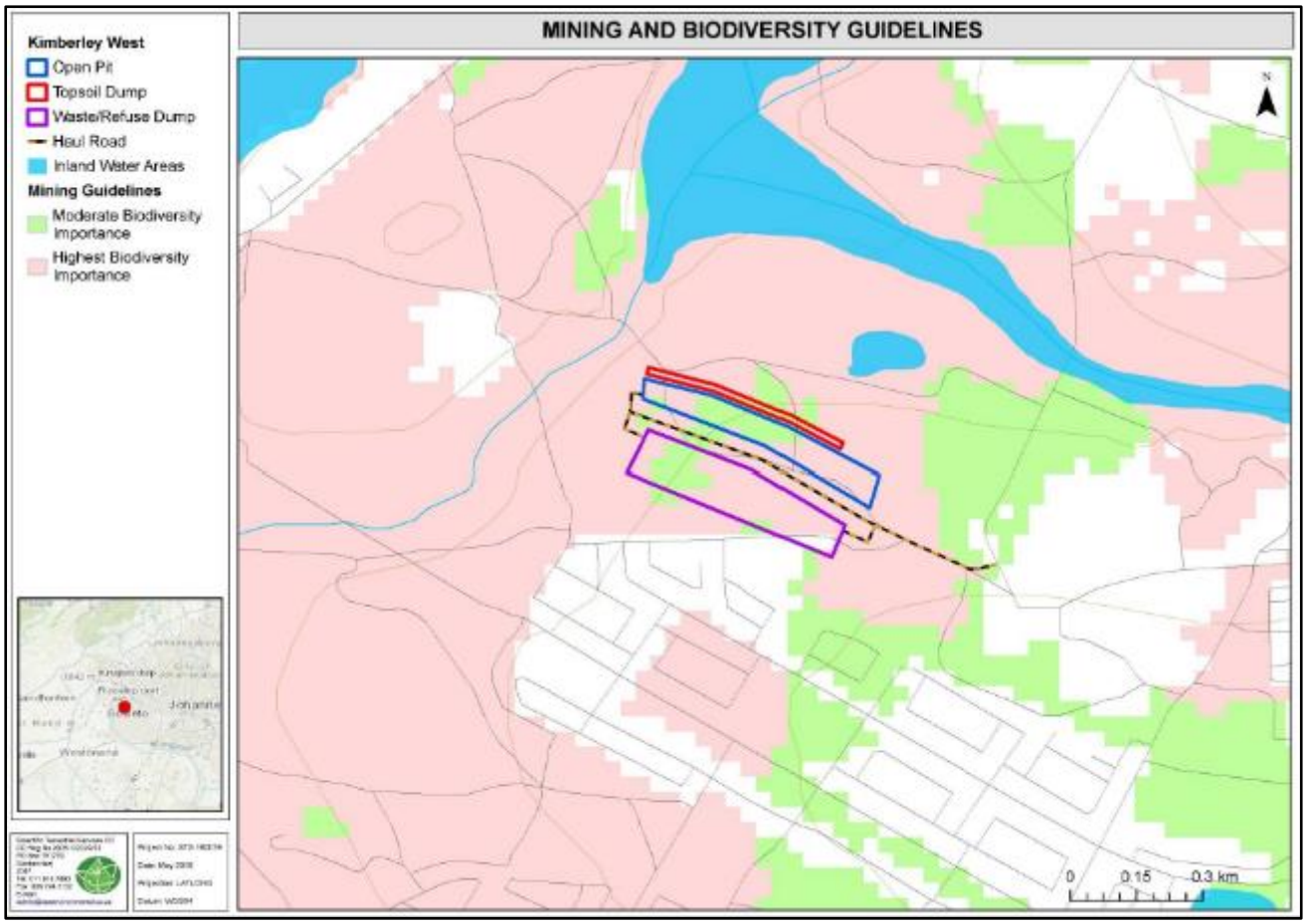


Figure 28: Importance of the Kimberley West mining permit area according to the Mining and Biodiversity Guidelines (2013).

The data presented in the Terrestrial Ecological Scan are bases on observations and findings made during a site visit undertaken on 6 and 7 of March 2018 (late summer). A summary of the observations and findings made during the site assessment is presented below.

Floral Scan

- Two habitat units (See **Figure 29** below) were identified during the field assessment, namely Secondary Grassland Habitat and Transformed Habitat. Historic and ongoing disturbance to the Transformed Habitat Unit was evident, as building rubble and cleared areas were observed within the Kimberley West MP. Further, these on-site disturbances have resulted in alien and invasive plant proliferation within the Kimberley West MP area;
- The Secondary Grassland habitat unit comprises of small pockets of modified grassland, also dominated by alien and invasive plant species as a result of historic and current anthropogenic activities and edge effects from the surrounding residential developments, illegal dumping and ongoing mining activities. The habitat unit has been largely transformed by historical mining activities, dumping of waste material and thickets of *Eucalyptus camaldulensis*. Due to the

high levels of disturbance, only common floral species were noted within the two mining permit areas;

- The Transformed Habitat Unit is considered significantly modified ecological condition, with a high abundance of alien and invasive floral species such as *Tagets minuta, Eucalyptus camaldulensis, Acacia mearnsii* and *Melia azedarach*. As a result of habitat degradation and alien and invasive plant proliferation, the habitat suitability for floral species has been significantly compromised, notably for Species of Conservation Concern (SCC);
- The Probability of Occurrence (POC) of all South African National Biodiversity Institute (SANBI) listed plants species for the Quarter Degree Square (QDS) 2629AB was calculated:
    - During the field assessment no floral SCC was observed and based on the results obtained *Hypoxis hemerocallidea* (Declining) and *Boophone disticha* (Declining) have a low probability to be present within the proposed Kimberley West MP and immediate surrounding areas, this can be attributed to the level of habitat transformation already associated with the study area and immediate surrounding area.
- Provided that all mitigation measures, stipulated in this report are adhered to, the proposed mining activity is deemed **unlikely** to pose a **conservation threat** to floral habitat and species in the immediate area

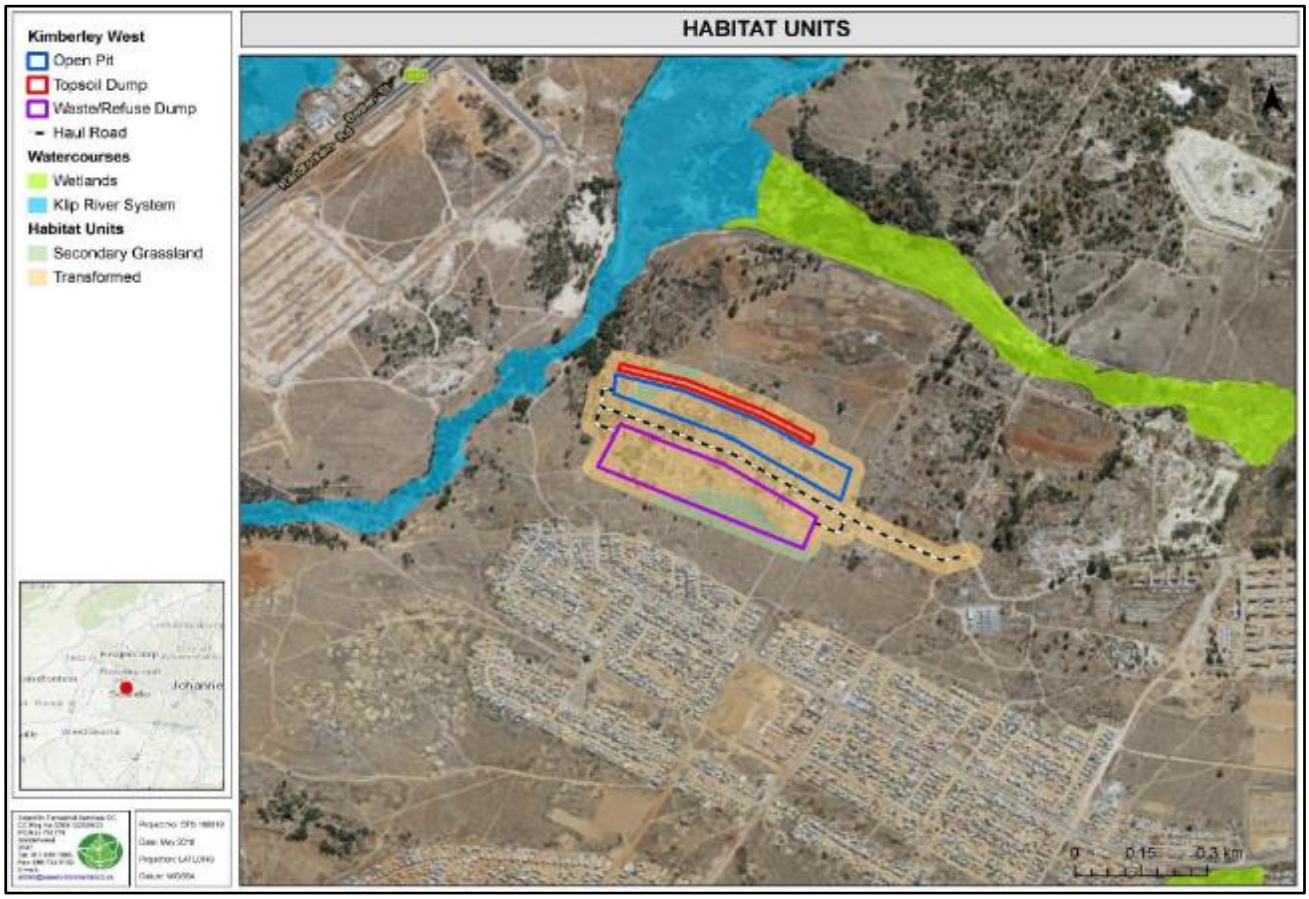


Figure 29: Habitat Units encountered within the Kimberley West MP area.

Faunal Scan

- The faunal habitat present within the Kimberley West MP areas, including the immediate surrounding area was negatively affected by historic and current anthropogenic activities, which includes mining activities, urban development and the proliferation of alien and invasive plant species that have led to a significant decrease of available natural faunal habitat;
- Only commonly occurring faunal species, which are more adapted at inhabiting disturbed habitats, were observed within the proposed mining permit area;
- No faunal SCC were observed during the field assessment and none are likely to occur within the proposed Kimberley West MP area. However, as a precaution, it is recommended that should any faunal SCC be encountered during the proposed mining activities, all operations must be stopped immediately, and a biodiversity specialist must be consulted, and a conservation plan designed and implemented;
- The proposed mining activity is thus deemed unlikely to pose a conservation threat to faunal species in the region should all proposed mitigation measures as set out in this report be adhered to.

Other Resources identified

- In order to identify possible sensitive habitat areas e.g. watercourses, that may potentially be impacted by the activities within the Kimberley West Mining Permit Application Area, a 500m "zone of investigation" was defined around the Mining Permit Application Area, in accordance with Regulation GN509 of the National Water Act, 1998 (Act 36 of 1998) promulgated in 2016. Assessing the wetland conditions, state and sensitivity did not form part of the scope of work for this assessment report, however the proximity of wetland features was highlighted as potential sensitive habitat within the investigation area; and
- No watercourses are located within the Kimberley West Mining Permit Application Area, however the Klip River (approximately 74m west of the proposed Mining Permit Application Area) and an associated channelled valley bottom wetland (approximately 383m north of the proposed Mining Permit Application Area) were identified within the Investigation Area around the Kimberley West Mining Permit Application Area.

Sensitivity

- The sensitivity of each habitat unit was determined in terms of the presence or potential for faunal and floral SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity. The table below

presents the sensitivity of each identified habitat units along with an associated conservation objective and implications for the proposed mining activities.

Table 21: A summary of sensitivity of each habitat unit and implications for the proposed mining activity.

Habitat Unit	Sensitivity	Conservation Objective	Development Implications
Secondary Grassland	Moderately Low	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.	The floral composition present within the Kimberley West mining permit area is considered to be in a pioneer state as a result of anthropogenic activities including alien and invasive plant proliferation This results in a moderately low ecological importance and sensitivity for the Secondary Grassland Habitat Unit. Therefore, it is highly unlikely to support any faunal or floral SCC. Proposed mining related activities would therefore have a low impact on this habitat unit, as the habitat is historically disturbed. Thus, no significant impact is anticipated should the proposed mining activity proceed.
Transformed Grassland	Low	Optimise development potential.	No SCC were found, and none are likely to utilise the Kimberley West mining permit area for breeding, habitation or frequent foraging purposes. Taking into consideration the existing urban surroundings and edge effects and low diversity of floral species and faunal habitat, proposed mining activities would therefore have a low impact on the flora and fauna habitat.

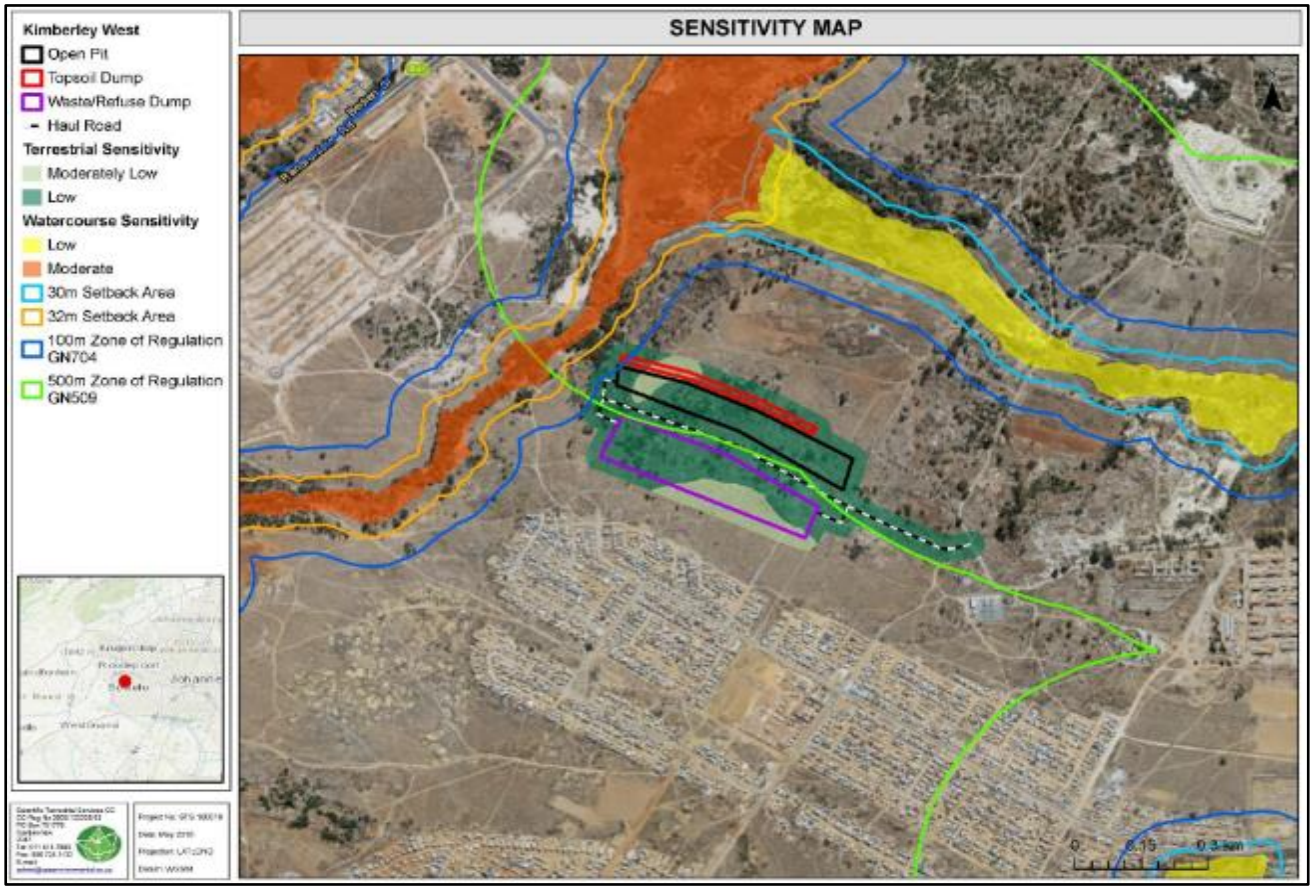


Figure 30: Ecological Sensitivity map of Kimberley West mining permit area

Conclusion of the Terrestrial Ecological Sensitivity Scan

The objective of this study was to provide sufficient information on the faunal and floral ecology of the area, together with other studies on the physical and socio-cultural environment for the Environmental Assessment Practitioner (EAP) and the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development. The need for conservation as well as the risks to other spheres of the physical and socio-cultural environment need to be compared and considered along with the need to ensure economic development of the country.

Based on the findings of the ecological assessment, from a terrestrial ecological perspective, the proposed mining activity poses minimal risk to the faunal and floral resource management and conservation initiatives for the area, due to the significantly decreased ecological integrity and transformation of the area. However, in order that the significance of perceived impacts remain low, all essential mitigation measures and recommendations presented in this report must be adhered to so as to ensure that the ecology within the proposed Mining Permit Application Area, along with the surrounding zone of influence is protected or adequately rehabilitated where necessary, in order to ensure that the intended post closure land use objectives are met.

Cultural and Heritage

The information in this section has been obtained from the Heritage Impact Assessment (PGS Heritage, May 2018) See Appendix G-iv for full report.

PGS Heritage conducted a Heritage Impact Assessment study of the proposed mining area. The aim of the study is to identify possible heritage sites and finds that may occur in the proposed mining permit area for the Kimberley West opencast area. The HIA aims to inform the Basic Assessment Reporting process (BAR) to assist the developer in managing any identified heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

The greater Roodepoort region has been extensively altered by historical mining activities since the farms Vogelstruisfontein, Roodepoort, Langlaagte and the two portions comprising Paardekraal (in Krugersdorp) were proclaimed as public diggings by the then ZAR government in 1886. A scan of SAHRIS revealed several previous heritage studies conducted in the general region of Roodepoort, however, only a few studies have been undertaken in the immediate vicinity of the Kimberley West opencast footprint. A number of possible sensitive area within and around the proposed site was identified based on historical information (See Figure 31). The sensitivity map as presented in Figure 31 is a theoretical sensitivity map based on historical information that may be present in the area.

During the field assessment (26 April and 8 May) of the Kimberley West pit footprint it was clear that any historical architectural structures that had existed in or adjacent to the footprint area had since been demolished. None of the futures present in Figure 31 were present on the site and **no SENSITIVE** heritage areas were identified during the site investigations.

The Heritage impact assessment concluded that during the fieldwork findings **no identified heritage resources situated inside or adjacent** to the Kimberley West foot print area. Since no heritage resources were identified within the Kimberley West opencast footprint area, the overall impact of the development on heritage resources is regarded as **VERY LOW** and no mitigation measures are required. It is the considered opinion of the Heritage specialist that overall impact on heritage resources is acceptably low and that the project can be approved from a heritage perspective.

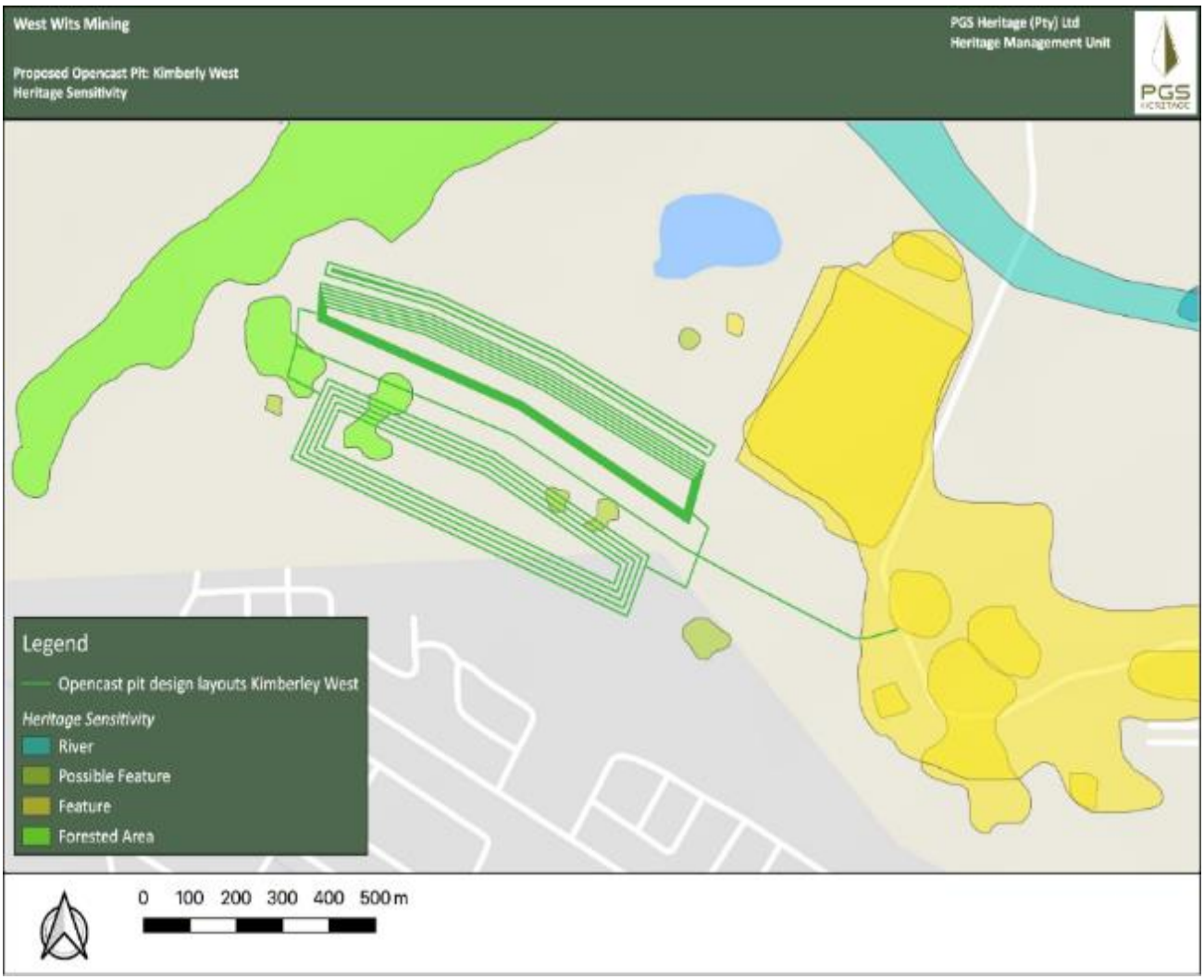
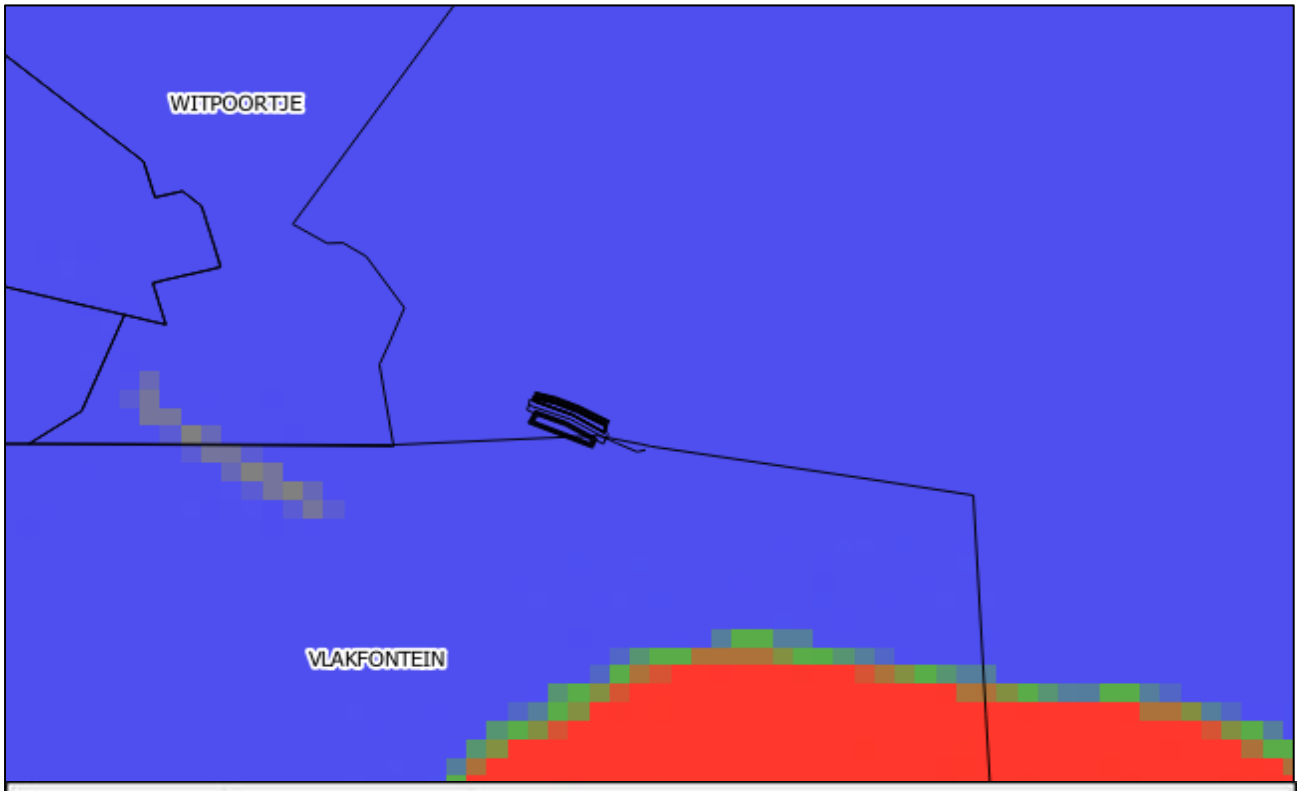


Figure 31: Heritage sensitivity map indicating possible sensitive areas within and around the Kimberley West opencast footprint

Palaeontology

The palaeontological sensitivity of the Witwatersrand Goldfields geology underlying the proposed opencast footprint and general region is rated as Low (See Figures below). It is therefore recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required, pending the discovery of newly discovered fossils. It is thus considered that the establishing of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.



Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 32: Overlay of the Kimberley West opencast footprint on the palaeo-sensitivity map from the SAHRIS database

Noise Baseline Assessment

The information in this section has been obtained from the Noise Impact Assessment (Airshed Planning Professionals, May 2018). For full specialist study refer to Appendix G-v.

Mining and associated activities often emit significant noise levels which can become a nuisance or health risk when not properly managed. This impact may affect not only to the mining area, but also to the surrounding land users and occupiers. The main objective of the noise specialist study was to determine the potential impact on the acoustic environment and noise sensitive receptors (NSRs) as a result of the development of the proposed project and recommend suitable management and mitigation measures.

In South Africa, provision is made for the regulation of noise under the National Environmental Management Air Quality Act (NEMAQA) (Act. 39 of 2004) but environmental noise limits have yet to be set. It is believed that when published, national criteria will make extensive reference to SANS 10103 of 2008 '*The measurement and rating of environmental noise with respect to annoyance and to speech communication'*. This standard has been widely applied in South Africa and is frequently used by local authorities when investigating noise complaints. These guidelines, which are in line with those published by the IFC in their General EHS Guidelines and World Health Organisation (WHO) *Guidelines for Community Noise*, were considered in the assessment.

The data from a baseline noise surveys conducted on 26 and 27 March 2018 was studied to determine current noise levels within the area. The baseline acoustic environment was described in terms of the location of NSRs, the ability of the environment to attenuate noise over long distances, as well as existing background and baseline noise levels. The following was found:

- The closest NSRs to the project site is ~120 m to the southwest.
- Birds, insects, vehicles and community activity are the main contributors to the acoustic environment of the area.
- The baseline noise levels (as measured during the survey) was 51.7 dBA during the day.

Noise emissions from diesel powered mobile equipment were estimated using LW predictions for industrial machinery (Bruce & Moritz, 1998), where LW estimates are a function of the power rating of the equipment engine. General materials handling LW's were obtained from the database of François Malherbe Acoustic Consulting cc (FMAC) for similar operations. Values from the database are based on source measurements. Estimates of road traffic were made given mining and production rates, truck capacities, assumed vehicle speeds and road conditions.

The source inventory, local meteorological conditions and information on local land use were used to populate the noise propagation model (CadnaA, ISO 9613). The propagation of noise was calculated over an area of 2.8 km east-west by 2.4 km north-south. The area was divided into a grid matrix with a 20-m resolution. Results are also presented in isopleth form (**Figure 33**). The simulated equivalent continuous day-time rating level (LReq,n) of 55 dBA (guideline level) extends ~220 m to the northeast

of the opencast pit area and ~180 m to the southwest of the waste rock dump. According to SANS 10103 (2008); 'little' reaction with '**sporadic complaints'** may be expected from the community for increased noise levels up to 10 dBA. The predicted increase in noise levels at the closest NSRs to the southwest of the project site is expected to be 10 dBA during day-time conditions (**Figure 33**). 'Little' reaction is therefore expected from the community due to the project. Change of 10 dB is subjectively perceived as a doubling in the loudness of the noise.

The main findings of the impact assessment are:

- A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area.
- The noise levels from the project operations exceed the selected noise criteria at the closest NSRs to the southwest of project site with change in day-time noise from baseline conditions expected to be less than 10 dBA. According to SANS 10103 (2008); 'little' reaction with 'sporadic complaints' may be expected from the community for increased noise levels up to 10 dBA.
- Construction and closure phase impacts are expected to me similar or slightly lower than simulated noise impacts of the operational phase.

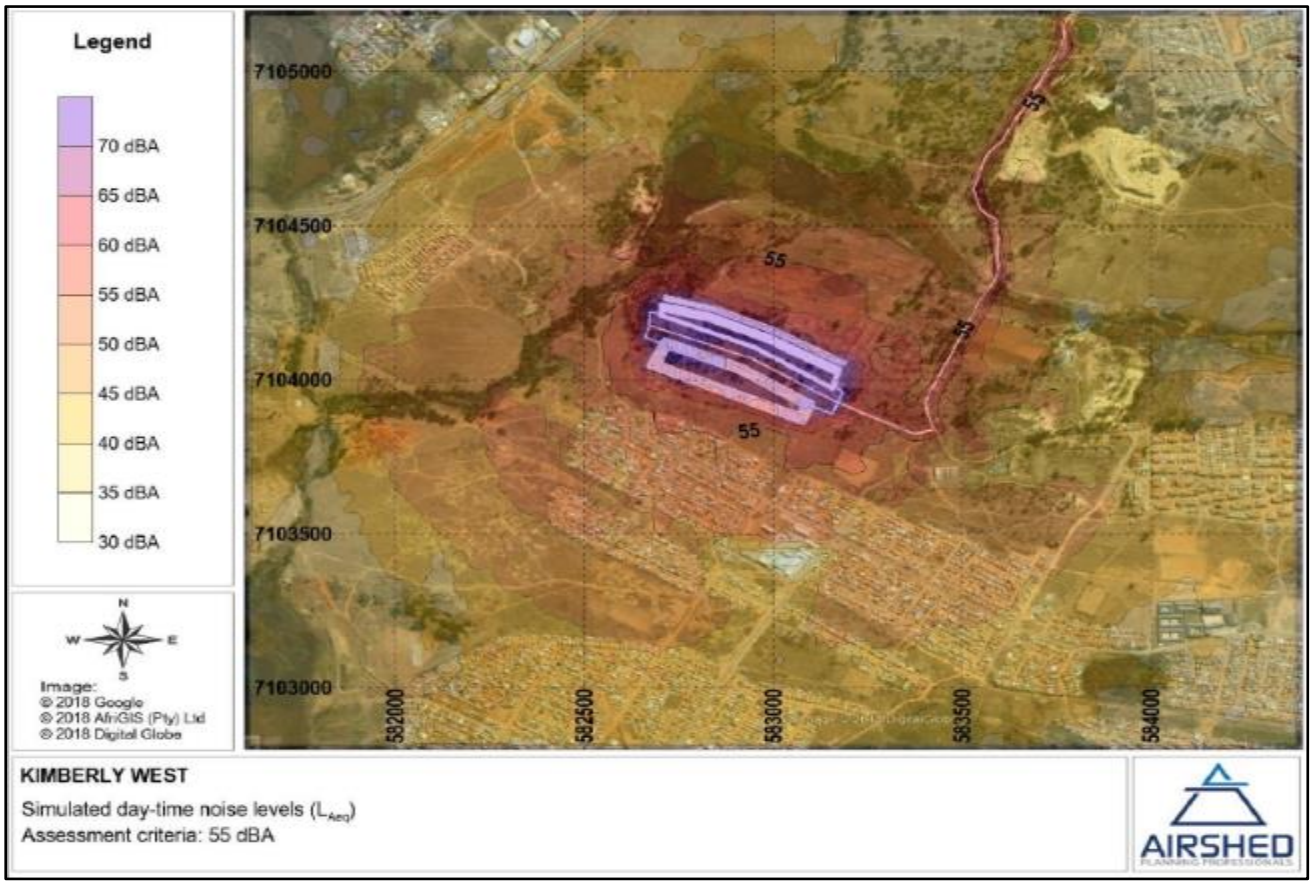


Figure 33: Simulated equivalent continuous day-time rating level ($L_{Req,d}$) for project activities

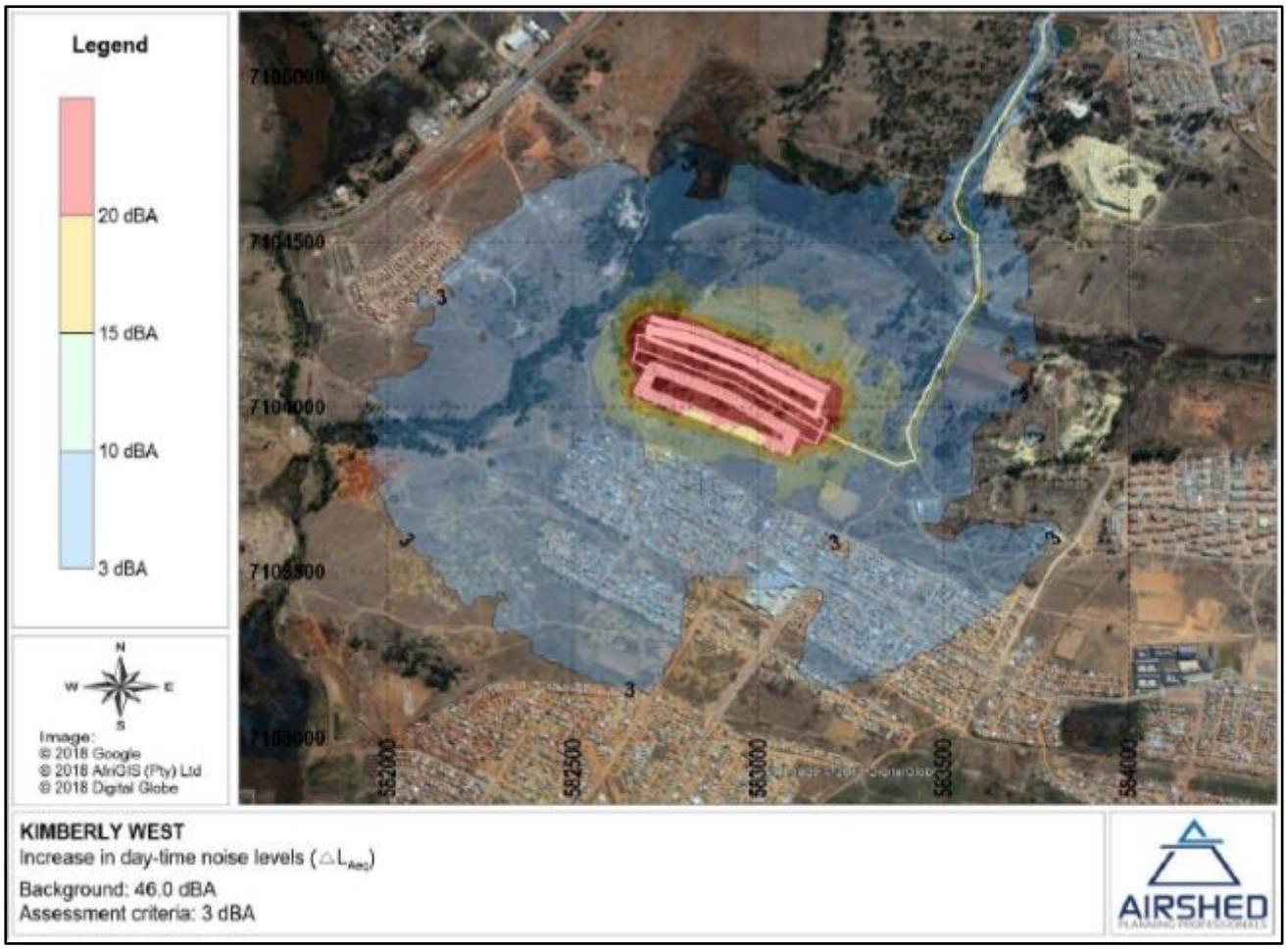


Figure 34: Simulated increase in equivalent continuous day-time rating level ($\Delta L_{Req,d}$) above the baseline

The following key recommendations should be included in the project environmental management programme:

- A monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103:
- Annually during the operational phase at the closest NSR; and
- In response to complaints received.

Based on the findings of the assessment and provided the measures planned and recommended are in place, it is the specialist opinion that the project may be authorised.

Air Quality Baseline

The information in this section has been obtained from the Air Quality Impact Assessment (Airshed Planning Professionals, May 2018). For full study refer to Appendix G-vi.

The Kimberley West operations fall across the northern boundary of the Vaal Triangle Priority area (**Figure 35**). The Vaal Triangle Airshed was declared the first priority area by the minister on 21 April 2006. The location of the proposed Kimberley West operations within the Vaal Triangle Priority area might have several important implications for these operations. New developments which are associated with atmospheric emissions and hence the potential for contributing to air pollutant concentrations are being subject to intense scrutiny by national air pollution control officers. Emphasis is being placed on ensuring that best practice control measures are being proposed for implementation and that the development will not substantially add to the existing air pollution burden in the region.

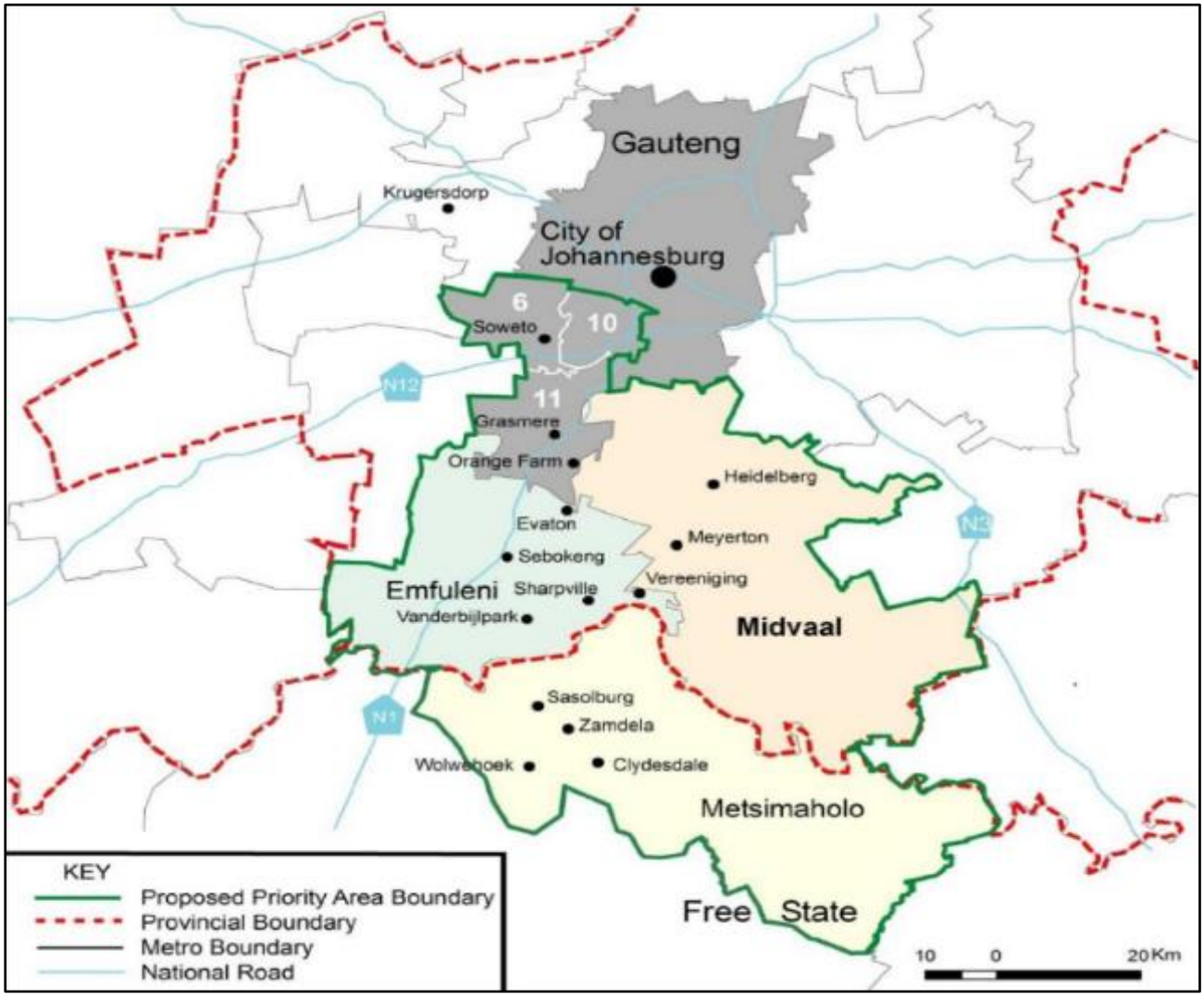


Figure 35: Boundaries of the Vaal Triangle Airshed Priority Area, as declared on 21 April 2006

Air quality guidelines and standards are fundamental to effective air quality management, providing the link between the source of atmospheric emissions and the user of that air at the downstream receptor site. The ambient air quality standards are intended to indicate safe daily exposure levels for the majority of the population, including the very young and the elderly, throughout an individual's lifetime. Sensitive receptors in the vicinity of the Kimberley West operations include the residential areas of Bram Fishervillle to the south and Valkfontein to the west (**Figure 36**). For the purposes of this assessment all residences within these areas were considered as sensitive receptors.

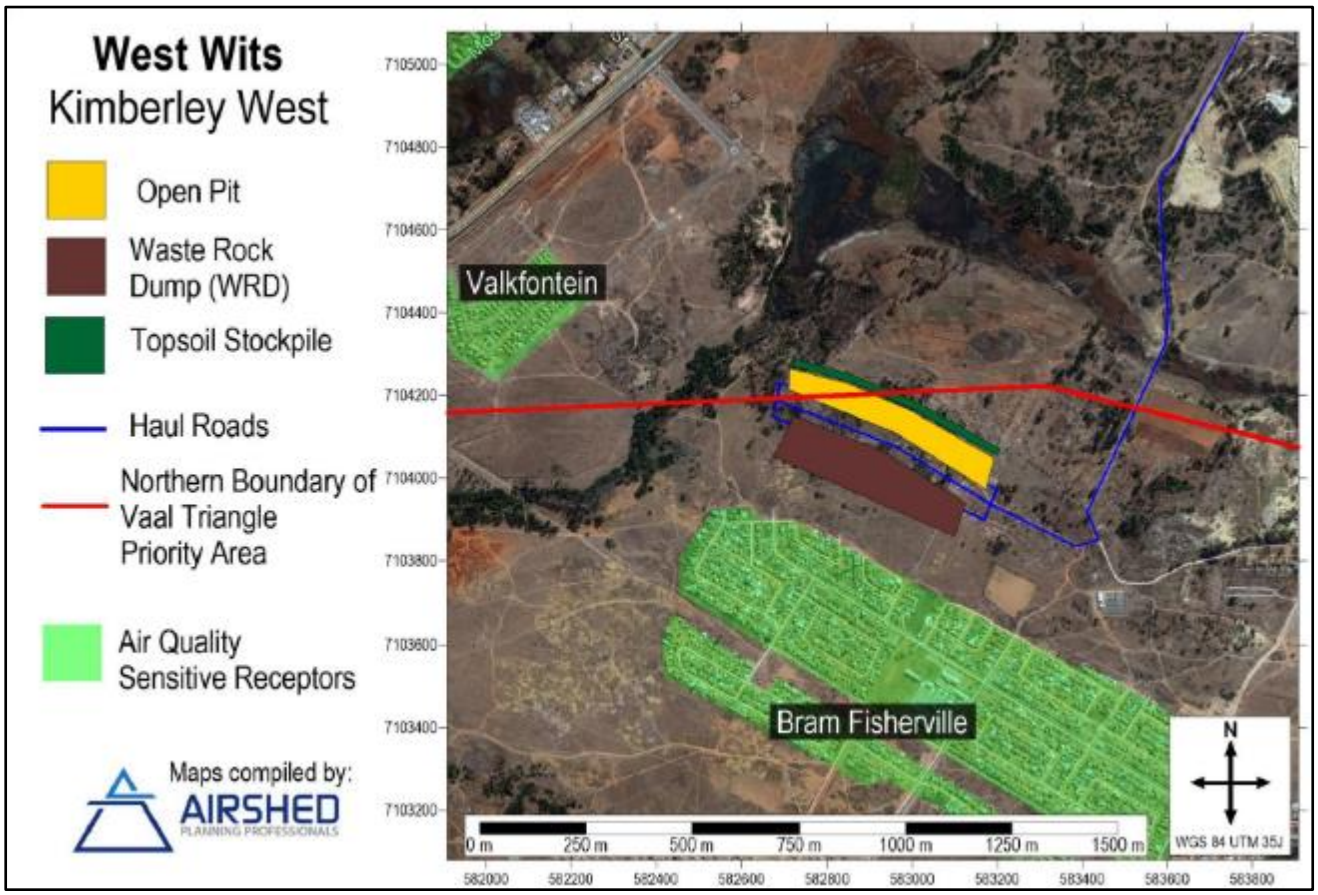


Figure 36: Location of potentially sensitive receptors in relation to the project

Ambient Air Quality within the Region

Sampling results from a dustfall monitoring network currently operated to the south and southeast of the Kimberley West study area was made available for inclusion in the air quality study. The sampling locations with available data for 2017, as provided by the operator of the dust fallout network, are shown in **Figure 37**. Dustfall for the period 2017 is provided in **Table 22**.

In accordance with the National Dust Control Regulation (NDCR) the dustfall limits (600 mg/m²/day for residential areas and 1200 mg/m²/day for non-residential areas) allows for two exceedances in a year, not sequential months. The NDCR for non-residential areas are exceeded Modise,

Maswanganyi and George Thengwani and for residential areas are exceeded at Moreroa and Yvonne Meno during the period 2017. The high variability between dust fallout rates at each sampling location indicates that dust fallout at each location is likely mainly influenced by localised sources. High dust fallout rates at all current sampling locations during the windy spring months from September to November indicates that wind erosion is likely a significant source of dust emissions in the study area

Table 22: Available dust fallout data in the study area for the period 2017

Sampling Site	Sampling month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Modise	424	573	182	233	97	447	997	543	6492	5327	4588	2029
Mashilane	123	214	111	108	0	0	0	0	0	0	0	0
Moreroa	366	211	277	292	227	410	211	247	3308	1114	1640	730
Maswanganyi	195	340	295	175	193	376		266	2495	2792	2172	1843
George Thengwani	482	342	185	238	551	373	442	356	6193	3243	1888	1118
Yvonne Meno	167	342	147	109	383	196	332	269	1681	803	952	202
Anna Doornkop	204	324	246	217	259	198	66	63		675	378	327

Figure 37: Current dust fallout sampling locations with available results for 2017.

Emissions Inventory

Emissions from the Kimberley West operations were calculated using emissions factors published by the US EPA AP42 Section 13.2.4 (Aggregate Handling and Storage Piles) and Section 13.2.2 (Unpaved Roads), and the Australian NPi Emission Estimation Technique Manuals for Combustion Engines (Version 3.0) and Mining (Version 3.1). Emission rates were calculated based on an average 60 tonnes/hour ROM mining rate and a 780 tonnes/hour waste rock removal rate. Vehicle exhaust emissions were calculated based on the estimated fuel usage of the Kimberley West fleet. Mining at the Kimberley West operations will take place from 6:00 to 18:00 on Mondays to Fridays and 6:00 to 14:00 on Saturdays.

Dispersion Model Selection and Results

Dispersion modelling simulations were undertaken to determine highest hourly, highest daily and annual average ground level concentrations for each of the pollutants considered for the operational phase. Averaging periods were selected to facilitate the comparison of simulated pollutant concentrations to the SA NAAQS. With no mitigation measures applied simulated highest daily PM_{10} concentrations exceed the NAAQS at the closest sensitive receptor locations to the south of the operations. With simple mitigation measures such as wet suppression of dust at material handling points and regular water sprays on haul roads, simulated incremental PM_{10} concentrations due to the Kimberley West operations are in compliance with the SA NAAQS at all sensitive receptor locations (**Figure 38**).

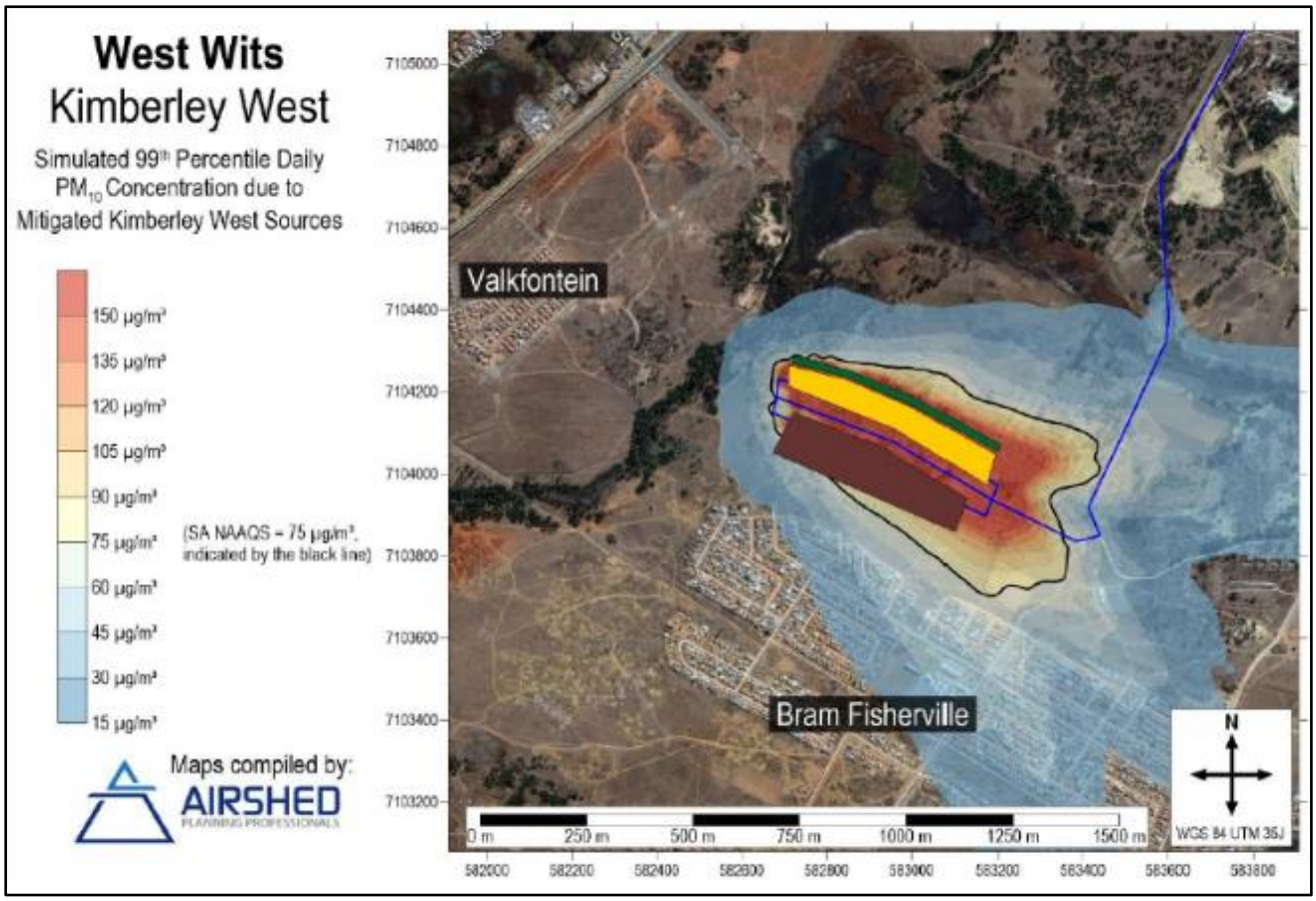


Figure 38: Simulated incremental mitigated 99th percentile (4th highest) PM10 concentrations due to Kimberley West operations

Even with no mitigation measures applied simulated $PM_{2.5}$, NO_2, SO_2, and CO concentrations are in compliance with the SA NAAQS for all averaging periods and simulated highest monthly dust fallout rates (**Figure 39**) are in compliance with the SA NDCR residential limit at all sensitive receptor locations and in compliance with the SA NDCR non-residential limit at all off-site areas.

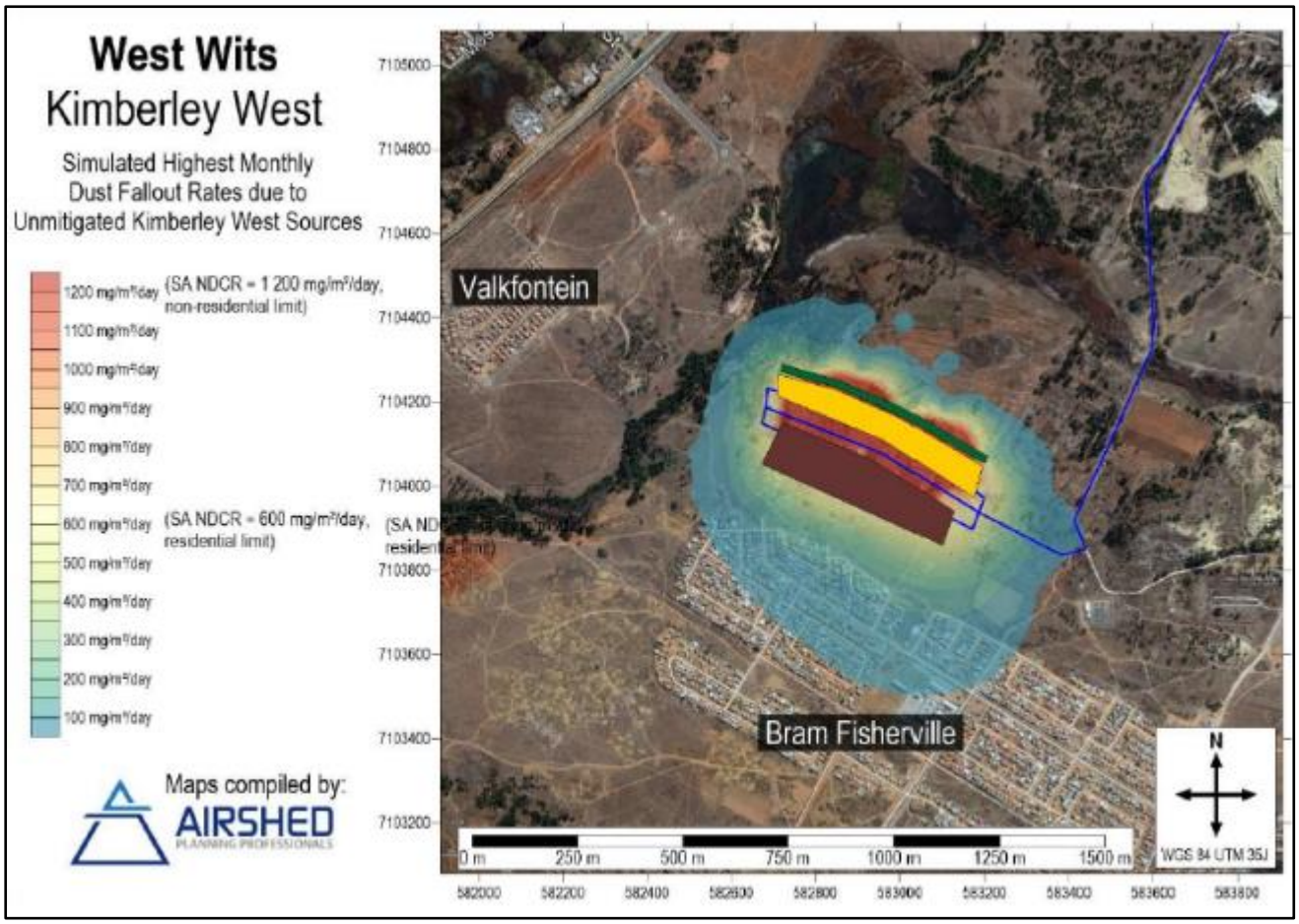


Figure 39: Simulated incremental unmitigated highest monthly dust fallout rates due to Kimberley West operations

The main findings from the baseline assessment are as follows:

- The flow field is dominated by winds from the north-north-east. During day-time conditions, winds from the north increase in frequency, with winds from the north-north-east sector increasing at night.
- Existing sources of emissions in the study area include vehicle exhaust and entrainment on paved and unpaved roads, household fuel burning, biomass burning (veld fires), industrial activities, mining operations and wind erosion from exposed areas and tailings storage facilities. High dust fallout rates recorded at all current sampling locations during the windy spring months from September to November indicates that wind erosion is likely a significant source of dust emissions in the study area.

The main findings from the impact assessment are as follows:

- The main sources of dust emissions from the Kimberley West operations are likely to be materials handling of ROM and waste rock in the pit and of waste rock at the WRD and vehicle entrainment emissions from haul trucks and other mobile equipment.

- With no mitigation measures applied simulated highest daily PM_{10} concentrations exceed the NAAQS at the closest sensitive receptor locations to the south of the operations. With simple mitigation measures such as wet suppression of dust at material handling points and regular water sprays on haul roads, simulated incremental PM_{10} concentrations due to the Kimberley West operations are in compliance with the SA NAAQS at all sensitive receptor locations.
- Even with no mitigation measures applied simulated $PM_{2.5}$, NO_2, SO_2, and CO concentrations are in compliance with the SA NAAQS for all averaging periods and simulated highest monthly dust fallout rates are in compliance with the SA NDCR residential limit at all sensitive receptor locations and in compliance with the SA NDCR non-residential limit at all off-site areas.
- With no mitigation measures applied the incremental impact of the Kimberley West project on the receiving environment is expected to be MEDIUM. With 50% mitigation of material handling emissions (achievable with the mitigation measures recommended below) and 30% mitigation of vehicle entrained dust from unpaved roads, the incremental impact of the Kimberley West project is expected to be LOW. The cumulative impact during the mining phase (with mitigation measures applied) is expected to be MEDIUM, but the short life of the Kimberley West operations means that long term impacts (annual average pollutant concentrations) are unlikely to exceed the SA NAAQS.

Visual Impact and Sense of Place

The receiving environment of the Kimberley West study area is associated with historic and current anthropogenic activities, which includes mining activities, urban development and the proliferation of alien and invasive plant species that have led to a significant decrease of available natural faunal habitat. A number of historical tailing storage dumps and a number of township developments are located within the surrounding environment. The Bram Fisherville residential area is located approximately 120m to the south of the proposed mining area.

The topography is characterised by gently undulating terrain with drainage lines and rivers in the valleys. The sense of place associated with the study areas are related to the landscape character type of the area – historical and current mining, historical tailing dumps, residential development and commercial areas. The natural area are highly disturbed and of low medium to low significant.

The proposed mining will be completed within a period of 4 to 5 months and the rehabilitation will be completed within 8 to 9 months. Although the visual impact will be considerable to the surrounding sensitive receptors the duration of the impact will be of limited duration. After rehabilitation no visual impact will remain.

During the operational phase the topsoil and waste rock dumps will be positioned to create a safety, visual and/or noise berm between the mining operations and nearby receptors. Dust suppression by means of water will be applied to the mining area and access/haul roads to prevent visual impact as a result of dust pollution. The preferred mining method will have a positive impact on the visual impact compared to drill and blasting as a mining method as no dust clouds will be created.

Traffic Impact Assessment

Information in this section was obtained from the Traffic Impact Assessment (Siyazi Limpopo Consulting Services, May 2018). For full specialist study refer to Appendix G-vii.

The purpose of the baseline traffic study was to determine the status of the existing roads network and vehicle traffic movements (status quo) adjacent the proposed mining development and provide recommendations on traffic related improvements for the current situation and provide baseline information for future planning as part of the proposed mining development.

The proposed mining development would involve opencast mining which would include conventional open pit mining operations of load and haul. Ore excavated will be transported by haul trucks via the existing roads network to a processing plant located of site. Locations for processing ore will be either Driekop Gold Mine or Sibanye Gold Mine. It is proposed that up to 67 200 tonnes of ore would be transported to the off-site processing plant over a maximum period of 4 to 5 months. It is anticipated that 6 trucks will be utilised doing 3 trips a day (i.e. Average of 18 trips per day) for the transport of ore.

As summary of the extent of the proposed mining development for all project phases are presented in the table below.

Table 23: Summary of the extent of the proposed mining development for the respective phases

<table>
<tr><th rowspan="2">DESCRIPTION</th><th colspan="4">PHASE</th></tr>
<tr><th>CONSTRUCTION</th><th>OPERATIONAL</th><th>DECOMMISSIONING</th><th>CLOSURE</th></tr>
<tr><td>ROM Ore to be transported off site for processing</td><td rowspan="12">The relevant proposed mining development does not include any construction of mining infrastructure since the ROM ore will only be excavated and transported to an off-site processing facility.

Only some ground clearing will be done of the relevant property and this is envisaged to generate less vehicle trips than the operational phase</td><td>Total: ±67 200
Per Month: ±13 4440</td><td>Not relevant.
(Activities include the demolition of all infrastructures and the rehabilitation of the site.)</td><td>Not relevant.
(All activities on the site, although limited, are planned to be completed and the mining company will leave the site.)</td></tr>
<tr><td>Duration</td><td>± 5 months</td><td colspan="2">± 2 months</td></tr>
<tr><td>Relevant time frame</td><td>Early 2019</td><td colspan="2">After operational phase is completed</td></tr>
<tr><td rowspan="2">Location from where workers are expected to come for all phases</td><td colspan="2">Management and supervision</td><td>50% from the east and 50% from the west of the proposed mining development (travelling via Randfontein Road)</td></tr>
<tr><td colspan="2">Semi-skilled workers</td><td>From areas around the proposed site via existing public transport or walking to site</td></tr>
<tr><td>Total number of management / supervision staff</td><td>9</td><td colspan="2" rowspan="3">Not known at the time of preparing the traffic impact assessment.</td></tr>
<tr><td>Total number of semi-skilled staff</td><td>38</td></tr>
<tr><td>Number of shifts and shift times for all staff</td><td>Anticipated to be one shift per day, Mondays to Fridays from 07:00 to 17:00.</td></tr>
<tr><td>Heavy vehicles delivering consumables per day via road transport</td><td>5</td><td>Limited, occasionally.</td><td>Limited, occasionally.</td></tr>
<tr><td>Assumed maximum % of heavy vehicles during AM or PM peak respectively</td><td>20%</td><td>Limited, occasionally.</td><td>Limited, occasionally.</td></tr>
<tr><td>Calculated number of vehicle trips to be generated per AM or PM peak hour</td><td>AM – 19
PM – 19
(See Tables 2.7 of Section 2)</td><td>Less than construction and operational phases.</td><td>Less than construction and operational phases.</td></tr>
</table>

Access Road

Access to and from the proposed Kimberley Reef West site would require a new access road to the north of the proposed site to link up with Randfontein Road (Road R41) and should avoid the Goudrand Township. Three potential points for the proposed access road to link up with Randfontein Road (Road R41) were identified which are (**Figure 40**):

- Via a new intersection with Randfontein Road (Road R41) west of the Goudrand township (Option 1: Preferred Option);
- Linking up at the existing intersection of Randfontein Road (Road R41) and Corlette Avenue (Point D). This option would require a low water bridge (Option 2); or
- Via an internal haul road to the east from where access could be gained to and from Randfontein Road (Road R41) via Gustav Street at Point G (Option 3).

It is important to take note that it would be required that the proposed access road would need to serve the broader area around the proposed mining development and not be exclusively for the proposed mining development. Further investigation and collaboration with the relevant roads authority and the proposed mining development project team would be required as part of the detail design phase. Refer to **Figure 40** for a graphical presentation of the proposed potential access routes for consideration.

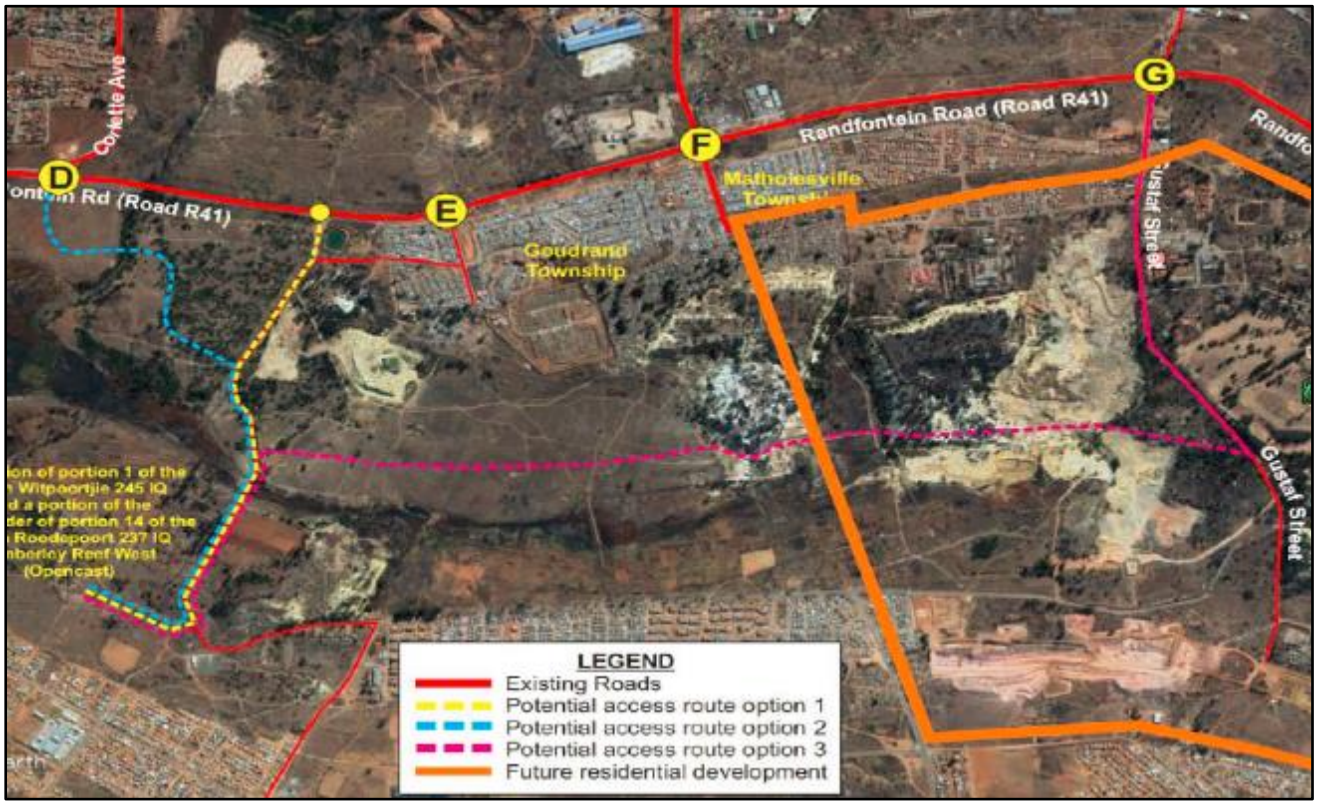


Figure 40: Potential Access to the Proposed Kimberley West Site

Future Planned Roads

Information was gathered in terms of the future planned roads network within the vicinity of the proposed mining development. Information was obtained from the Gauteng Province: Department of Roads and Transport (Gautrans) “Gauteng Roads Atlas 2015/2016”. The following planned future roads were identified:

- Proposed extension of Road N17 south of the proposed mining development; and
- Proposed Road PWV5 west of the proposed mining development.

Refer to **Figure 41** for a graphical presentation of the proposed road network within the vicinity of the proposed mining development. It is anticipated that the construction of the proposed extension of Road N17 and the proposed Road PWV5 is not planned for in the near future and it is anticipated that the proposed roads would not have a major impact on the proposed mining development activities. Further collaboration with the relevant road authorities will be conducted as part of the traffic impact assessment to confirm the last mentioned.

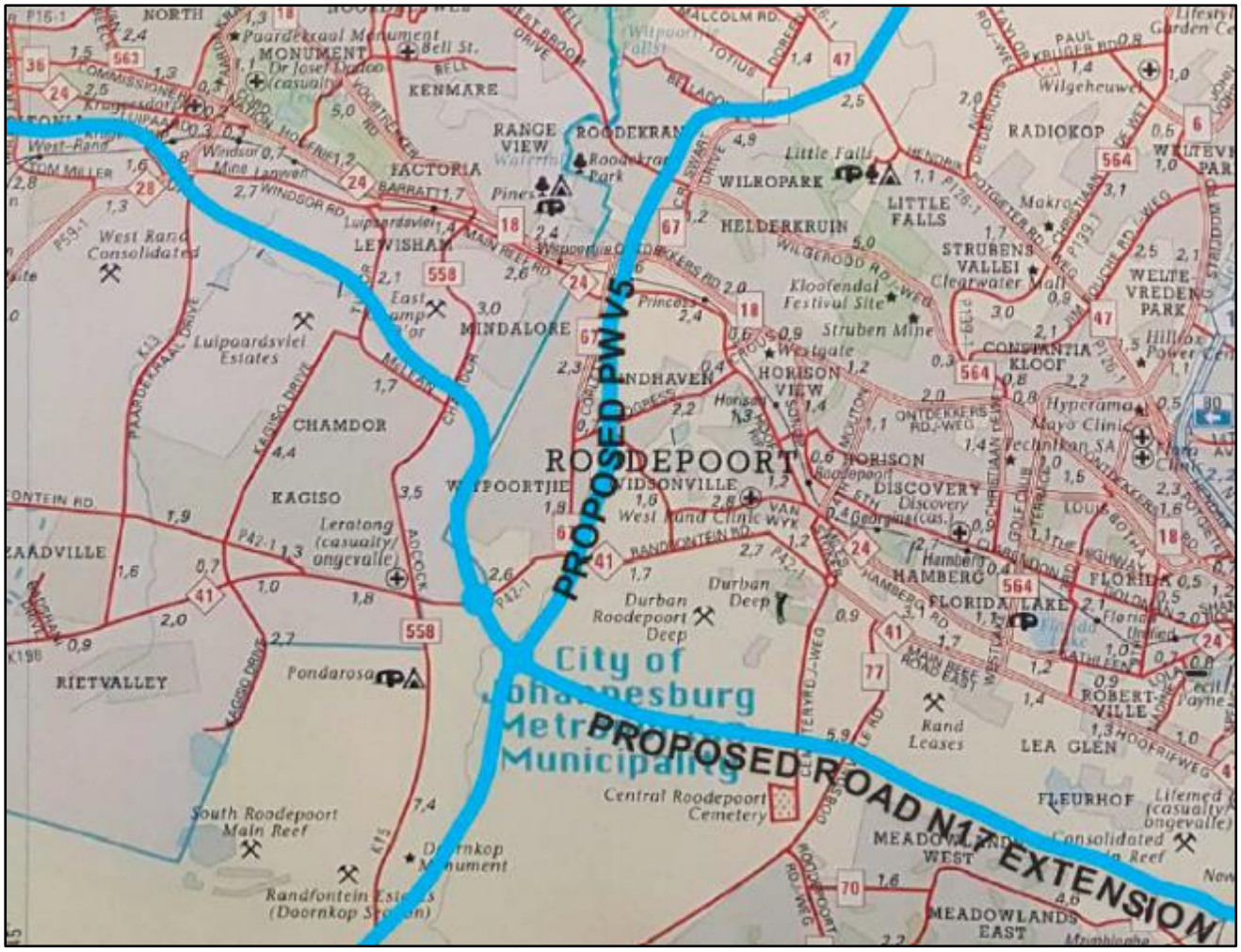


Figure 41: Proposed Future Roads Network

Determination of the levels of service at the relevant intersections.

The "***SIDRA Intersection***" software was used as an aid for the design and evaluation of the relevant intersections. The following intersections were evaluated for levels of service:

- Point D: Intersection of Randfontein Road (Road R41) and Corlette Avenue;
- Point E: Intersection of Randfontein Road (Road R41) and Mathews Goniwe Drive;
- Point F: Intersection of Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard; and
- Point G: Intersection of Randfontein Road (Road R41) and Gustaf Street; and
- Option 1: Preferred proposed Access Intersection with Randfontein Road (Road R41).

From the results it is possible to note that:

- The intersections of Points E, F and G would require geometric upgrading and traffic light signal cycle revision without the proposed mining development;
- Double lanes in the eastern and western directions would be required for the full relevant section of Randfontein Road (Road R41) under investigation;
- An additional third through lane on the western approach at Point G would be required; and
- No additional geometric upgrading would be required due to the proposed mining development (as long as the required road network improvements as recommended are implemented) apart from the construction of the proposed Access intersection along Randfontein Road.

Sensitive Road Sections

Figure 42 is an indication of the sensitive road sections and intersections indicating existing sensitive area and intersections WITHOUT the proposed mining development and mitigation measures. The anticipated sensitive road sections and intersections with background mitigation and WITH the proposed mining development is presented in **Figure 43**.

The sensitivity of the relevant section of Randfontein Road (Road R41) under investigation and the relevant intersections under investigation would improve with mitigating measures that is recommended and it is concluded the proposed mining development would an insignificant impact on the sensitivity of the roads network within the vicinity.

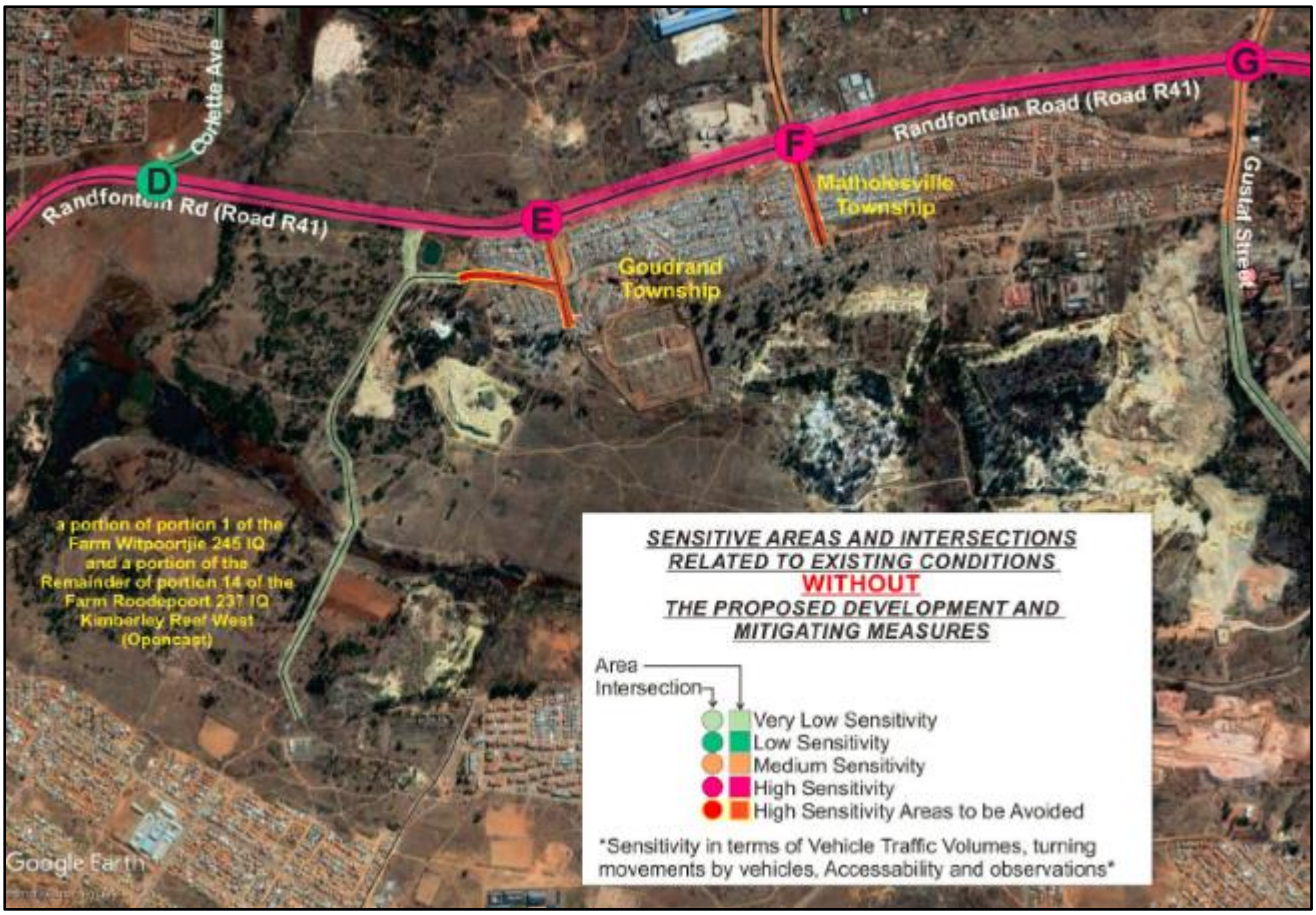


Figure 42: Presentation of existing sensitive road sections and intersections without the proposed mining development

Figure 43: Presentation of existing sensitive road sections and intersections with background mitigating measures with proposed mining development

Conclusion and Recommendations

Ore excavated will be transported by haul trucks via the existing roads network to a processing plant located of site. Locations for processing ore will be either Driekop Gold Mine or Sibanye Gold Mine. It is proposed that up to 67 200 tonnes of ore would be transported to the off-site processing plant over a maximum period of 4 to 5 months. It is anticipated that 6 trucks will be utilised doing 3 trips a day (i.e. Average of 18 trips per day) for the transport of ore.

The following recommendations are made in terms of the detailed design phase of roads for the proposed project:

- Detailed investigations should be conducted in conjunction with the relevant road authority in terms of the existing quality and potential life span of the existing road surface layers of the roads where consumables, ROM ore and workers will be transported; and
- A road maintenance plan needs to be prepared in conjunction with the relevant road authority on public roads where trucks will operate as soon as the project has been approved in order to ensure that the consumables, ROM ore and workers can be transported at all times

As part of the proposed mining development, it is recommended that ore haulage heavy vehicles avoid transporting ore during the relevant Am and PM peak periods.

In conclusion of the findings as part of the investigations, Siyazi Gauteng Consulting Services (Pty) Ltd is of the opinion that the proposed mining development would have a manageable impact on the relevant roads network as long as the mitigating measures are implemented as recommended as part of the Traffic impact assessment report and should thus be granted authorisation.

Closure Assessment

Information in this section was obtained from the Closure Plan (Golder, May 2018). For full specialist statement refer to Appendix G-ix.

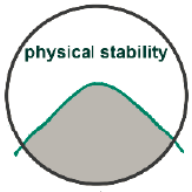
Golder Associates Africa (Pty) Ltd (Golder) was appointed to compile a Mine Closure Plan (Closure Pan) for the proposed Kimberley West opencast pit. The Closure Plan was compiled in alignment to the NEMA GN R. 1147 Regulations. Good practice measures widely adopted by the South African and international gold mining industry were incorporated where deemed necessary.

The approach adopted in undertaking closure planning for Kimberley West is founded on three key planning foci.

1. The application of an iterative closure planning / design process

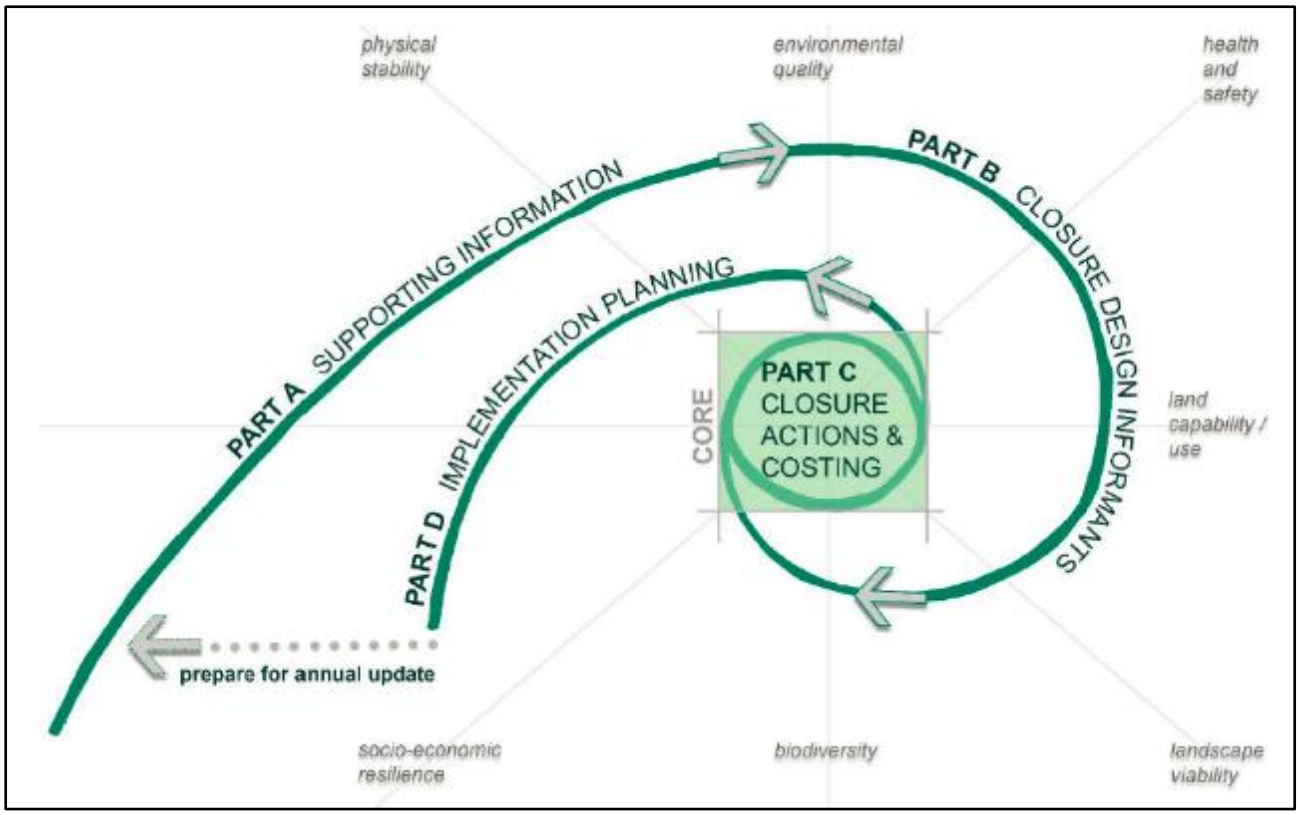
This iterative process underpins the principle that planning for closure should occur throughout the life of the mine, with solutions continually being refined via a cyclical process of survey, analysis and design.

2. An entrenchment of seven key closure objectives:

	To create a physically stable, safe, rehabilitated landscape that limits long term environmental degradation, erosion and failure / collapse of unavoidably remnant mining residue which are present on the mine site post closure, thus enabling the successful establishment of the planned post-mining land use
	To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contamination arising from the mine site or individual facilities, as well as to sustain catchment yield as far as possible after closure
	To limit the possible health and safety threats to humans and animals using the rehabilitated mine site as it becomes available
	To re-instate a suitable land capability over the mine site to facilitate the progressive implementation of the planned post-mining land use
	To create a landscape that is self-sustaining and over time will converge to the desired ecosystem structure, function and composition
	To encourage, where appropriate and as aligned to the planned post-mining land use, the re-establishment of native vegetation on the rehabilitated mine site such that the terrestrial biodiversity is largely re-instated over time
	To ensure that there constructive engagement and alignment with local communities and regulatory authorities regarding the proposed end land use

3. The application of a tiered risk-based process to allow for a true understanding of the challenges and opportunities that needs to be addressed and refining, abstracting and prioritising essential issues.

The structure, development (intensification) and application of the above foci is illustrated below, with each section of the Closure plan described below.



Preferred Closure Options

The preferred option for current closure planning is:

- Backfill the open pit with all the available overburden to create a free-draining post mining landform in line with final land use requirements;
- Construct slopes congruent with the surrounding topography and not steeper than a gradient of 1:9;
- Replace all topsoil stripped ahead of mining;
- Plant naturally occurring grasses to prevent erosion, to provide a wilderness land use, potential habitat and limited grazing potential.

Planned Rehabilitation

The mining layout is indicated in Figure 44. The footprint of the overburden stockpile is reduced through the implementation of concurrent rehabilitation. The anticipated stages of mining are also indicated in Figure 44. The final land form is presented in Figure 45.

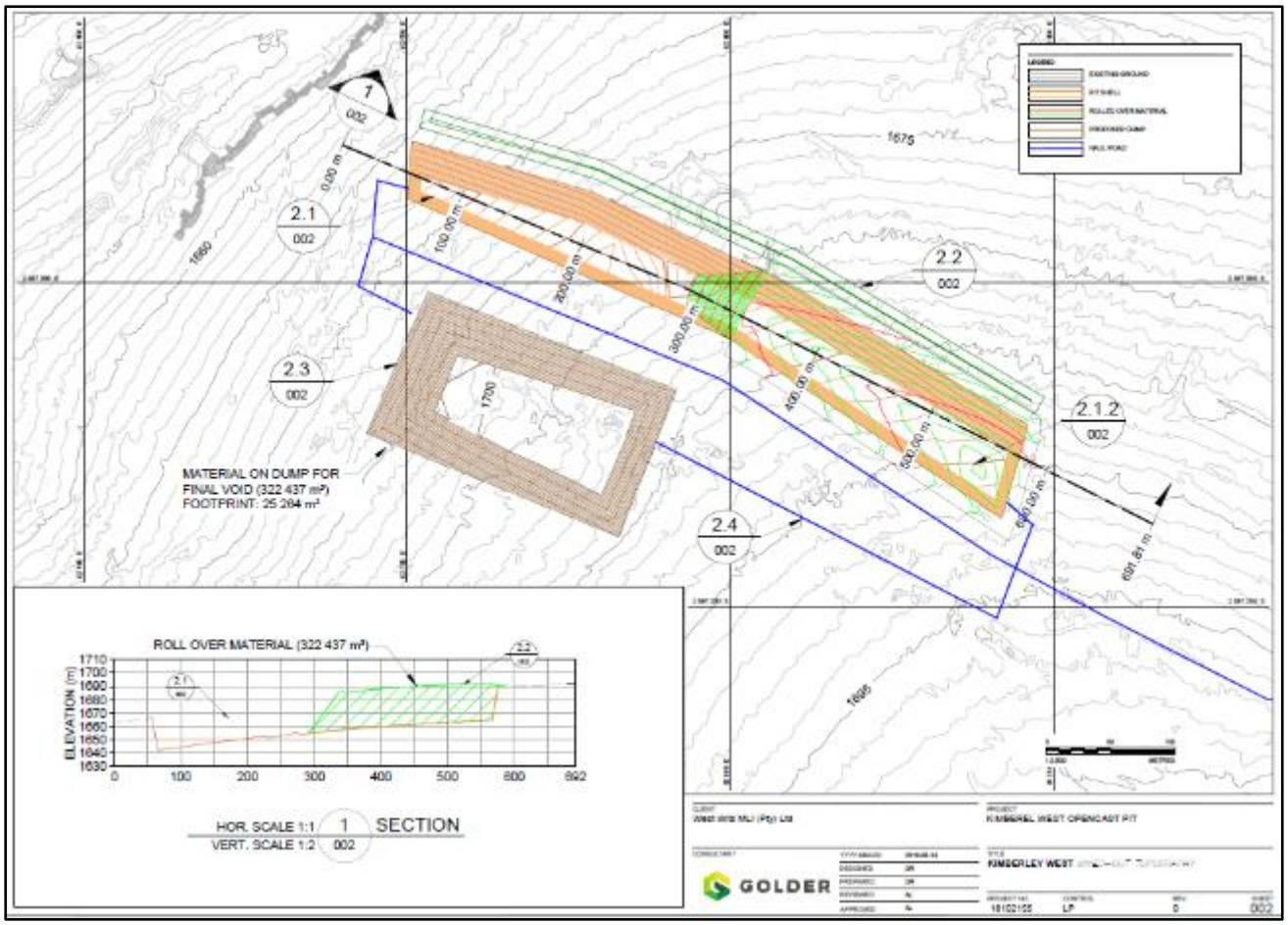


Figure 44: Mining sequence, concurrent backfill and final void.

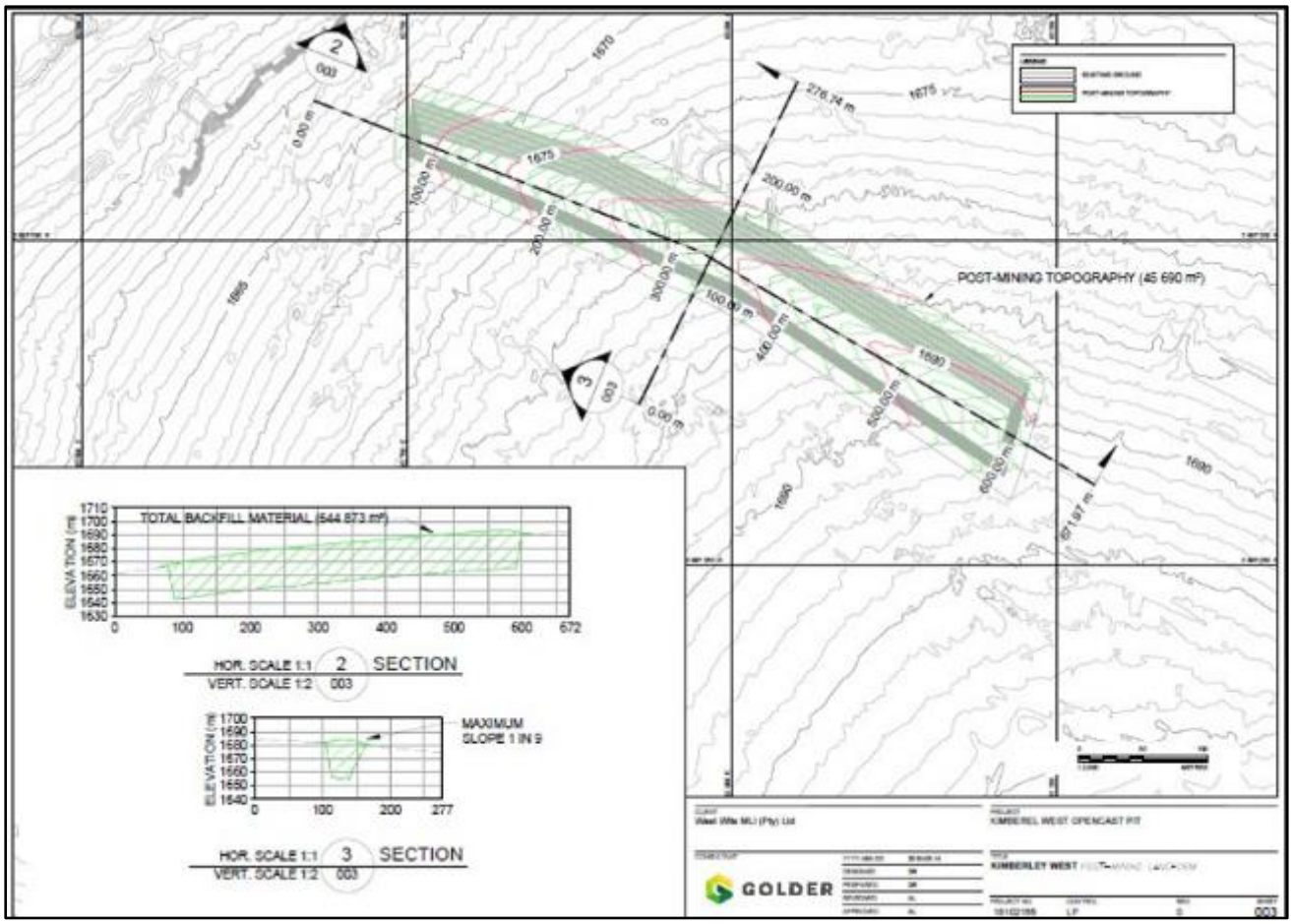


Figure 45: Post Mining Landform

Preliminary Closure Schedule

The preliminary closure schedule is presented in Schedule Table, including the closure and post closure timeline. The closure plan is a live document that should be updated regularly throughout the life of the mine, as solutions are continually refined and the knowledge base is developed.

Table 24: Preliminary Closure Schedule

Facility life/ phase	Activity	Timeline	Frequency
operational	Further refine / update the closure plan and closure action plan to incorporate detailed specialist assessment outcomes	2018/19	At least every 3-5 years
	Develop cash flows and related financial information for funding the implementation of the stipulated closure measures	2018/19	Annually
	Ongoing environmental monitoring to establish baseline conditions to benchmark the closure situation	Full life of facility	As per monitoring plan

	Engage with relevant stakeholder and I&APs with respect to concurrent rehabilitation, closure planning and end land use	To be informed by stakeholder engagement plan to be developed	
	Compile final closure plan	2018/19	Once-off
	Inform the Department of the intention to close the mine site to ensure that necessary procedures are implemented and criteria met before closure	At least one year prior to closure	Once-off
	Submit the final closure/rehabilitation plan and supporting documentation in terms of Section 57 Government Notice R.527 MPRDA, 2002 for the application of a closure certificate	180 days prior to intended closure	Once-off
Closure	Backfill final void, replace topsoil, prepare and revegetated all affected areas; and General site rehabilitation	2018/19	Once-off
	Once the mine site has been rehabilitated in accordance with the closure report, the permit holder must notify the Department in writing of the intended closure of the site, at least 60 days prior to the event. Should the Department approve the condition of the disposal site; the permit holder will be provided with written permission to close the site. The site may then be closed and the end use plan may be implemented	At least 60 days prior to closure	Once-off
Post-closure	Maintaining closure measures and conducting required inspection and monitoring to demonstrate achievement (success) of closure measures	+- 3 years post closure	As informed by operational monitoring
End state/land use	Implement agreed-upon end state/land use	Approximately 3 years post-closure	Once-off
	On-going care and maintenance as per arrangement with regulators, as required	As agreed upon with regulators	

Conclusion and Recommendations

The closure cost estimate must be updated annually during the operation's life to reflect known developments, including changes from the annual review of the closure strategy assumptions and inputs, scope changes, the effect of a further year's inflation, new regulatory requirements and any other material developments (GNR 1147). A preliminary schedule of monitoring, auditing and reporting requirements which relate to the risk assessment, legal requirements and knowledge gaps is proposed as follows

- Internal annual rehabilitation audits co-ordinated by the mine and including soils, groundwater and closure specialists. The purpose is to review the CP, the specific rehabilitation actions and results thereof for the previous 12 months, develop the plan for the coming 12 months, review the closure provision and the ARP provision.

- External financial audits co-ordinated by the financial manager and the Closure manager, by suitable qualified independent auditors. The aim is to ensure that the closure plan is measurable, appropriate and aligned with the GNR1147 requirements.
- Legal compliance audits co-ordinated by the Mine manager aligned with Environmental Authorisation requirements. Relevant aspects relating to closure, such as changes to the risk assessment, changes in closure options and changes in the closure provision will be reported.

This primary closure plan, is compiled in the overall approach and structure to align for closely to Appendix 4 of GN.R. 1147, namely minimum content of a final rehabilitation, decommissioning and mine closure plan. This plan also reflects an integration and consolidation of closure-related studies and additional specialist work recently undertaken.

- Develop the conceptual post mining landform to detailed design level prior to the commencement of the concurrent backfill;
- Capture improved accuracy regarding the bulking factor into the design and planning;
- Develop and include a detailed topsoil balance for the site based on actual survey data to replace the current estimates;
- Utilising the improved topsoil data to accurately plan the topsoil placement depths;
- Capture the updated outcomes of the refined ground water model which will be updated with site specific monitoring data from the proposed boreholes;
- Incorporate the relevant outcomes of the specialist studies detailed in the scoping report and EIA phase of the larger mining right application;
- The detailed social aspects of this closure plan is currently being incorporated into the broader mining right application which have a more comprehensive approach. The relevant components must be used to inform the further development of this CP. It is a key aspect that must be addressed; and
- Include a revision of the closure costs to improve the accuracy running into the closure phase.

Closure Cost Assessment

The summary of the scheduled closure costs calculated for the proposed Kimberley West opencast pit are indicated in the table below.

Table 25: Schedule Close Cost

18102155 Kimberley West Opencast Pit Closure Costs, as at May 2018			
Closure components		Unscheduled Closure (2018)	Scheduled Closure (2019)
1	Infrastructural aspects	R -	R -
2	Mining aspects	R -	R 5,900,886.86
3	General surface rehabilitation	R -	R 106,764.51
	Sub-Total 1	**R -**	**R 6,007,651.37**
5	**Post-Closure Aspects**		
5.1	Surface water monitoring - 5 years	R -	R 229,346.30
5.2	Groundwater monitoring - 5 years	R -	R 313,004.50
5.3	Rehabilitation monitoring - 3 years	R -	R 211,722.00
5.4	Care and maintenance - 3 years	R -	R 298,579.72
5.5	Contingencies for post-closure aspects	R -	R 105,265.25
	Sub-Total 2	**R -**	**R 1,157,917.78**
6	**Additional Allowances**		
6.1	Preliminary and general	R -	R 600,765.14
6.2	Contingencies	R -	R 600,765.14
6.3	Additional studies	R -	R 208,792.50
	Sub-Total 3	**R -**	**R 1,410,322.77**
	Grand Total Excl. VAT. (Sub-total 1 +2 +3)	**R -**	**R 8,575,891.92**

Radiation

Information in this section was obtained from the Radiation Statement (SciRAD Consulting, May 2018). For full specialist statement refer to Appendix G-viii.

SciRAD consulting was appointed to provide a statement on Radiation impact for the West Wits – Kimberley West mining permit and the possible health risk for surrounding communities and workers. Uranium and Thorium and their daughter products (e.g. Radium and Radon) are the radioactivity found in the gold and uranium bearing ore. The radiation from the ore may present a health risk to the public living close to the mine. The risk to members of the public can be influence by a number of factors and may come from various sources:

- Inhalation of radioactive dust and radon,
- Exposure to the radioactive dust deposited in the area as a result of the mining operations.

However, studies at a number of mines in the Witwatersrand area have shown that the radiation dose to members of the public is not expected to exceed the 250 microSievert (0.25 mSv/a) per year dose constraint (for a single operation) set by the National Nuclear Regulator (NNR). In addition, for the

Kimberley West operations, dust concentrations are expected to be low (refer to the Airshed Air Quality Assessment), groundwater in the area is not potable (refer to the Noa Agencies Groundwater Report) and tailings - that could potentially pollute the environment – will not be present. These aspects will contribute to a reduction in the radiation dose compared to other operations. It may therefore be concluded that radiation from the Kimberley West mining operations presents a very low health risk to members of the public.

The health risk for workers at the mine will be exposed to the same radiation sources as the public but at higher concentrations, due to closer proximity to these sources. Still, the worker doses are not expected to exceed the worker dose limit of 20 mSv/a (20 000 microSievert). The radiation from the Kimberley West mining operations may therefore present a low health risk to the workers on site.

Possible risk after closure. Remediation, from a radiological perspective, must be performed according to the NNR's Regulatory Guide – Site Remediation and Release from Regulatory Control (RG-0026). If remediation is done properly, the risk to the environment and the public is expected to be low. A radiological assessment has been initiated to determine the remediation requirements for the activity.

Vibration Assessment

Information in this section was obtained from the Vibration Statement (Cambria CC, May 2018). For full specialist statement refer to Appendix G-viii.

Cambria CC was appointed to assessment the possible impact associated with vibration during opencast mining at the West Wits – Kimberley West mining permit area. Vibration measures was undertaken at an existing opencast area (i.e. Sol Plaaitjie). No blasting will take place on site and rock breaking will be done through modern rock breaking methods (Xcentric rippers).

A White Industrial Mini Seis II seismograph was used to measure the disturbance levels. The seismograph is equipped with a tri-axial geophone and a microphone so it is capable of measuring vibration and noise simultaneously. The seismograph was initially set up at a distance of 15m from the ripper. The trigger levels were set to 0.762mm/sec for ground vibration and to 106dB for air disturbance (noise). Monitoring was carried out at both location for almost one hour. The seismograph was then moved to a second position 45m away from the ripper. The vibration trigger level was initially set to 0.254mm/sec and the air trigger was left at 106dB, which is the lowest possible trigger setting. The vibration trigger was then changed to 0.381mm/sec because of the number of haul trucks that were moving in the close proximity to the seismograph location.

Analysis of the ground vibration levels recorded at a distance of 15m from the ripper shows that 57% of the events recorded registered levels of less than 1.0mm/sec, 89% of the events recorded registered levels of less than 1.5mm/sec, 95% of the events registered levels of less than 2.0mm/sec and 100% of the events registered levels less than 2.5mm/sec.

The vibration levels were highest close to the ripper and the levels had attenuated significantly at a distance of 45m. The same was true for the air /noise disturbance. In the table below the ground vibration level reduces from 2.29mm/sec at 15m to 0.508mm/sec at 45m. The highest PPV level recorded at 15m from the ripper was utilised to model the possible impact of ground vibration with increase in distance. The results show how the PPV levels decrease rapidly with increase in distance. The results show how the PPV levels decrease rapidly with increase in distance. Based on the measurements made and the calculations performed the vibration levels at any distance greater than 100m from the pit will be imperceptible. If the calculated values are compared to the USBM and DIN recommended standards it is clear that they are well within the proposed limits. The results are presented below.

VIBRATION	
Distance increment metres	Vibration Level
Distance (m)	**PPV (mm/s)**
15	2.28
20	1.42
30	0.73
35	0.56
40	0.45
45	0.37
50	0.31
100	0.10
150	0.05
200	0.03
235	0.02

Despite the low levels predicted, the vibrations may still attract attention as the highest levels fall into the ‘distinctly perceptible’ human response category at distances starting at about 50m. The effect of ground vibrations on humans is summarised in the Table 26.

Ground Vibration Limits

Human response to ground vibration

Although buildings can withstand ground vibration amplitudes of 12.7 mm/sec or more, depending on the frequency, human beings are easily disturbed at lower levels. The typical human response to ground vibration is illustrated in the table below.

Table 26: Human response to ground vibration

Effect on Humans	Ground Vibration Level in mm/sec
Imperceptible	0.025 – 0.076
Barely perceptible	0.076 – 0.254
Distinctly perceptible	0.254 – 0.762
Strongly perceptible	0.762 – 2.540
Disturbing	2.540 – 7.620
Very disturbing	7.620 – 25.400

Ground vibration levels of 0.76 to 2.54 mm/sec received at a structure are perceptible, but the probability of damage is almost non-existent. Levels in the 2.54 to 7.6 mm/sec can be disturbing and levels above 7.6 mm/sec can be very unpleasant, although permanent damage is unlikely.

Building response to ground vibration

Although there are no formalized limits to vibration, the United States Bureau of Mines (USBM) limits are commonly applied in South Africa. The limiting curve is shown in Figure 46 and it has been developed from empirical studies (Siskind et.al. 1980).

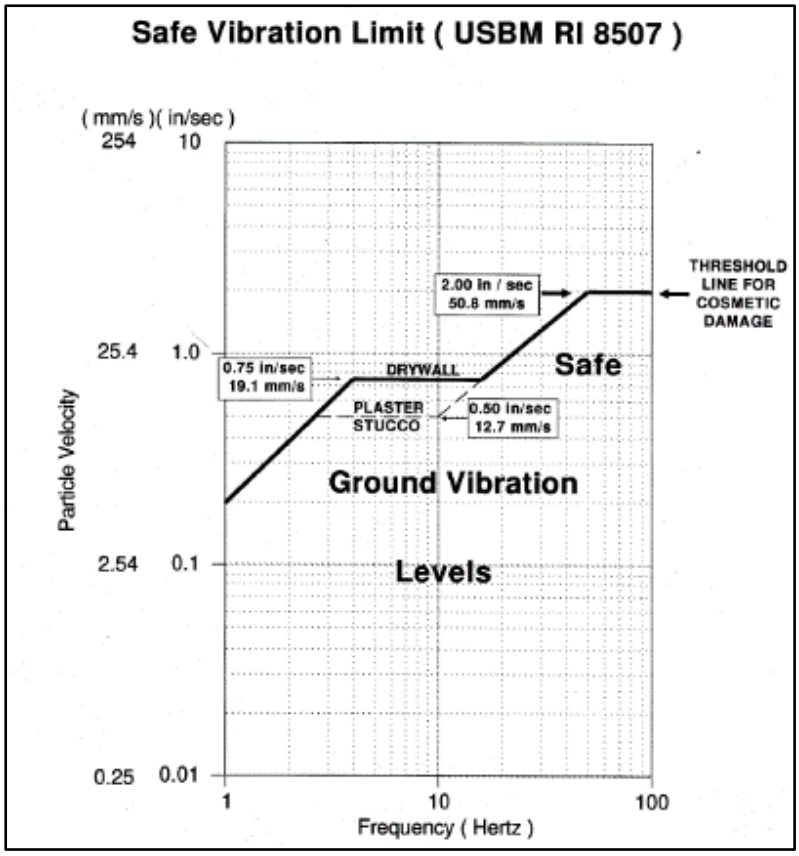


Figure 46: USBM curve that is generally used in South Africa.

The limiting curve in Figure 46 represents the limit for cosmetic damage to a house. The maximum ground vibration amplitudes are frequency dependent with higher frequencies allowing higher peak amplitudes. In general, at lower frequencies (less than 10 Hz), the ground vibration should not exceed 12.7 mm/sec, but at higher frequencies, the limit can increase to 50 mm/sec.

Conclusion

The ground vibration levels were highest close to the Xcentric ripper's area of operation. The levels attenuated rapidly with increase in distance. Vibration levels at distances greater than 50m will be negligible in this geological environment. The ground vibration levels recorded in close proximity to the equipment were not high enough to cause damage to structures. The levels recorded at a distance of 45m were even lower and is within the lower end of the *Distinctly Perceptible* range. The vibration decreases to the imperceptible range within 100m from the activity. The close sensitive receptor to the proposed Kimberley West mining activity will be approximately 150m and based on the measurements will be in the imperceptible range. For a comprehensive noise assessment, refer to the noise impact assessment in Appendix G.

The Kimberley Reef rock in pit 3 was weathered and appeared to break very easily. The vibration levels will vary in response to how competent the rock mass is in a specific geological environment. The low levels recorded in pit #3 would not necessarily be the case in other areas where a more competent rock mass is encountered. Higher vibration levels should be expected when this occurs. It may be necessary to carry out control monitoring in the different mining areas as and when required.

Socio-Economic Environment

Information in this section was obtained from the West Wits Social and Labour Plan (April 2018).

The socio-economic profile of the area was compiled from the 2017-2018 City of Johannesburg draft Integrated Development Plan (IDP) Review, Stats SA 2011 Census data and Stats SA 2016 Community Survey. This information is supplemented by information from the Gauteng Socio-economic Review and Outlook (2016), the City of Johannesburg Annual Economic Review (2015) and Wazimap Municipal Data (2016). The emerging socio-economic profile from this desktop review also provides the backdrop for the development of the West Wits Mining Community Development Strategy upon which the Local Economic Development (LED) projects are premised.

The City comprises an area of 1 648 km² and is home to approximately 4.9 million people according to the 2016 Stats SA Community Survey. This makes the City the biggest metro in South Africa despite its physical size.

Demographics

The size of the population of City of Johannesburg Metropolitan Council (CoJ) as per the 2016 Stats SA Community Survey results is 4.9 million people. This makes it the biggest Metro by population size in South Africa and is projected to grow to 5.4 million by 2021 and to 7.6 million by 2027. The City of Johannesburg population represents 36% of the Gauteng Province population, and 8.9% of the country's population. The mining permit area is located in Ward 127 and on the boundary of Ward 49.

A general trend emerging from the first Census of 1996 is that the white population is decreasing in proportion to the other races in both the province and the municipality. The CoJ population continues to grow at an annual rate of 2.0% - 2.3% with a third of the population comprising young people aged between 14 and 35 years. The growth rate could also be attributed to the monthly inflow of mainly migrants to the city for better opportunities, estimated to be approximately 3000 each month.

Table 27: Population Distribution

Population	City of Johannesburg		Ward 49	Ward 127
	Census 2001	Census 2011	Wazimap Municipal Data 2016	
Total Population	3 226 055	4 434 827	46 251	38 731
African	73.5%	77.1%	99%	99%
Coloured	6.4%	5.6%	0%	0%
White	16.0%	12.4%	0%	0%
Indian or Asian	4.2%	4.9%	0%	0%
Other			1%	1%

Source : Stats SA Census 2001 and Census 2011; Wazimap Municipal Data 2016

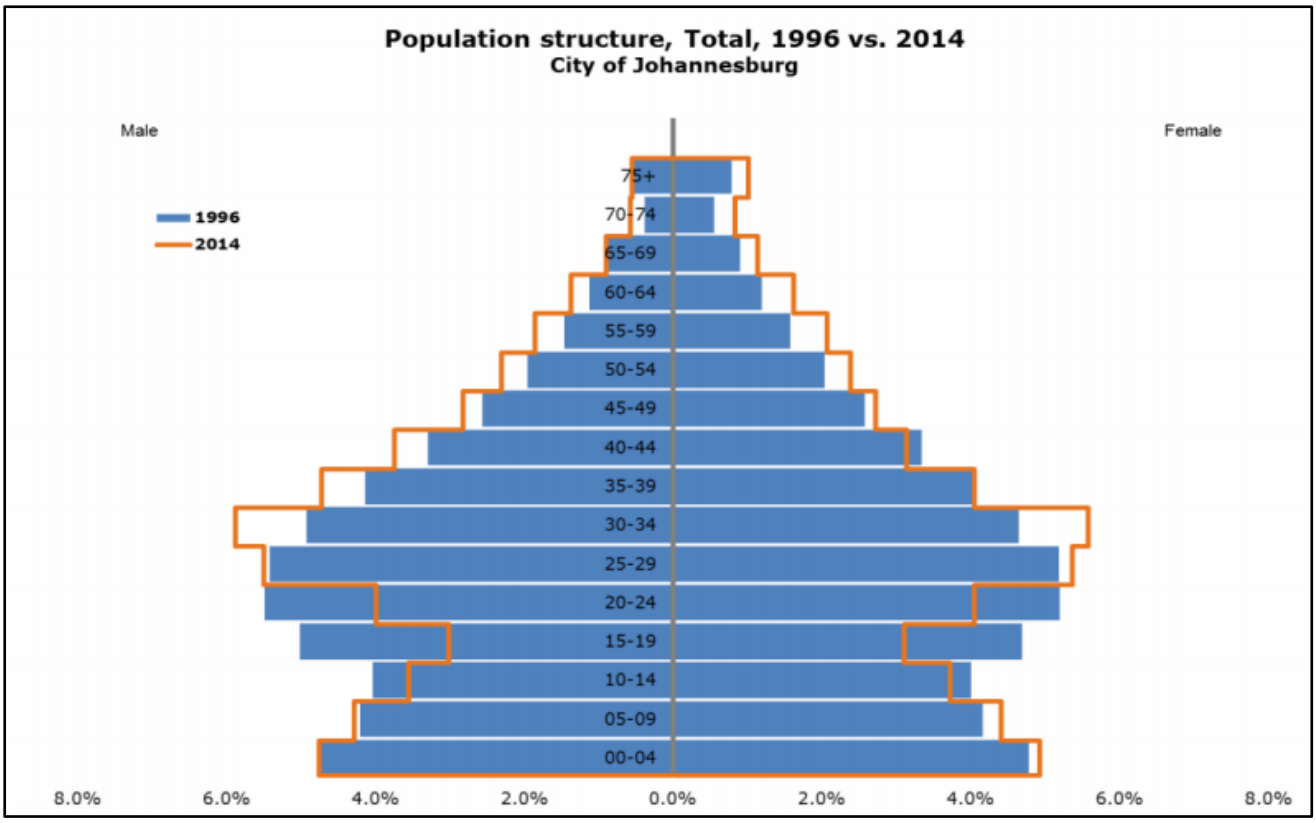


Figure 47: City of Johannesburg pollination pyramid, 2014

The bulk of the population, i.e., more than two-thirds, is aged between 15 to 64. The older population aged 64 and older remained unchanged over the two Census periods of 2001 and 2011, while the rest of the population saw insignificant growth. The median age is 26 in Wards 127.

Table 28: Household Dynamics

Socio-Economic Indicators	Gauteng Province	City of Johannesburg
Total household population	11 567 089	4 132 148
Total number of households	3 909 022	1 434 856
Average size of households	3.0	2.9
Female headed household (%)	36.2	34.1
Child headed household (%)	0.3	0.3

Source : Stats SA Census 2011 ; Community Survey 2016

The total number of households in the municipality stood at 1.4 million households during Census 2011 and has increased to 1.85 million as reported in the Stats SA 2016 Community Survey. This number is expected to grow at an annual rate of 3.5% to 3.9% to approximately 2.16 million by the year 2030. Sixty-four percent (64%) of households were headed by males, and 36% by females.

While Census 2011 showed a decline in the proportion of households headed by children, the Stats SA 2016 Community Survey highlights a growing trend of male, child-headed households in South Africa.

Table 29: Households by Type of Dwelling

Type of Dwelling	Gauteng Province	Ward 49	Ward 127
House	55.4%	76%	33%
Shack	17.8%	9.4%	50.4%
Backyard in Flat	5.3%	4.8%	4.4%
Semi-detached house	1.1%	4.1%	2.6%
Other	20.5%	5.7%	9.1%

Source : Wazimap Municipal Data (2016)

Slightly more than half of households of Ward 127 reside in shacks, while Ward 49 has the least number of shacks. This is partly because Ward 49 comprises mainly RDP houses. There is an increase in the proportion of households residing in formal dwellings across the province and in the CoJ. Similarly, the use of traditional dwellings first increased in the past decade but has declined steadily to date.

Most of the City's population resides in formal houses in urban areas while the number of those who dwell in traditional houses or farm areas has declined significantly, especially after 1994. According to the Gauteng Socio-economic Review and Outlook (2015), urban areas are linked to the trend towards the urbanization of poverty, with a proliferation of informal settlements characterised by extreme levels of unemployment and poverty. It is estimated that over 4.4 million people live in informal settlements in Gauteng, with most of them being in the City of Johannesburg alone. Ironically, the City is at once, a centre of high economic activity and poverty and inequality. This challenge poses a dilemma for City officials and calls for concerted and proactive responses to, and management of the urbanization process. The City's rapid urbanization has several implications, i.e., increase in social problems such as: i) housing backlogs, ii) growth in informal settlements, and iii) overcrowding and its attendant problems of squalor and health related problems.

Table 30: Access to Basic Services

Socio Economic Indicators	Gauteng Province		City of Johannesburg Metropolitan Council	
	2001 (%)	2011(%)	2001(%)	2011(%)
Flush toilet with sewerage system	78.2	83.1	82.3	87.1
No access to any toilet facilities	3.6	1.1	2.8	0.8
Weekly waste removal	84.6	89.8	93.9	97.0
Own refuse dump	12.4	7.9	4.8	2.3
No rubbish disposal	3.0	2.0	1.3	0.5
Electricity used for cooking	72.0	83.9	78.7	87.4
Electricity used for lighting	80.1	87.4	84.9	90.8
Electricity used for heat	69.4	74.7	76.9	82.1
Piped water inside dwelling/yard	82.7	89.4	84.5	91.6
Piped water on communal stand	14.5	8.8	12.6	7.0
No access to water	2.9	1.8	3.0	1.4

Source : Stats SA Census 2001 and Census 2011

While a large percentage of the City's households enjoys access to basic services such as electricity, piped water and flush toilets, a significant proportion of the population is still without the means to access and/benefit from these services. This is partly due to increasing inward migration, growth in the number of households and rapid urbanisation. Furthermore, poor households cannot afford to pay for these basic services, let alone for their places of abode. Wazimap Municipal Data for 2016 shows that some households occupied houses without paying rent – 39% in Ward 49 and 45% in Ward 127. Lack of affordability poses a challenge for the City, which must create mechanisms to expand delivery to meet the growing demand and to constantly review tariffs in efforts to facilitate affordability for the poor.

Table 31: Population by Highest Educational Level

Educational Level	Gauteng Province	Ward 49	Ward 127
No schooling	3.6%	4.7%	5.4%
Other	0.5%	0.2%	0.2%
Some primary	7.3%	7.6%	12.1%
Primary	3.3%	3.8%	6.6%
Some secondary	32.2%	40.1%	45.5%
Grade 12	39.7%	40.3%	28.7%
Undergraduate	6.8%	1.3%	1.1%
Post graduate	4.1%	0.5%	0.4%
N/A	2.5%	1.5%	0.3%

Source : Wazimap Municipal Data 2016 ; Stats SA Census 2011

According to Stats SA 2016 Community Survey, illiteracy levels have declined significantly since the first Census of 1996. The reduction in illiteracy levels is further corroborated by figures for school attendance in the 2 Wards (90% in Ward 49 and 84.5% in Ward 127). While this improvement augurs well for functional literacy, the City should aim at improving the number of individuals with appropriate skills that can be sold to the labour market.

Table 32: Average Annual Household Income

Income Category	Gauteng Province	Ward 49	Ward 127
No income	17%	18.8%	30%
Under R4 800	3%	5.4%	5.4%
R 5 000 - R 10 000	5%	6.9%	7.8%
R 10 000 to R 20 000	12%	15%	16%
R 20 000 – R 40 000	17%	22.4%	21.7%
R 40 000 – R 75 000	15%	18.1%	12.1%
R 75 000 – R 150 000	11%	9.2%	3.6%
R 150 000 - R 300 000	9%	3.3%	1.7%
R 300 000 – R600 000	7%	0.9%	1%
R 600 000 – R 1 200 000	3%	0.1%	0.2%
R 1 200 000 – R 2 500 000	1%	0.1%	0.1%
Over R 2 500 000	1%	0%	0.%

Average annual household income is a median estimate, which is the band at which the incomes of half of households are at or below. Thus, the average annual household income across the City, the province and country is R 29 400. This figure is applicable to Wards 49, but not to Ward 127 which has an average annual household income of R14 600; about half the amount earned on average in Gauteng Province and in South Africa. A third of the population of Ward 127 (approximately 30%) earns no income at all, while about 10% of households survive on earnings of less than R10 000 per annum.

Table 33: Annual Employee Income

Income Category	Gauteng Province	Ward 49	Ward 127
No income	8%	10.3%	8.1%
R1 - R4 800	3%	4.2%	4.1%

R 5 000 - R 10 000	4%	6.5%	8.7%
R 10 000 to R 20 000	11%	15.4%	23.8%
R 20 000 – R 40 000	20%	30.3%	31.5%
R 40 000 – R 75 000	15%	19.1%	12.2%
R 75 000 – R 150 000	13%	6.3%	3.4%
R 150 000 - R 300 000	11%	1.4%	2.2%
R 300 000 – R600 000	6%	0.3%	0.8%
R 600 000 – R 1 200 000	3%	0%	0.1%
R 1 200 000 – R 2 500 000	1%	0%	0.1%
Over R 2 500 000	1%	0%	0.1%
Unspecified	6%	6.2%	5.1%

Source : Wazimap Municipal Data 2016

Average annual employee income is a median estimate, which is the band at which the incomes of half of the workers are at or below. Thus, the average annual employee income across the 2 Wards is the same as the average annual income in South Africa at **R 30 000**. The average annual employee income in Gauteng Province is higher at **R 57 500**.

Employment and Procurement Requirements

West Wits at the Sol Plaaitjie operation employs 47 employees, 16 permanent employees and 31 contract employees. It is envisaged that the number of people (permanent and contractors) employed will remain the same for this proposed project. The procurement requirements will be communicated before the commencement of the project. The procurement for the project will a aligned to the requirements as set out in the Social and Labour plan of the West Wits mining right and will take the requirements of the Broad-Based Black Economic Empowerment Act into consideration.

Land Claims

A land claim has been lodged in term of the Restitution of land Rights Amendment Act, 2014 (Act no 15 of 2015) on Portion 92 of the Farm Vlakfontein 238 IQ. The Commission will not process the above claim unit it finishes claims lodged by 31 December 1998 or until Parliament passes a new law providing for re-opening of lodgement of claims. It is important to note that the provisions of section 11(7) of the Restitution of land Rights Amendment Act, 1994 do not apply until after the Commission has accepted the claim for investigation and published its details in the Government Gazette.

The mining permit will not be located on the portion affected by the land claim. A section of the access/haul road and waste rock dump will be located on the portion. The waste rock will be utilised for rehabilitation of the open pit and all waste rock will be utilised for rehabilitation. The access/haul road will be rehabilitated. Where section 11(7) of Restitution of land Rights Amendment Act, 1994 applies, the land claim commission will be inform a month before any activity is undertake on the property.

(b) Description of the current land uses

The study area is vacant with no formal land use taking place. The areas is dominated by historical mining activities, alien vegetation and illegal waste dumping (See **Figure 48** to **Figure 53**). Some illegal mining has taken place on the site and illegal mines are very active in the surrounding areas. An unnamed gravel road (extension of Hail road) with an existing river crossing over a tributary of the Klip River is located on the eastern boundary of the site. A number of other gravel roads and paths are located on the site.

The natural vegetation is highly degraded and only small section of natural vegetation remain in the area. Some remains of historical infrastructure are located on the study area. The Klip River flows to the west of the study area in a southerly direction. North of the site a tributary of the Klip River is located and flow in a western direction before merging with the Klip River. Surrounding land use map is included in Appendix E.

Surrounding land uses include *inter alia:*

- Historical Mining and Waste Dumps are located East and North East from the study area;
- An Eskom transmission station is located 500m in an easterly direction;
- Some subsistence agricultural activities, very small scale are located adjacent to the Klipspruit, approximately 350m in a northerly direction from the study area.
- The R41 (Randfontein Road) is located 1km north of the study area.
- Witpoortjie Residential area is approximately 1.5km from the study are is northerly direction;
- Goudrand and Matholesville is approximately 1.3km from the study are is north easterly direction;
- The Sol Plaaitjie residential area is within 1km from the study area in a easterly direction;
- The Bram Fischerville residential area is located south of the study area within 150m from the proposed waste rock dump;
- The Bram Fischerville school is within 500m from the study area in a southerly direction; and
- An extension of the Leratong Village is within 1 km from the study area in a westerly direction.

Figure 48: Waste Dump area, old excavation

Figure 49: Gravel road and Waste dumping

Figure 50: Historical Structures

Figure 51: Illegal Waste Dumping

Figure 52: Eskom power

Figure 53: Alien Vegetation

(c) Description of specific environmental features and infrastructure on the site

Environmental Features

No sensitive features are present on the site. Sensitive features located adjacent to the proposed area is include the following. As identified in specialist studies.

- Klip River located to the west of the site;
- Wetland area associated with the Klip River
- Pan located to the north of the site
- Surrounding residential areas, sensitive receptors.
- Proposed residential development to the north of the site.

A sensitivity map of the area is included in Appendix E – Sensitivity Maps

(d) Environmental and current land use map

(Show all environmental, and current land use features)- **Please see Appendix E – Land use map**

The proposed site and surrounding areas consist out of the following land uses as presented in Figure 54. The figure also indicated the proposed residential development that will be located in the area.

- Formal Urban
- Informal vacant
- Mining
- Informal /Vacant/ Mining
- Build Up Area
- Proposed residential development

10. Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated).

The following table contains impacts identified for the activities associated with the proposed mining development. The impact methodology used to determine the significance of the impact is presented in **Table 34** below. Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the Irreplaceability (Magnitude, Extent, Duration, and Intensity) multiplied by the Probability of the impact.

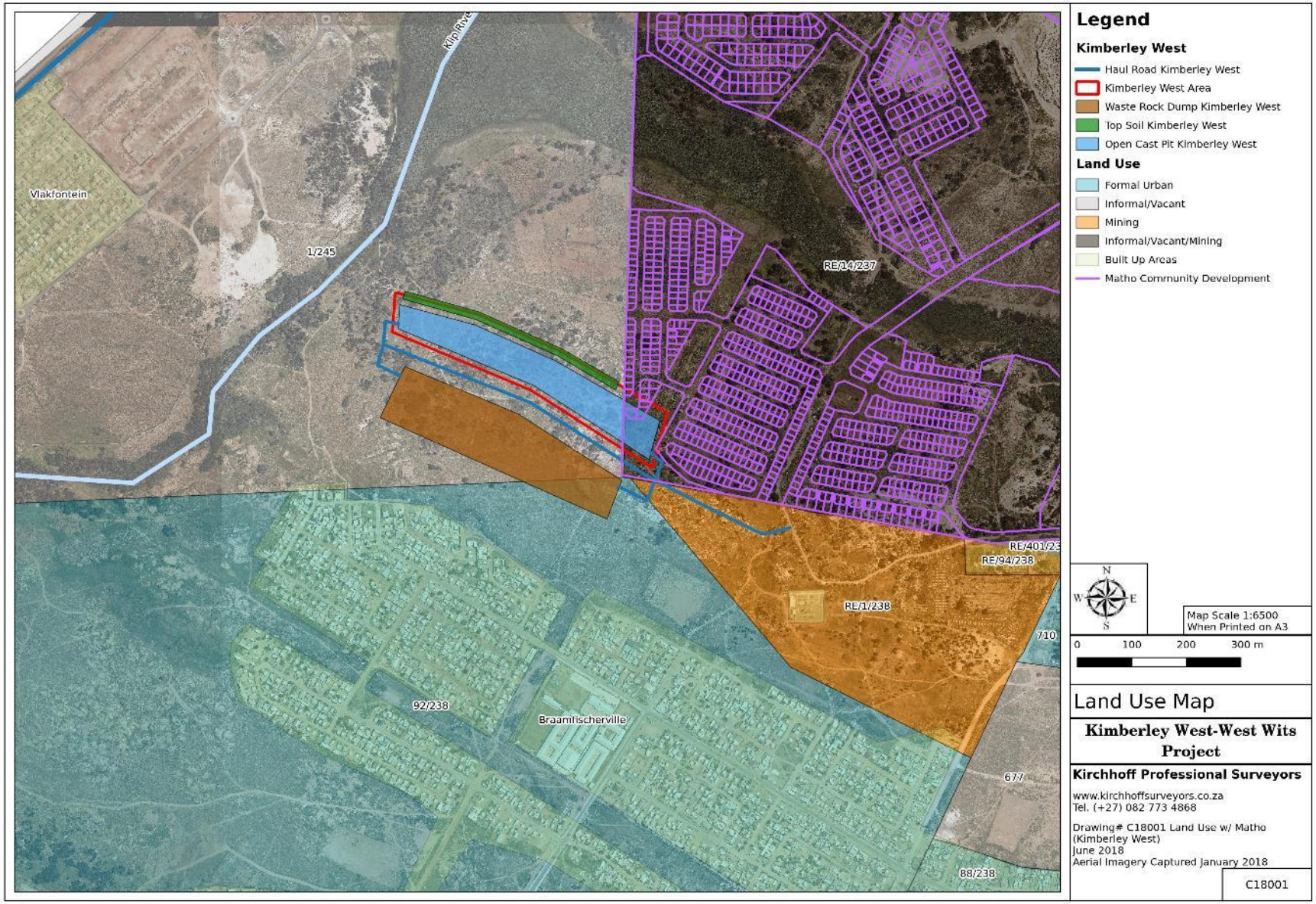


Figure 54: Land Use Map

Table 34: Impact Significance Calculation – Construction, Operational and closure phase

ENVIRONMENTAL ASPECT	NATURE OF THE IMPACT	IMPACT STATUS	EXTENT	DURATION	INTENSITY	REVERSIBILITY	IRREPLACEABILITY	PROBABILITY	SIGNIFICANCE PRE-MITIGATION	MITIGATION POTENTIAL	SIGNIFICANCE POST-MITIGATION	CONFIDENCE RATING	CUMULATIVE IMPACTS
GEOLOGY AND SOILS	Opencast mining will lead to loss and disturbance to topsoil as a result of clearing of vegetation and excavation of topsoil to stockpile. Loss of soil natural structure and properties (physical and chemical) as a result of stripping and stockpiling of topsoil. The soils natural structure is disturbed and as a result the natural cycle is broken exposing the bare soil to erosion. Decline in topsoil fertility due to mixing of soil's A and B horizons (upper and lower horizons) and due to possible mixing of different soil types	N	2	2	5	3	12	5	60	High	36	Certain	Very Low
	Insufficient topsoil quality and quantity present on site.	N	2	5	4	2	13	4	52	High	26	Certain	Very Low
	Hydrocarbon spills on soils can occur where heavy machinery and vehicles are parked such as the hard park area because they contain large volumes of lubricating oils, hydraulic oils, and diesel to run. There is always a chance of these breaking down and/or leaking.	N	1	1	3	2	7	3	21	Medium	14	Certain	Very Low
	Contamination of soil through the utilization of stormwater for dust suppression	N	1	1	3	3	8	3	24	Medium	16	Certain	Very Low
	Opencast mining will result in destruction of geological structures. Loss of geological structure, integrity. Loss of natural resources	N	1	5	5	4	15	5	75	Medium	60	Sure	Low
TOPOGRAPHY	Change in topography as a result of opencast mining. Change in surface drainage	N	1	3	3	2	9	5	45	Medium	36	Sure	Very Low
	Change in topography as a result of opencast mining. Change in final land from.	N	1	3	3	3	9	5	45	Medium	36	Sure	Very Low
LAND CAPABILITY	Loss of soil resources for agricultural and other land uses	N	2	3	3	3	11	3	33	Medium	22	Sure	Low
	Change in landforms due to mining activities and rehabilitation of opencast mining area.	N	2	1	3	3	9	3	27	High	18	Certain	Very Low
HYDROLOGY GROUNDWATER	Dewatering of local aquifer an impacting local and neighboring groundwater users	N	3	5	5	2	15	1	15	High	15	Sure	Low
	Mass migration from waste rock dump negatively impacting groundwater quality	N	3	5	5	2	15	1	15	High	15	Sure	Low
	Formation of Acid Mine Drainage (AMD) and the generation of AMD decant from the rehabilitated pit area	N	3	4	5	3	15	1	15	High	15	Sure	Low
HYDROLOGY SURFACE WATER	Stormwater, erosion and siltation impacts due to a lack of implementing temporary measures to manage stormwater run-off quantity and quality. Change in flow regimes. The impact is cause by compaction of soil, removal of vegetation	N	3	3	1	3	10	5	50	Medium	30	Sure	Very Low
	Contamination of stormwater runoff from waste rock dump and water flowing into pit area. Changes in water quality. Increase siltation and dissolved solids.	N	3	2	1	3	9	5	45	Medium	30	Sure	Very Low
	Pollution of Klip River through the discharge of contaminated stormwater	N	3	1	3	3	10	2	20	High	10	Sure	Very Low

ENVIRONMENTAL ASPECT	NATURE OF THE IMPACT	IMPACT STATUS	EXTENT	DURATION	INTENSITY	REVERSIBILITY	IRREPLACEABILITY	PROBABILITY	SIGNIFICANCE PRE-MITIGATION	MITIGATION POTENTIAL	SIGNIFICANCE POST-MITIGATION	CONFIDENCE RATING	CUMULATIVE IMPACTS
GEOCHEMISTRY	Disposal of waste rock onto the waste rock facility and resulting formation of acid mine drainage conditions	N	3	5	5	2	15	1	15	High	15	Sure	Low
	Disposal of waste rock onto the waste rock facility and resulting leaching of metal(liod)s, especially arsenic, from the material	N	3	5	5	2	15	1	15	High	15	Sure	Low
TERRESTRIAL ECOLOGY	Impact on Habitat Integrity for Faunal and Floral Species	N	2	2	3	3	10	5	50	Medium	40	Sure	Very Low
	Impact on Faunal Species of Conservation Concern	N	2	2	3	3	10	4	40	Medium	30	Sure	Very Low
	Introduction and spread of alien invasive species.	N	4	3	3	3	13	4	52	Medium	39	Sure	Very Low
CULTURAL HERITAGE	Alteration of archaeological, historical and palaeontological resources that may be discovered during earthworks. Destruction of historical areas or structures.	N	2	5	2	2	14	1	14	High	14	Sure	Very Low
	Possible destructions of burial ground and graves	N	1	1	1	4	7	1	7	Medium	7	Sure	Low
	Possible of uncovering subsurface heritage material	N	2	1	1	5	9	2	18	Medium	9	Unsure	Low
VISUAL AND SENSE OF PLACE	Visibility from sensitive receptors / visual scarring of the landscape as a result of the mining activities. Visual impact as a result of operation of waster rock dump.	N	3	1	3	3	10	5	50	Medium	40	Certain	Low
	Visual impact resulting for dust and air pollution	N	2	1	3	2	8	4	32	High	24	Certain	Low
NOISE AND VIBRATION	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise and vibration impacts associated with the operation of vehicles, machinery and equipment.	N	3	1	4	3	11	4	44	Medium	33	Sure	Low
	Increase in background noise levels as a results of site activities. Transporting of ore.	N	3	1	2	2	8	4	32	Medium	24	Sure	Very Low
	Mining operations, hauling and decommissioning. Noise impacts generated may impact on the social environment, especially residential areas adjacent to the mining area.	N	3	1	4	3	11	4	44	Medium	33	Sure	Low
	Mining operations, hauling and decommissioning. Vibration generated may impact on surrounding communities having a negative impact on structures and social environment.	N	2	1	2	2	7	3	21	Medium	14	Sure	Very Low
AIR QUALITY	Increased dust pollution due to vegetation clearance, vehicles driving on gravel road and mining activities including crushing of ore. Increase in windblown particles from exposed surfaces, gravel roads, soil and rock dumps and open pit area	N	3	1	3	2	9	5	45	Medium	36	Certain	Low
	Gaseous emissions from vehicles and machinery may cause an impact on ambient air quality. Impact of inhalable gaseous concentrations and dust fallout at sensitive receptor locations	N	3	1	2	3	9	4	40	Medium	27	Sure	Low
RADIATION	Risk of exposure to radiation through the inhalation of radioactive dust and radon. Exposure to the radioactive dust deposited in the area as a result of the mining activities.	N	3	2	5	5	15	2	30	Medium	15	Sure	Low
	Risk of exposure to radiation to the mine workers during the mining and transportation of ore.	N	3	2	5	5	15	2	30	Medium	15	Sure	Low

ENVIRONMENTAL ASPECT	NATURE OF THE IMPACT	IMPACT STATUS	EXTENT	DURATION	INTENSITY	REVERSIBILITY	IRREPLACEABILITY	PROBABILITY	SIGNIFICANCE PRE-MITIGATION	MITIGATION POTENTIAL	SIGNIFICANCE POST-MITIGATION	CONFIDENCE RATING	CUMULATIVE IMPACTS
	Risk of exposure to land users after rehabilitation of the mining area	N	2	5	5	5	16	2	32	Medium	15	Sure	Low
WASTE	Generation of additional general waste, litter and building rubble and hazardous waste.	N	3	3	1	5	12	5	60	High	36	Certain	Very Low
	Clearing site and disposing of illegally dumped waste on the site at appropriate waste disposal facility	P	2	1	3	3	9	5	45	N/A	45	Certain	Very Low
	Residue Stockpile. Impact the depositing of waste rock and subsoil and have on the receiving environment	N	3	3	2	2	10	3	30	Medium	20	Sure	Low
SERVICES	Minor impact caused by need for services i.e. water, electricity and sewerage systems during the mining phase causing additional strain on natural resources and service infrastructure.	N	2	2	1	3	8	2	16	Medium	8	Certain	Very Low
TRAFFIC	Change in traffic patterns as a result of traffic entering and exiting the site on the surrounding road infrastructure and existing traffic.	N	4	1	3	3	11	5	55	Medium	33	Certain	Low
	Nuisance, health and safety risks caused by increased traffic on and adjacent to the study area including cars, and heavy vehicles.	N	3	1	3	3	10	4	40	Medium	20	Sure	Very Low
HEALTH AND SAFETY	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and users	N	3	1	4	3	11	3	33	High	22	Sure	Very Low
	Increased risk to public and worker safety: If not fenced off, the public and workers may fall into excavated areas and trenches. Increase in traffic.	N	3	1	4	3	11	3	33	High	22	Sure	Very Low
	Increase health risk associated with increase in noise and air pollution	N	3	2	3	3	11	4	44	Medium	33	Sure	Low
	Improved control of the site resulting in reduce health and safety risk associated with illegal waste dumping and illegal mining.	P	3	3	4	2	12	5	60	N/A	60	Certain	Low
SOCIO-ECONOMIC	Potential creation of employment opportunities for the local community, ensuring job security.	P	3	3	1	1	8	5	40	N/A	40	Certain	Very Low
	Multiplier effects on local economy will be positive, but limited in extent and only short term.	P	3	3	1	1	7	5	35	N/A	35	Certain	Very Low
	Reduction in illegal mining taking place in the area	P	2	5	2	3	12	5	60	N/A	60	Certain	Low
	Opening areas for housing developments	P	3	5	2	3	12	5	60	N/A	60	Certain	Low
	Damage to infrastructure on surrounding properties	N	3	1	3	3	10	3	30	Medium	20	Sure	Very Low
	Disruptions in daily living and movement patterns	N	3	1	3	3	10	4	40	Medium	30	Sure	Low

11. Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision).

The impact assessment methodology used to determine the significance of impacts prior and after mitigation is presented below.

Extent of the impact

The EXTENT of an impact is the physical extent/area of impact or influence.

Score	Extent	Description
1	Footprint	The impacted area extends only as far as the actual footprint of the activity.
2	Site	The impact will affect the entire or substantial portion of the site/property.
3	Local	The impact could affect the area including neighbouring properties and transport routes.
4	Region	Impact could be widespread with regional implication.
5	National	Impact could have a widespread national level implication.

Duration of the impact

The DURATION of an impact is the expected period of time the impact will have an effect.

Score	Duration	Description
1	Short term	The impact is quickly reversible within a period of less than 2 years, or limited to the construction phase, or immediate upon the commencement of floods.
2	Short to medium term	The impact will have a short term lifespan (2–5 years).
3	Medium term	The impact will have a medium term lifespan (6 – 10 years)
4	Long term	The impact will have a medium term lifespan (10 – 25 years)
5	Permanent	The impact will be permanent beyond the lifespan of the development

Intensity of the impact

The INTENSITY of an impact is the expected amplitude of the impact.

Score	Intensity	Description
1	Minor	The activity will only have a minor impact on the affected environment in such a way that the natural processes or functions are not affected.
2	Low	The activity will have a low impact on the affected environment.
3	Medium	The activity will have a medium impact on the affected environment, but function and process continue, albeit in a modified way.
4	High	The activity will have a high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.
5	Very High	The activity will have a very high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

Reversibility of the impact

The REVERSIBILITY of an impact is the severity of the impact on the ecosystem structure

Score	Reversibility	Description
1	Completely reversible	The impact is reversible without any mitigation measures and management measures
2	Nearly completely reversible	The impact is reversible without any significant mitigation and management measures. Some time and resources required.
3	Partly reversible	The impact is only reversible with the implantation of mitigation and management measures. Substantial time and resources required.
4	Nearly irreversible	The impact is can only marginally be reversed with the implantation of significant mitigation and management measures. Significant time and resources required to ensure impact is on a controllable level.
5	Irreversible	The impact is irreversible.

Probability of the impact

The PROBABILITY of an impact is the severity of the impact on the ecosystem structure

Score	Probability	Description
1	Improbable	The possibility of the impact occurring is highly improbable (less than 5% of impact occurring).

2	Low	The possibility of the impact occurring is very low, due either to the circumstances, design or experience (5% to 30% of impact occurring).
3	Medium	There is a possibility that the impact will occur to the extent that provision must be made therefore (30% to 60% of impact occurring).
4	High	There is a high possibility that the impact will occur to the extent that provision must be made therefore (60% to 90% of impact occurring).
5	Definite	The impact will definitely take place regardless of any prevention plans, and there can only be relied on migratory actions or contingency plans to contain the effect (90% to 100% of impact occurring).

Calculation of Impacts – Significance Rating of Impact

Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the Irreplaceability (Magnitude, Extent, Duration, and Intensity) multiplied by the Probability of the impact. The significance of an impact is rated according the scores a presented below:

Significance = Irreplaceability (Reversibility + Intensity + Duration + Extent) X Probability

Significance Rating

Score	Significance	Colour Code
1 to 20	Very low	
21 to 40	Low	
41 to 60	Medium	
61 to 80	High	
81 to 100	Very high	

Degree to which the impact can be mitigated: *The effect of mitigation measures on the impact and its degree of effectiveness.*

- High (Impact 100% mitigated)
- Medium (Impact >50% mitigated)
- Low (Impact <50% mitigated)

Confidence rating: *Level of certainty of the impact occurring*.

- **Certain**
- **Sure**
- **Unsure**

Cumulative impacts: *The effect the combination of past, present and "reasonably foreseeable" future actions have on aspects.*

- Very Low cumulative impact
- Low cumulative impact
- Medium cumulative impact
- High cumulative impact

The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties).

West Wits applied for a mining permit on the existing prospecting right area. The site is therefore regarded as the preferred site and alternative sites are not considered. From the public participation already completed the main concerns raised by I&AP's focussed on:

This section will be updated once comments have been received from the IA&P's during the 30 day review period.

Possible Negative Impacts on Communities

- Communicate Engagement
- Social economic impact on communities
- Vibration
- Illegal Mining in the area
- Rehabilitation of historical areas.
- Terrestrial Ecology Impact
- Water Pollution (surface and ground water)
- Air and Noise pollution (increase in dust and noise pollution)
- Impact on traffic (increase in traffic volume)
- Impact on Heritage sites
- Influx of persons (job seekers)
- Radiation impact

Possible Positive Impacts on Community

- Positive impact on local GDP
- Employment opportunities (direct and indirect)
- Social Economic benefit to the communities (skills development)
- Eradication of illegal mining
- Improved security of the area
- Opening land for housing developments

- Eradication and clearing of illegal waste dumping and mining

The possible mitigation measures that could be applied and the level of risk.

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

Comments and concerns raised by stakeholders as summarised in Appendix F are included and taken into consideration and have informed the mitigations outlined in Part B –EMPR. Mitigation measured proposed by specialist for each of the specialist studies undertaken to inform the BAR has been included in Part B – EMPR.

Motivation where no alternative sites were considered

Mining is determined by the present and availability of minerals. Minerals can only be mined where they exist. Therefore, the specific locations and extent of the mining activity is relatively set. The proposed property is in an area dominated by current and historical mining activities. Extensive prospecting has indicated the presence of gold bearing reef on these properties. Minerals can only be mined where identified and economic viable, therefore it was not practical to select any other sites. The site is therefore, the preferred site and alternative sites are considered.

A number of alternatives in terms of layout, mining method, technology and infrastructure were investigated. The layout of the mining area (i.e. placement of waste rock dumps, topsoil stockpiles and roads) has been influenced by inputs form the specialists, stockholders and landowners. The mining method, technology and layout assessed in this report is the preferred alternative.

Statement motivating the alternative development location within the overall site

(Provide a statement motivating the final site layout that is proposed)

The preferred site was chosen due to the following:

- Position of the resource
- The economic viability of the reserve
- Depth and quality of resource
- Environmental conditions

The design and layout of the mining activity is solemnly dependant on the mining plan. The mine planning is done in such a way to reduce the amount of material is handled and to optimise the

recovery of the resource. A number of alternatives for the placement of waste rock dumps, topsoil stockpiles and road network was investigated. The layout was finalised based on the following inputs:

- Availability of the resource;
- Sensitive areas;
- Specialist Studies ;
- Limiting material handling;
- Existing road network; and
- Comments from I&AP's and land owners;

The size and shape of the topsoil stockpile was altered as a result of input from landowners. The alteration decreased the site of the topsoil dump and increase the height of the stockpile. The stockpile will act as a visual barrier to opencast area. The preferred site layout avoids environmental sensitive areas, access to the site is from existing roads network and the existing infrastructure will be utilised located on Sol Plaaitjie. Therefore, no alternative layout is assessed as part of this report.

b) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (in respect of the final site layout plan) through the life of the activity

(Including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures).

An Environmental Impact Assessment (EIA), Basic Impact Assessment process was followed. The Basic Impact Assessment for this project complies with the following requirements:

- National Environmental Management Act (1998) [as amended];
- NEMA Environmental Impact Assessment Regulations (2014) [as amended]; and
- Guidelines of the Department of Environmental Affairs (DEA).

The following principles from the guideline document was followed:

- **Desktop Assessment**

Information gathering is performed by the EAP by analysing the desktop information available for the study area. The desktop assessment is performed to identify any sensitivities that would be impacted upon through the proposed mining activity. Various specialist studies were identified based on these observations.

Identification of the legal framework took place during the desktop assessment. The legal framework was again assessed after the conclusion of the specialist studies and site assessment.

- **Site Investigation**

A physical site visit by the project team is undertaken to confirm and expand on identified potential impacts. The following specialist studies has been conducted:

- Groundwater Study;
- Geochemical Study;
- Terrestrial Ecology;
- Heritage impact Assessment;
- Noise Impact Assessment
- Air Quality Baseline Assessment
- Vibration Assessment
- Traffic Impact Assessment; and
- Closure Plan and Cost Assessment

The objective of the independent specialist studies are to provide sufficient information on the current environmental conditions of the area, together with other studies on the physical and socio-cultural environment for the Environmental Assessment Practitioner (EAP) and the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development. The needs for conservation as well as the risks to other spheres of the physical and socio-cultural environment need to be compared and considered along with the need to ensure economic development of the country. Specialist input, based on sensitive futures identified, with input from stakeholders and landowners determined the final layout of the proposed mining activity.

- **Assessment of Impacts**

As part of the specialist studies the proposed layout is assessed to establish the best social-economical and biophysical option. Potential impact of the proposed mining activities are identified and assessed by the specialist and the EAP.

The mitigation and management measures for environmental impact as identified by the specialist studies were incorporated into the Basic Assessment Report. An environmental Management Programme is established from containing mitigation, management and monitoring measures and specifying roles and responsibilities was compiled with specialist input and are included in this report.

- **Stakeholder engagement**

Consultation with stakeholders, landowners and IA&P's took place as described in this report. See section on Public Participation and Appendix F for information on the process followed.

c) Assessment of each identified potentially significant impact and risk

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties)

Potential impacts that may be caused by the proposed development will be identified using input from the following, Stakeholder Engagement, Existing information; Specialist investigations, Site visit with the project team and Legislation.

12. Impacts Assessment for the Construction phase

Table 35: Impact and proposed mitigation measures of activities in the construction phase of the project

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
Clearing of Vegetation	**Soils**	Vegetation clearing on the site will take place before any construction can take place. The clearing of vegetation will result in loss of topsoil Insufficient topsoil quality and quantity present on site.	**Medium**	• Establish a soil management plan before construction of the activity is undertaken. • Clearing of areas to take place a maximum of one month prior to intended mining in the area; • Stripping of topsoil will not take place during rain or excessive wind; and • The top 30 cm of vegetation and topsoil is to be stripped from the area to be mined. • Topsoil (top 30cm) is to be stored in predetermined topsoil berms, (+/- 5m) outside the boundary of the specific area; and • Topsoil stockpiles will be restricted to 1.5 to 2m in height • Seedbank to be preserved during vegetation clearing and topsoil stripping. • Alien vegetation to be cleared to prevent contamination of topsoil. • strip all available soils/growth medium off the pit, pit fringe (5m buffer), stockpile and road footprints prior to mining and store in the berm • (depth determined during soil survey); • Utilize the stored topsoil for the sole purpose of rehabilitation; and • No topsoil should be used for landscaping or construction purposes such as roads or embankments	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
	Vegetation and Terrestrial Ecology	Vegetation clearing can result in loss of species of conservation concern. Reduction in biodiversity of the area. Note that no red data species or species of conservation concern were identified within the proposed mining area.	**Medium**	• Environmental awareness training should include that no hunting, trapping or killing of fauna are allowed; • An alien vegetation management plan should be drawn up and implemented; • Regular removal of invasive alien species should be undertaken. This should extend through to the closure phase of the project; • Rehabilitation of disturbed areas to take place with indigence vegetation. • No clearing of vegetation outside of the footprint area. • Animals may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-contractors' employees. This includes foraging, food and wood collecting outside of the construction site • No collection of firewood, floral SCC or medicinal floral species must be allowed by construction or mining personnel if any species occur on site; • Should any other floral SCC species be encountered or will be disturbed, ensure effective relocation of individuals to suitable similar habitat. Arrangement with the relevant authorities needs to take place to rescue and relocate the species.	**Low**
	Surface Water	Increase runoff as a result of vegetation clearing. Increase sediment load resulting in sedimentation of rivers. Altering water quality	**Medium**	• Establish a stormwater management plan before construction of the activity is undertaken in line with requirements as set out in GN 704. • Water quality monitoring program to be stablish in the Klip River, up and downstream of activity.	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Proper storm water measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. Strict erosion control to be implemented. • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas	
	Air	Clearing of Vegetation may cause dust that will influence the quality of air. Vehicle emissions can also cause deterioration in air quality.	**Medium**	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns. • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rate.	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Loading, transfer, and placement of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	
	Visual impact	A visual impact will be created as a result of the clearing of vegetation and dust pollution	**Low**	• No clearing of vegetation outside of the footprint area. • Dust suppression to be applied • Visual barriers to be created with topsoil stockpile.	**Low**
	Background Noise levels	Clearing of vegetation activities may cause an increase in background noise levels. Noise generated by equipment. Vegetation acts as a natural noise boundary.	**Medium**	• A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all noise related problems. Frequent community liaison meetings should be held with the neighbouring communities to address noise related concerns. • Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Implement noise monitoring programme as specified by specialist study. • Activities to be restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday	**Low**
	Cultural Heritage	Alteration of archaeological, historical and paleontological resources that may be discovered during earthworks	**Very Low**	• Implement chance find procedures in case where possible heritage finds area made • In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations or removal of vegetation, the ECO in charge for the	**Very Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				developments ought to be informed instantly. These finds must be protected (preferably in situ) and the ECO must alert SAHRA (South African Heritage Research Agency) to ensure that mitigation (e.g. recording, collection) can be undertaken by a professional paleontologist. • Preceding any excavation of fossils, a collection permit from SAHRA must be obtained.	
Construction of haul roads	**Soils**	Soils will be stripped to construct haul roads. This could lead to and mixing of topsoil. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils.	**Medium**	• Spill kits to be stored on site, and staff trained to act when spills occur. • Contaminated soil to be removed and transported to a facility for remediation. • Drip trays to be used for vehicles that stand overnight. • All vehicles and machinery will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks; • All leaks will be cleaned up immediately using an absorbent material and spill kits, in the prescribed manner; • strip all available soils/growth medium off the pit, pit fringe (5m buffer), stockpile and road footprints prior to mining and store in the berm • (depth determined during soil survey); • Utilize the stored topsoil for the sole purpose of rehabilitation; and • No topsoil should be used for landscaping or construction purposes such as roads or embankments.	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
	Vegetation and Terrestrial Ecology	Vegetation will be removed during the construction of the roads. No protected or species of concern was found to be on the site. Loss of biodiversity as a result of clearing of vegetation	**Medium**	• Removal and storage of all usable soils to be used in rehabilitation. • Access roads and haul roads to avoid sensitive areas • Clearing of vegetation to be restricted to mining area. • Any animals rescued or recovered will be relocated in a suitable habitat away from the mining operations and associated infrastructure; • Any lizards, snakes or monitors encountered should be allowed to escape to a suitable habitat away from disturbance. • No reptile should be intentionally killed, caught or collected during any phase of the project; and • General avoidance of snakes is the best policy if encountered. Snakes should not be intentionally harmed or killed and allowed free movement away from the area.	**Low**
	Surface Water	Loose material can contaminate surface water in the event of a storm water run-off occurring during the construction of the roads. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality.	**Medium**	• All hydrocarbon spills to be contained and soils removed. • Proper storm water measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams;	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas. • Runoff from roads must be managed to avoid erosion and pollution problems.	
	Air Quality	Construction activities may cause dust that will influence the quality of air. Vehicle emissions can also cause deterioration in air quality.	**Medium**	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rate. • Loading, transfer, and placement of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	**Low**
	Background Noise levels	Construction activities may cause an increase in background noise levels.	**Low**	• Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery.	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Construction of Waste Rock will limit noise levels to the residential area to the south of the mine • Implement noise monitoring programme. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday • Heavy vehicle traffic should be routed away from noise sensitive areas where possible; • Noise levels should be kept within acceptable limits. All noise and sounds generated should adhere to South African Bureau of Standards (SABS) specifications for maximum allowable noise levels for construction sites. No pure tone sirens or hooters may be utilised except where required in terms of SABS standards or in emergencies	
	Traffic	Increase in traffic on roads surrounding the mining area. Impact on surround road network users	**Medium**	• Road markings, reflective road studs, road signs should be provide and maintained. • Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits. • Ensure drivers are informed that off-road travelling is prohibited. • All traffic accommodation measures are to conform to the latest edition of the South African Road Signs Manual.	**Low**
Stripping and stockpiling of topsoil	**Soils**	Topsoil will be stripped and stockpiled; this may cause deterioration in soil quality. During the stripping process topsoil may be	**Medium**	• Establish a soil management plan before construction of the activity is undertaken. • Clearing of areas to take place a maximum of one month prior to intended mining in the area;	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
		mixed. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils.		• Stripping of topsoil will not take place during rain or excessive wind; and • The top 30 cm of vegetation and topsoil is to be stripped from the area to be mined. • Topsoil (top 30cm) is to be stored in predetermined topsoil berms, (+/- 5m) outside the boundary of the specific area; and • Topsoil stockpiles will be restricted to 1.5 to 2m in height • Seedbank to be preserved during vegetation clearing and topsoil stripping. • Alien vegetation to be cleared to prevent contamination of topsoil. • strip all available soils/growth medium off the pit, pit fringe (5m buffer), stockpile and road footprints prior to mining and store in the berm (depth determined during soil survey); • Utilize the stored topsoil for the sole purpose of rehabilitation; and • No topsoil should be used for landscaping or construction purposes such as roads or embankments • The stored topsoil should be used as soon as possible in concurrent rehabilitation; • Visual inspections to be conducted. • Spill kits to be stored on site, and staff trained to act when spills occur. • Contaminated soil to be removed and transported to a facility for remediation. • Drip trays to be used for vehicles that stand overnight.	

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• All vehicles and machinery will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks; • All leaks will be cleaned up immediately using an absorbent material and spill kits, in the prescribed manner; and • Proliferation of alien and invasive plant species are expected within any disturbed areas. These species should be eradicated and controlled, to prevent their spread beyond the proposed development footprint areas. Alien and invasive plant seed dispersal within the top layers of the soil within footprint areas must be controlled;	
	Vegetation and Terrestrial Ecology	Vegetation will be removed during the stripping of the topsoil and will also be affected during the stockpiling process. Loss of species of conservation concern Note that no red data species or species of conservation concern were identified within the proposed mining area.	**Medium**	• Environmental awareness training should include that no hunting, trapping or killing of fauna are allowed; • An alien vegetation management plan should be drawn up and implemented; • Regular removal of invasive alien species should be undertaken. This should extend through to the closure phase of the project; and • Rehabilitation of disturbed areas to take place with indigence vegetation. • No clearing of vegetation outside of the footprint area. • Animals may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-contractors' employees. This includes foraging, food and wood collecting outside of the construction site.	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• No collection of firewood, floral SCC or medicinal floral species must be allowed by construction or mining personnel if any species occur on site; • Should any other floral SCC species be encountered or will be disturbed, ensure effective relocation of individuals to suitable similar habitat. Arrangement with the relevant authorities needs to take place to rescue and relocate the species.	
	Land Capability	Stripping of topsoil will result in the current possible land use to cease completely. No agricultural activities are taking place on the area.	**Low**	• Rehabilitation of disturbed areas to take place with indigence vegetation. • Land use after rehabilitation to be open space for housing development. • Soil fertility testing to be performed before construction and before rehabilitation to establish the need to improve the soil fertility.	**Low**
	Surface Water	Loose material can contaminate surface water in the event of a storm water run-off occurring during the stripping and stockpiling of topsoil. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality.	**Medium**	• All hydrocarbon spills to be contained and soils removed. • Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater to be in line with the requirements Regulation 704 (4 June 1999). • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems;	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas. • Establishment of monitoring points up and downstream of the activity in the Klip River.	
	Air Quality	Stripping and stockpiling of topsoil may cause dust due to vehicle movement that will influence the quality of air. Material handling (topsoil) will generate dust and this and vehicle emissions can potentially cause deterioration in air quality.	**Medium**	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Loading, transfer, and placement of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
	Background Noise levels	Stripping and stockpiling activities may cause an increase in background noise levels.	**Low**	• Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday • Establish noise monitoring program as specified by specialist study.	**Low**
	Cultural Heritage	Alteration of archaeological, historical and paleontological resources that may be discovered during earthworks	**Very Low**	• A heritage practitioner should be appointed to develop a heritage induction program and conduct training for the ECO, as well as team leaders, in the identification of heritage resources and artefacts. • Implement chance find procedures in case where possible heritage finds area made • In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations or removal of vegetation, the ECO in charge for the developments ought to be informed instantly. These finds must be protected (preferably in situ) and the ECO must alert SAHRA (South African Heritage Research Agency) to ensure that mitigation (e.g. recording, collection) can be undertaken by a professional paleontologist. • Preceding any excavation of fossils, a collection permit from SAHRA must be obtained. The fossil material must be housed in an approved collection (museum or university collection) and the	**Very Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				fieldwork and reports need to comply with the minimum standards for palaeontological impact studies developed by SAHRA.	
Storage of overburden material and stockpiles	**Soil**	Loss of topsoil as n result of wind and water erosion	**Medium**	• Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • Height of topsoil and overburden material to be restricted	**Low**
	Surface Water	Contaminated runoff from overburden and stockpile areas. Siltation of river systems.	**Medium**	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater to be in line with the requirements Regulation 704 (4 June 1999). • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas.	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Establishment of monitoring points up and downstream of the activity in the Klip River.	
	Groundwater	The formation of acid mine drainage as a result of ingress water and oxygen into the stockpiled overburden. Mass migration from waste rock dump negatively impacting groundwater According to the Geo-chemical assessment the overburden is considered inert and therefore does not have a great potential for AMD.	**Low**	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Establishment of monitoring points up and downstream of the activity in the Klip River. • A monitoring borehole should be drilled between the open pit and the Klip River. • Two monitoring boreholes should be drilled between the WRD and the community to the south. • Monitoring (water levels and quality) during construction should be performed monthly due to the construction period (1 months). • A groundwater monitoring program to be establish. All boreholes should be sampled and analysed for the full spectrum of metalloids, Uranium and Thorium as well as micro and macro chemical parameters. Monthly sampling during construction and operation.	**Low**
	Geochemistry	Disposal of water rock onto waste rock facility and resulting formation of acid mine drainage and the leaching of metal(liods), especially arsenic from the material	**Low**	• A monitoring borehole should be drilled between the open pit and the Klip River. • Two monitoring boreholes should be drilled between the WRD and the community to the south. • Monitoring (water levels and quality) during construction should be performed monthly due to the construction period (1 months).	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• A groundwater monitoring program to be establish. All boreholes should be sampled and analysed for the full spectrum of metalloids, Uranium and Thorium as well as micro and macro chemical parameters. Monthly sampling during construction and operation.	
	Air Quality	Increase in air pollution as a result of wind erosion.	**Medium**	• Establishment of air quality monitoring program as specified by specialist • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Roll over mining to limit amount of overburden	**Low**
	Visual impact	A visual impact will be created	**Medium**	• Keep stockpile and waster rock dump height as low as possible • Placement of stockpiles and waster rock to be used to reduce visual impact of mining.	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Reduce dust pollution from stockpile and dumps • Reduce time of stockpiling topsoil and waster rock through concurrent rehabilitation	
	Radiation	Risk of exposure to radiation through the inhalation of radioactive dust and radon. Exposure to the radioactive dust deposited in the area as a result of the mining activities. Risk of exposure during transport of overburden	**Low**	• Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material. • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impacts are minimised.	**Very Low**
	Aesthetic quality and sense of place	Risk of exposure to radiation to the mine workers during the mining and transportation of ore.	**Medium**	• Reduce amount of overburden stockpiles by implementing roll over mining. • Restricted height of overburden to designed high. • Use overburden as a visual barrier to shield mining operation.	**Low**
Waste Management	**Waste**	Waste generated of waste from construction. Clearance and removal of waste dumped illegally on the site	**Medium**	• Low volumes of waste will be produced on site during construction and all maintenance of equipment will take place of site. Disposal of any waste produce during emergency maintenance to be disposed of at the correct waste management facility. • Waste generated (hazardous and general) on site to be disposed within 30 days. • Waste generated (illegally dumped) from clearing of site must be disposed at the correct waste management facility. • Waste from chemical toilets to dispose by supplier. • No chemical storage to take place on site.	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• No waste storage to take place on site, all waste to be removed to offsite facility.	
Construction of West Wits Project	**Socio-Economic Impact**	Impacts on local employment - Opencast mining operations: Contractor would require between 40 and 50 employees.	**Medium – Positive**	• Apply employment/procurement policies and procedures (e.g. do not employ at the mine gate) to prevent unnecessary influx by job-seekers; • Ensure compliance with socio-economic tools and legal requirements (BBBEE and Mining Charter); • First source people from the local community before jobs are advertise • Implement a skills development program	**Medium – Positive**
		Disruptions in daily living and movement patterns for surrounding communities, land owners and road users could manifest in the form of traffic and intrusion impacts resulting in short-term disruptions and safety hazards.	**Medium**	• Erect signboards indicating accesses to the construction site. • Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and un-roadworthy vehicles that could lead to accidents. • The mine to consult with adjacent landowners whose private residences, crops, livestock and other infrastructure could be affected by dust, noise and other impacts that result from traffic movement. Provide a schedule of the construction activities to landowners and relevant I&APs if required.	**Low**
		Health and safety risks for workers Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers.	**Medium**	• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety; • Implement measures to suppress dust - spraying of gravel roads, surfaces and stock piles with water on a regular basis. • Construction workers to wear personal protective equipment;	**Low**

Assessment of Potential Impact During the Construction Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Any health and safety incidents should be reported to the Site Manager (SM) immediately; • First aid facilities should be available on site at all times; • Workers have the right to refuse work in unsafe conditions; • Material stockpiles or stacks should be stable and well secured to avoid collapse and possible injury to site workers. • Access to excavation must be controlled; • Excavated areas should be temporarily • Provide sufficient ablution facilities (chemical/portable toilets, etc.) at strategic locations that are cleaned regularly. • Potable water to be provide to workers.	
		Possibility of construction activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners, visitors and workers.	**Medium**	• All workers will be sensitised to the risk of fire; • Smoking is only allowed in designated smoking areas and disposal of cigarette butts safely in sand buckets; • The Applicant shall ensure that the basic fire-fighting equipment is available on the site; • Extinguishers should be located outside hazardous materials and chemicals storage containers; • Fire response and evacuation: • An Emergency Plan (including Fire Protection, Response and Evacuation Plan) is to be prepared by the Applicant and conveyed to all staff on the site' • Identify major risks to minimise the environmental impacts e.g., air pollution and contaminated effluent runoff.	**Low**

Table 36: Impact and proposed mitigation measures of activities in the operational phase of the project

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
Clearing of Vegetation	**Soils**	Vegetation clearing on the site will take place before any construction can take place. The clearing of vegetation will result in loss of topsoil	**Medium**	• Establish a soil management plan before construction of the activity is undertaken. • Clearing of areas to take place a maximum of one month prior to intended mining in the area; • Stripping of topsoil will not take place during rain or excessive wind; and • The top 30 cm of vegetation and topsoil is to be stripped from the area to be mined. • Topsoil (top 30cm) is to be stored in predetermined topsoil berms, (+/- 5m) outside the boundary of the specific area; and • Topsoil stockpiles will be restricted to 1.5 to 2m in height • Seedbank to be preserved during vegetation clearing and topsoil stripping. • Alien vegetation to be cleared to prevent contamination of topsoil. • strip all available soils/growth medium off the pit, pit fringe (5m buffer), stockpile and road footprints prior to mining and store in the berm (depth determined during soil survey); • Utilize the stored topsoil for the sole purpose of rehabilitation; and • No topsoil should be used for landscaping or construction purposes such as roads or embankments	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
	Vegetation and Terrestrial Ecology	Vegetation clearing can result in loss of species of conservation concern. Reduction in biodiversity of the area. Note that no red data species or species of conservation concern were identified within the proposed mining area.	**Medium**	• Environmental awareness training should include that no hunting, trapping or killing of fauna are allowed; • An alien vegetation management plan should be drawn up and implemented; • Regular removal of invasive alien species should be undertaken. This should extend through to the closure phase of the project; and • Rehabilitation of disturbed areas to take place with indigence vegetation. • No clearing of vegetation outside of the footprint area. • Animals may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-contractors' employees. This includes foraging, food and wood collecting outside of the construction site.	**Low**
	Surface Water	Increase runoff as a result of vegetation clearing. Increase sediment load resulting in sedimentation of rivers. Altering water quality	**Medium**	• Water quality monitoring program to be maintained during the operational phase. Sampling of the Klip River, up and downstream of activity. • Proper storm water measures to be implemented and maintained during operational phase to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater management to be in line with the requirements Regulation 704 (4 June 1999).	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Temporary diversion channels should be constructed and maintained ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas	
	Air	Clearing of Vegetation may cause dust that will influence the quality of air. Vehicle emissions can also cause deterioration in air quality.	**Medium**	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be maintained during the operational phase and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rate.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Loading, transfer, and placement of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • PM_{10} monitoring is recommended for the duration of the mining and rehabilitation phases. The recommended location for PM_{10} monitoring is at a suitable safe location on the northern edge of Bram Fishersville directly to the south of the operations • Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	
	Visual impact	A visual impact will be created as a result of the clearing of vegetation and dust pollution	**Low**	• No clearing of vegetation outside of the footprint area. • Dust suppression to be applied • Visual barriers to be created with topsoil stockpile.	**Low**
	Background Noise levels	Clearing of vegetation activities may cause an increase in background noise levels. Noise generated by equipment. Vegetation acts as a natural noise boundary.	**Medium**	• Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Maintain a noise monitoring programme. A monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday • Heavy vehicle traffic should be routed away from noise sensitive areas where possible; • Noise levels should be kept within acceptable limits. All noise and sounds generated should adhere to South African Bureau of Standards (SABS) specifications for maximum allowable	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				noise levels for construction sites. No pure tone sirens or hooters may be utilised except where required in terms of SABS standards or in emergencies	
	Cultural Heritage	Alteration of archaeological, historical and palaeontological resources that may be discovered during earthworks	**Very Low**	• Implement chance find procedures in case where possible heritage finds area made • In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations or removal of vegetation, the ECO in charge for the developments ought to be informed instantly. These finds must be protected (preferably in situ) and the ECO must alert SAHRA (South African Heritage Research Agency) to ensure that mitigation (e.g. recording, collection) can be undertaken by a professional paleontologist. • Preceding any excavation of fossils, a collection permit from SAHRA must be obtained.	**Very Low**
Stripping and stockpiling of topsoil	**Soils**	Topsoil will be stripped and stockpiled; this may cause deterioration in soil quality. During the stripping process topsoil may be mixed. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils.	**Medium**	• Clearing of areas to take place a maximum of one month prior to intended mining in the area; • Stripping of topsoil will not take place during rain or excessive wind; and • The top 30 cm of vegetation and topsoil is to be stripped from the area to be mined. • Topsoil (top 30cm) is to be stored in predetermined topsoil berms, (+/- 5m) outside the boundary of the specific area; and • Topsoil stockpiles will be restricted to 1.5 to 2m in height	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
		Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils.		• Seedbank to be preserved during vegetation clearing and topsoil stripping. • Alien vegetation to be cleared to prevent contamination of topsoil. • strip all available soils/growth medium off the pit, pit fringe (5m buffer), stockpile and road footprints prior to mining and store in the berm (depth determined during soil survey); • Utilize the stored topsoil for the sole purpose of rehabilitation; and • No topsoil should be used for landscaping or construction purposes such as roads or embankments • The stored topsoil should be used as soon as possible in concurrent rehabilitation; • Visual inspections to be conducted. • Spill kits to be stored on site, and staff trained to act when spills occur. • Contaminated soil to be removed and transported to a facility for remediation. • Drip trays to be used for vehicles that stand overnight. • All vehicles and machinery will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks; • All leaks will be cleaned up immediately using an absorbent material and spill kits, in the prescribed manner; and	

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
	Vegetation and Terrestrial Ecology	Vegetation will be removed during the stripping of the topsoil and will also be affected during the stockpiling process. Loss of species of conservation concern Note that no red data species or species of conservation concern were identified within the proposed mining area.	**Medium**	• Environmental awareness training should include that no hunting, trapping or killing of fauna are allowed; • An alien vegetation management plan should be drawn up and implemented; • Regular removal of invasive alien species should be undertaken. This should extend through to the closure phase of the project; and • Rehabilitation of disturbed areas to take place with indigence vegetation. • No clearing of vegetation outside of the footprint area. • Animals may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-contractors' employees. This includes foraging, food and wood collecting outside of the construction site.	**Low**
	Land Capability	Stripping of topsoil will result in the current possible land use to cease completely.	**Medium**	• Rehabilitation of disturbed areas to take place with indigence vegetation. • Land use after rehabilitation to be open space for housing development. • Inspection of topsoil stockpile to be undertake. Any alien vegetation to be removed from topsoil stockpile • Fertility testing on topsoil to be undertaken before rehabilitation to establish treatment requirements to improve fertility of soils.	**Low**
	Surface Water	Loose material can contaminate surface water in the event of a	**Medium**	• All hydrocarbon spills to be contained and soils removed.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
		storm water run-off occurring during the stripping and stockpiling of topsoil. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality.		• Proper stormwater measures to be maintained to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater to be in line with the requirements Regulation 704 (4 June 1999). • Temporary diversion channels should be constructed and maintained ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas. • Maintain a surface monitoring points up and downstream of the activity in the Klip River.	
	Air Quality	Stripping and stockpiling of topsoil may cause dust due to vehicle movement that will influence the quality of air. Material handling (topsoil) will generate dust and this and vehicle emissions can	**Medium**	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
		potentially cause deterioration in air quality.		encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • PM_{10} monitoring is recommended for the duration of the mining and rehabilitation phases. The recommended location for PM_{10} monitoring is at a suitable safe location on the northern edge of Bram Fishersville directly to the south of the operations • Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	
	Background Noise levels	Stripping and stockpiling activities may cause an increase in background noise levels.	**Medium**	• Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area. • A monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103. Annually during the operational phase at the closest NSR; and in response to complaints received.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Waste rock and stockpiles to be utilized as noise barriers to reduce impact on surrounding sensitive receptors. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday	
	Cultural Heritage	Alteration of archaeological, historical and palaeontological resources that may be discovered during earthworks	**Very Low**	• An appropriately qualified archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified. • The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered. • In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations or removal of vegetation, the ECO in charge for the developments ought to be informed instantly. These finds must be protected (preferably in situ) and the ECO must alert SAHRA (South African Heritage Research Agency) to ensure that mitigation (e.g. recording, collection) can be undertaken by a professional paleontologist. • Preceding any excavation of fossils, a collection permit from SAHRA must be obtained. The fossil material must be housed in an approved collection (museum or university collection) and the fieldwork and reports need to comply with the minimum standards for palaeontological impact studies developed by SAHRA.	**Very Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
Storage of overburden material and stockpiles	**Soil**	Loss of topsoil as n result of wind and water erosion	**Medium**	• Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • Height of topsoil and overburden material to be restricted • Proper storm water measures to be put in placer and maintained to prevent contamination of surface water. This will include the construction of berms and trenches. • Temporary diversion channels should be constructed and maintained ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system	**Low**
	Surface Water	Contaminated runoff from overburden and stockpile areas. Siltation of river systems. Contaminated stormwater from storage areas.	**Medium**	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater to be in line with the requirements Regulation 704 (4 June 1999). • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems;	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas. • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Any water reporting to the open pit or storm water management areas should be kept in a closes system (classified as contact water) and not be discharged into the environment before treatment to the specific catchment Target Water Quality Guideline (TWQG) standards • Contact water can be recirculated and used in a closed system according to GN704 Best Practise Guideline	
	Groundwater	The formation of acid mine drainage as a result of ingress water and oxygen into the stockpiled overburden. Mass migration from waste rock dump negatively impacting groundwater According to the Geo-chemical assessment the overburden is considered inert and therefore	**Low**	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Maintain groundwater monitoring program as establish in construction phase. Should consist out of up-gradient and down-gradient monitoring points as specified by specialist. • Monitoring (water levels and quality) during mining should be performed monthly due to the short Life of Mine (5 months).	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
		does not have a great potential for AMD.		• All boreholes should be subjected to aquifer tests to assess aquifer properties to be used in the model update. All boreholes should be sampled and analysed for the full spectrum of metalloids, Uranium and Thorium as well as micro and macro chemical parameters.	
	Air Quality	Increase in air pollution as a result of wind erosion.	**Medium**	• Establishment of air quality monitoring program • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Roll over mining to limit amount of overburden present on stockpiles. • Maintain air quality monitoring program as specified.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	
	Visual impact	A visual impact will be created	**Medium**	• Keep stockpile and waster rock dump height as low as possible • Placement of stockpiles and waster rock to be used to reduce visual impact of mining. • Reduce dust pollution from stockpile and dumps • Reduce time of stockpiling topsoil and waster rock through concurrent rehabilitation	**Low**
	Radiation	Risk of exposure to radiation through the inhalation of radioactive dust and radon. Exposure to the radioactive dust deposited in the area as a result of the mining activities. Risk of exposure during transport of overburden	**Low**	• Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material. • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised.	**Very Low**
	Aesthetic quality and sense of place	Visibility from sensitive receptors / visual scarring of the landscape as a result of the overburden and stockpiles.	**Medium**	• Reduce amount of overburden stockpiles by implementing roll over mining. • Restricted height of overburden to designed high. • Use overburden as a visual barrier to shield mining operation.	**Low**
Waste Management	**Waste**	Waste generated during normal operation. Clearance and removal of waste dumped illegally on the site.	**Medium**	• Low volumes of waste will be produced on site during construction and all maintenance of equipment will take place of site. Disposal of any waste produce during emergency maintenance to be disposed of at the correct waste management facility.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
		Disposing Waste Rock onto the residue stockpile.		• Waste generated (illegally dumped) from clearing of site must be disposed at the correct waste management facility. • Waste from chemical toilets to disposed of by supplier. • No chemical storage to take place on site. • No waste storage to take place on site, all waste to be removed to offsite facility. • Waste Rock only to be dump at designated area.	
	Soil	Residue Stockpile - Disposal of waste rock onto the waste rock facility and resulting formation of acid mine drainage conditions	**Low**	• Type D liner to be installed • Monitoring of groundwater to take place to establish if the residue stockpile (Waste Rock Dump) has any impact on the groundwater or surface quality • Any water discharging from the Waste Rock dump should be prevented from flowing into the receiving environment	**Low**
	Surface Water	Contaminated runoff from overburden and stockpile areas. Siltation of river systems. Contaminated stormwater from storage areas.	**Medium**	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater to be in line with the requirements Regulation 704 (4 June 1999). • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems;	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas. • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Any water reporting to the open pit or storm water management areas should be kept in a closes system (classified as contact water) and not be discharged into the environment before treatment to the specific catchment Target Water Quality Guideline (TWQG) standards • Contact water can be recirculated and used in a closed system according to GN704 Best Practise Guideline	
	Groundwater	The formation of acid mine drainage as a result of ingress water and oxygen into the stockpiled overburden. Mass migration from waste rock dump negatively impacting groundwater According to the Geo-chemical assessment the overburden is considered inert and therefore	**Low**	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Maintain groundwater monitoring program as establish in construction phase. Should consist out of up-gradient and down-gradient monitoring points as specified by specialist. • Monitoring (water levels and quality) during mining should be performed monthly due to the short Life of Mine (5 months).	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
		does not have a great potential for AMD.		• All boreholes should be subjected to aquifer tests to assess aquifer properties to be used in the model update. All boreholes should be sampled and analysed for the full spectrum of metalloids, Uranium and Thorium as well as micro and macro chemical parameters.	
	Radiation	Risk of exposure to radiation through the inhalation of radioactive dust and radon. Exposure to the radioactive dust deposited in the area as a result of the mining activities. Risk of exposure during transport of overburden and dumping of waste.	**Low**	• Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material. • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised.	**Very Low**
Opencast mining activities including crushing of ore Concurrent rehabilitation /Roll over mining	**Soil**	Loss of soil natural structure and properties (physical and chemical) as a result of stripping and stockpiling of topsoil. Operating of heavy duty equipment on site. Possible hydrocarbon spills from equipment	**Medium**	• Disturbed and cleared areas need to be revegetated with indigenous grass species in order to help stabilise the soil surface; • Concurrent/progressive rehabilitation must be implemented at all times and disturbed areas must be rehabilitated as soon as such areas become available. This will not only reduce the total disturbance footprint, but will also reduce the overall rehabilitation effort and cost; • Any hydrocarbon spills to be cleaned in accordance with the spill procedure. • Spill kits and drip trays to be provided and available on site.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Height of topsoil and overburden material to be restricted to decrease possibility of wind erosion • Visual inspection of topsoil to be undertaken. Any alien vegetation observed on topsoil stockpiles to be removed. • Fertility testing to be performed to establish fertilizer requirements during rehabilitation. • Concurrent rehabilitation (roll over mining) to be in line with the closure plan and procedure.	
	Geology	Opencast mining will result in destruction of geological structures. Loss of geological structure and integrity. Low of resources Breaking of rock through modern methods to reduce noise.	**High**	• Stockpiling of subsoil and waste rock not to take place on the same stockpile. • Rehabilitation of pit to take place in accordance with rehabilitation plan, procedure to ensure rehabilitation objects are achieve. • Final landform and land use to be achieved through rehabilitation.	**Medium**
	Groundwater	Dewatering of local aquifer an impacting local and neighboring groundwater users. Abstraction of groundwater to prevent pit flooding Deterioration of groundwater quality down gradient of the mining operations	**Low**	• Maintain groundwater monitoring program as establish in construction phase. Should consist out of up-gradient and down-gradient monitoring points as specified by specialist. • Monitoring (water levels and quality) during mining should be performed monthly due to the short Life of Mine (5 months). • All boreholes should be subjected to aquifer tests to assess aquifer properties to be used in the model update. All boreholes should be sampled and analysed for the full spectrum of	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				metalloids, Uranium and Thorium as well as micro and macro chemical parameters. • An updated hydrocensus should be completed in a 500m radius around the Kimberley West open pit project area. The data recorded should be used to update the monitoring protocol and the groundwater flow model and associated management scenarios	
	Surface water	Discharge of polluted water. Increase sediment load. Damage to riparian vegetation	**Medium**	• Stormwater structure to be maintained to prevent uncontaminated stormwater flowing into the pit area. • Clean and dirty water separation to take place. • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Any water reporting to the open pit or storm water management areas should be kept in a closes system (classified as contact water) and not be discharged into the environment before treatment to the specific catchment Target Water Quality Guideline (TWQG) standards • Contact water can be recirculated and used in a closed system according to GN704 Best Practise Guideline • No contaminated water to be discharge. • Stormwater runoff from the area to be prevented to increase pollution and sediment load of the river system.	**Low**
	Radiation	Risk of exposure to radiation through the inhalation of radioactive dust and radon.	**Low**	• Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material.	**Very Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
		Exposure to the radioactive dust deposited in the area as a result of the mining activities. Risk of exposure during transport of overburden		• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised.	
	Palaeontological	Alteration of archaeological palaeontological resources that may be discovered during earthworks	**Very Low**	• An appropriately qualified archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified. • The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered. • In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations or removal of vegetation, the ECO in charge for the developments ought to be informed instantly. These finds must be protected (preferably in situ) and the ECO must alert SAHRA (South African Heritage Research Agency) to ensure that mitigation (e.g. recording, collection) can be undertaken by a professional paleontologist. • Preceding any excavation of fossils, a collection permit from SAHRA must be obtained. The fossil material must be housed in an approved collection (museum or university collection) and the fieldwork and reports need to comply with the minimum standards for palaeontological impact studies developed by SAHRA.	**Very Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
	Visual Aesthetic Impact	Visibility from sensitive receptors / visual scarring of the landscape as a result of the mining activities	**Medium**	• The waste rock storage facility to be utilized as a visual barrier between the mining operation and sensitive receptors. • Dust from Stockpile areas, roads and other activities must be managed by means of dust suppression to prevent excessive dust. • Stockpiles should not exceed 20m in height. • The retention of as much existing vegetation as possible	**Low**
	Noise and Vibration	Increase in background noise levels from the increase activities and use of heavy equipment. Breaking of rock through modern methods. Excavation of overburden and reef.	**Medium**	• A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area. • A monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103. Annually during the operational phase at the closest NSR; and in response to complaints received. • The waste rock storage facility to be utilized as a noise barrier between the mining operation and sensitive receptors. • Basic rule of thumb for barrier height is: Any noise barrier should be at least as tall as the line-of-sight between the noise source and the receiver, plus 30%. So if the line-of-sight is 10m high, then the barrier should be at least 13m tall for best performance • Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. • The operation to use modern rock breaking equipment to reduce the noise and vibration.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• No blasting to take place. If any blasting is required approval should be obtained from surrounding communities. • Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Maintain a noise monitoring programme. A monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103: • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday	
	Air Quality	Opencast mining can have a negative impact on surround air quality. Increase dust and emissions. Breaking of rocks, stripping of overburden. Load, haul and transporting of overburden. Breaking of rock through modern methods. Crushing of ore to correct size.	**Medium**	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• PM_{10} monitoring is recommended for the duration of the mining and rehabilitation phases. The recommended location for PM_{10} monitoring is at a suitable safe location on the northern edge of Bram Fishersville directly to the south of the operations. • Modern rock breaking equipment to be used to reduce the risk to air quality associated with blasting. No blasting to be performed. • Dust suppression by means of water sprayers to be applied to crushing equipment to prevent dust pollution for crushing. • Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	
	Topography	Opencast mining will result in a change in topography. Change in surface drainage and final land from	**Medium**	• Implement of closure plan to ensure effective rehabilitation of the area. • Re-establishment of vegetation to take place after rehabilitation • Monitoring and maintenance program to be establish for the post closure phase. • Final land form to be free draining and erosion control to be implemented. • Final land use and land form to be establish in final closure plan.	**Low**
	Health and Safety	Health and safety risks for workers Inadequate management of the mining process and general operation related activities could result in health and safety risks for workers. Increase in traffic.	**Medium**	• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety; • Implement measures to suppress dust - spraying of gravel roads, surfaces and stock piles with water on a regular basis. • Mine workers to wear personal protective equipment;	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Any health and safety incidents should be reported to the Site Manager (SM) immediately; • First aid facilities should be available on site at all times; • Workers have the right to refuse work in unsafe conditions; • Material stockpiles or stacks should be stable and well secured to avoid collapse and possible injury to site workers. • Access to excavation must be controlled; • Excavated areas should be temporarily • Provide sufficient ablution facilities (chemical/portable toilets, etc.) at strategic locations that are cleaned regularly. • Potable water to be provide to workers. • Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits. • Monitoring of water quality, air quality and noise.	
Load and Haul	**Noise and Vibration**	Increase in baseline noise as a result of equipment. Low vibration level is expected from equipment	**Medium**	• A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area. • Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. • Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday	
	Air Quality	Increase in air pollution as n result of equipment movement, handling of overburden and ore, and placement of overburden on stockpiles.	**Medium**	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • Wet suppression techniques should be used to control dust emissions, especially in areas where dry material is handled or stockpiled. • Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions. • Vehicles should be fitted with catalytic converters and low sulfur fuel should be used to minimise NO_2 and SO_2 impacts. Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	**Low**
	Radiation	Risk of exposure during transport of overburden	**Low**	• Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material.	**Very Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety. • Dust suppression to be applied to ore during crushing.	
	Traffic	Increase in traffic surrounding the site.	**Medium**	• Road markings, reflective road studs, road signs should be provide and maintained. • Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits. • Ensure drivers are informed that off-road travelling is prohibited. • All traffic accommodation measures are to conform to the latest edition of the South African Road Signs Manual. • Place point's men at intersections to ensure safe use. • All traffic laws to be inforce on and surround site.	**Low**
	Health and Safety	Increase risk as n result of air and noise pollution. Increase safety risk associated with the movement of equipment.	**Medium**	• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety; • Implement measures to suppress dust - spraying of gravel roads, surfaces and stock piles with water on a regular basis. • Mine workers to wear personal protective equipment; • Any health and safety incidents should be reported to the Site Manager (SM) immediately; • First aid facilities should be available on site at all times; • Workers have the right to refuse work in unsafe conditions;	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Material stockpiles or stacks should be stable and well secured to avoid collapse and possible injury to site workers. • Equipment not use to be switch off to prevent air pollution, dangerous gasses. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions.	
Pumping of groundwater	**Hydrogeology**	Dewatering of local aquifer an impacting local and neighboring groundwater users. Abstraction of groundwater to prevent pit flooding Dewatering of local aquifer an impacting local and neighboring groundwater users Deterioration of groundwater quality down gradient of the mining operations	**Low**	• Maintain groundwater monitoring program as establish in construction phase. Should consist out of up-gradient and down-gradient monitoring points as specified by specialist. • Monitoring (water levels and quality) during mining should be performed monthly due to the short Life of Mine. • All boreholes should be subjected to aquifer tests to assess aquifer properties to be used in the model update. All boreholes should be sampled and analysed for the full spectrum of metalloids, Uranium and Thorium as well as micro and macro chemical parameters. • An updated hydrocensus should be completed in a 500m radius around the Kimberley West open pit project area. The data recorded should be used to update the monitoring protocol and the groundwater flow model and associated management scenarios. • Any water discharge must be monitored for quality and quantity and must comply with the applicable discharge limits.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
	Surface water	Discharge of polluted water. Increase sediment load. Damage to riparian vegetation Increasing flow in Klip river due to groundwater discharge. This can lead to improvement in water quality of stream as the groundwater is uncontaminated.	**Medium**	• Stormwater structure to be maintained to prevent uncontaminated stormwater flowing into the pit area. • Clean and dirty water separation to take place. • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Any water reporting to the open pit or storm water management areas should be kept in a closes system (classified as contact water) and not be discharged into the environment before treatment to the specific catchment Target Water Quality Guideline (TWQG) standards • Contact water can be recirculated and used in a closed system according to GN704 Best Practise Guideline • No contaminated water to be discharge. • Stormwater runoff from the area to be prevented to increase pollution and sediment load of the river system • Any water discharge must be monitored for quality and quantity and must comply with the applicable discharge limits.	**Low**
Transporting of Ore to treatment facility	**Traffic**	Increase in traffic as a result of the transportation of ore to offsite treatment facility.	**Medium**	• Road markings, reflective road studs, road signs should be provide and maintained. • Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits. • Ensure drivers are informed that off-road travelling is prohibited. • All traffic accommodation measures are to conform to the latest edition of the South African Road Signs Manual.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Place point's men at intersections to ensure safe use. • All traffic laws to be inforce on and surround site. • It is expected that 6 trucks will be utilized for the transport of ore. 18 trips per day. Ore haulage heavy vehicles avoid transporting ore during the relevant Am and PM peak periods. • Traffic management to be done in accordance with the Traffic Impact Assessment • Detailed investigations should be conducted in conjunction with the relevant road authority in terms of the existing quality and potential life span of the existing road surface layers of the roads where consumables, ROM ore and workers will be transported • Ore trucks must be cover load with a tarp to present dust pollution during transport;	
	Noise and Vibration	Increase in background noise as a result of the transportation of ore to offsite treatment facility.	**Medium**	• A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area. • Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. • Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday. Ore haulage heavy vehicles avoid transporting ore during the relevant Am and PM peak periods.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
	Air Quality	Increase in dust and gas pollution associated with transportation of ore to offsite treatment facility.	**Medium**	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • Wet suppression techniques should be used to control dust emissions, especially in areas where dry material is handled or stockpiled. • Loading of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions. • Vehicles should be fitted with catalytic converters and low sulfur fuel should be used to minimise NO_2 and SO_2 impacts.	**Low**
	Health and Safety	Transport of ore to the offsite facility can increase the risk of accidents and safety risk to works and communities. Risk of exposure to radiation during transport of ore	**Medium**	• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety; • Mine workers to wear personal protective equipment; • Any health and safety incidents should be reported to the Site Manager (SM) immediately; • Equipment not use to be switch off to prevent air pollution, dangerous gasses.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions. • Equipment should have lights and ensure that they are visible. • Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material	
Operation of West Wits Project	**Socio-Economic Impact**	Impacts on local employment - Opencast mining operations: Contractor would require between 40 and 50 employees.	**Medium – Positive**	• Apply employment/procurement policies and procedures (e.g. do not employ at the mine gate) to prevent unnecessary influx by job-seekers; • Ensure compliance with socio-economic tools and legal requirements (BBBEE and Mining Charter); • First source people from the local community before jobs are advertise • Implement a skills development program	**Medium – Positive**
		Disruptions in daily living and movement patterns Disruptions in daily living and movement patterns for surrounding communities, land owners and road users could manifest in the form of traffic and intrusion impacts resulting in short-term disruptions and safety hazards.	**Medium**	• Erect signboards indicating accesses to the construction site. • Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and un-roadworthy vehicles that could lead to accidents. • The mine to consult with adjacent landowners whose private residences, crops, livestock and other infrastructure could be affected by dust, noise and other impacts that result from traffic movement. Provide a schedule of the construction activities to landowners and relevant I&APs if required.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
		Health and safety risks for workers Inadequate management of the mining process and general operational related activities could result in health and safety risks for workers	**Medium**	• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety; • Implement measures to suppress dust - spraying of gravel roads, surfaces and stock piles with water on a regular basis. • Construction workers to wear personal protective equipment; • Any health and safety incidents should be reported to the Site Manager (SM) immediately; • First aid facilities should be available on site at all times; • Workers have the right to refuse work in unsafe conditions; • Material stockpiles or stacks should be stable and well secured to avoid collapse and possible injury to site workers. • Access to excavation must be controlled; • Excavated areas should be temporarily • Provide sufficient ablution facilities (chemical/portable toilets, etc.) at strategic locations that are cleaned regularly. • Potable water to be provide to workers.	**Low**
		Possibility of operation activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners, visitors and workers.	**Low**	• All workers will be sensitised to the risk of fire; • Smoking is only allowed in designated smoking areas and disposal of cigarette butts safely in sand buckets; • The Applicant shall ensure that the basic fire-fighting equipment is available on the site; • Extinguishers should be located outside hazardous materials and chemicals storage containers; • Fire response and evacuation:	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• An Emergency Plan (including Fire Protection, Response and Evacuation Plan) is to be prepared by the Applicant and conveyed to all staff on the site' • Identify major risks to minimise the environmental impacts e.g., air pollution and contaminated effluent runoff.	
		Improvement of security in and surround mining area.	**Medium Positive**	• Eradication of illegal mining in the area through removal of resource and rehabilitation of area. • Cleaning of area of illegally dump waste • Freeing up land for housing developments after rehabilitation of area.	**Medium Positive**
		Reducing quality of life. Damage to property and infrastructure	**Medium**	• Equipment and trucks that produce loud noise must be fitted with appropriate silencers where possible. • Dust suppression measures must be implemented to reduce the amount of dust released into the air. • Low vibration equipment to be used to prevent damage to house and infrastructure. • Houses within close proximity of mining area to be surveyed for crack before any operations commence. • Equipment should not be overload, this will prevent damage to roads. • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised.	**Low**

Assessment of Potential Impact During the Operational Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Groundwater monitoring (quality and quantity) to be monitored to ensure that groundwater users are not negatively affected. • PM_{10} monitoring is recommended for the duration of the mining and rehabilitation phases. The recommended location for PM_{10} monitoring is at a suitable safe location on the northern edge of Bram Fishersville directly to the south of the operations. • If PM_{10} concentrations are found to be in exceedance of the NAAQS at the closest sensitive receptor locations additional dust suppression measures should be investigated. If the mitigation measures employed are considered best practice, additional offset measures should be considered. Such offset measures include upgrading of public road surfaces, electrification of houses for cooking and heating or supply of cleaner burning fuel for cooking and heating purposes	

Table 37: Impact and proposed mitigation measures of activities in the closure phase of the project

Assessment of Potential Impact During the Closure Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
Closure of final void and placement of topsoil - Establishment of final land form	**Soil**	Loss of topsoil when loading and from topsoil stockpile and during placement.	**Medium**	• Rehabilitation to be done in line with the requirements of the closure plan • Placement of waste rock, subsoil and topsoil to be done in correct order. • Roads to be ripped before topsoil is place. • Do not overload trucks to prevent spillage of topsoil • Limit driving over the topsoil areas to limit compaction and rip the topsoil after placement. • Fertility testing to be undertaken on topsoil to establish the fertility of the soil against the baseline test. Mitigation measures to be establish if fertility of the soil is low or have decreased.	**Low**
	Geology	Opencast mining will result in destruction of geological structures. Loss of geological structure and integrity. Rehabilitation, backfill of open pit. Placement of strata in correct order.	**High**	• Rehabilitation of pit to take place in accordance with rehabilitation plan, procedure to ensure rehabilitation objects are achieve. • Final landform and land use to be achieved through rehabilitation. • Ensure compaction of waste rock to prevent ingress of water. • Rehabilitation to be in line with landowner requirements and closure plan.	**Medium**
	Surface water	Erosion on rehabilitated areas. Ponding of water. Increase in siltation load from stormwater	**Medium**	• Stormwater measures implemented during operational phase to prevent erosion of exposed soils and increase sediment load. • Water quality monitoring to be maintained during closure and post closure. • In the event that decant takes place, monitoring of the water quality to take place.	**Low**

Assessment of Potential Impact During the Closure Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• The rehabilitated areas should be free draining and erosion control should be implemented.	
	Groundwater	Impact on groundwater and surrounding users. Possible formation of AMD and decant from opencast rehabilitated area. Geo-chemical report indicates that the possibility of AMD formation is very low. Deterioration of water quality of the Klip River (hydrologically linked with the pit)	**Low**	• Groundwater monitoring point to be establish in the low point of the rehabilitated opencast area. This point to be included into the monitoring program. • Groundwater monitoring program to be maintained for 2 years post rehabilitation. • Mitigation measures to be establish and implemented if any formation of AMD is observed in the groundwater. • Utilise the monitoring data to calibrate the ground water models, replacing the inferred data to provide certainty on potential impacts; • Rerun the geochemical model to reflect the preferred closure scenario; • Determine the risk of latent and residual impacts. If required, devise mitigation measures and implement controls, adjust the closure liability calculation if required.	**Low**
	Topography	Change in topography of the area.	Medium	• Rehabilitation to be done in line with the requirements of the closure plan. Final land form to be establish as specified in closure plan. Final land form to take settlement into account. • Settlement to be monitored and areas where ponding is taking place to be leveled out. • Ensure that the profile of the rehabilitated area is free-draining and establish a slope similar to the pre-mining slope.	**Low**

Assessment of Potential Impact During the Closure Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• The final backfilled opencast topography should be engineered such that runoff is directed away from the opencast areas. • Rehabilitation to be in line with landowner requirements and closure plan.	
	Vegetation	Transport activities can damage/destroy vegetation. Failure to establish vegetation on the areas where the infrastructure was removed can enhance the possibility of the establishment of alien vegetation.	**Medium**	• Trucks should remain on roads and designated areas • Re-establish indigenous vegetation as soon as possible after the placement of the topsoil. Ensure the area remains free of exotic species.	**Low**
	Air	Rehabilitation (spreading of soil, re-vegetation and profiling/ contouring) activities can lead to an increase in dust emission and emissions from equipment.	**Medium**	• Wet suppression techniques should be used to control dust emissions, especially in areas where dry material is handled; • Loading of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions. • Vehicles should be fitted with catalytic converters and low sulfur fuel should be used to minimise NO_2 and SO_2 impacts. • The bare soil will be prone to erosion and therefore there is need to reduce the velocity near the surface of the soil by re-vegetation.	**Low**

Assessment of Potential Impact During the Closure Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Leaving the surface of the soil in a coarse condition reduces wind erosion and ultimately reduces the dust levels. • Management measures should be aimed to reduce the potential for fugitive dust generation and render the impacts on ambient air quality negligible. • Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	
	Noise	Rehabilitation (spreading of soil, re-vegetation and profiling/ contouring) activities can lead to an increase in background noise levels	**Medium**	• A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area. For all phases of the project. • Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. • Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday.	**Low**
	Radiation	Risk of exposure to radiation through the inhalation of radioactive dust and radon. Exposure to the radioactive dust deposited in the area as a result of the mining activities. Risk of exposure during transport of	**Low**	• Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material. • Comply with NNR regulation requirements for closure. Site remediation and release from regulatory control • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout	**Very Low**

Assessment of Potential Impact During the Closure Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
		overburden. Risk of exposure to land users after rehabilitation of the mining area		all mining and development phases. Water cars to be used to make sure dust impact are minimised.	
	Visual	Removal of stockpiles and waste rock dump. Establishing a final land form.	**Medium**	• Rehabilitation of the area must be done as the mining is completed. • Bare areas will be re-vegetated and regularly inspected to ensure good cover and erosion prevention.	**Low**
Seeding and re-vegetation of rehabilitated areas	**Soils**	Loss of soil fertility as a result of leaching and compaction. Loss of topsoil due to load and handling of soil and wind, water erosion. Compaction of topsoil as a result of placement and equipment driving over the soil during seeding.	**Medium**	• Disturbed and cleared areas need to be revegetated with indigenous grass species in order to help stabilise the soil surface; • Upon completion of mining activities, it must be ensured that no bare areas remain, and that indigenous grassland species are reintroduced. • Soils that have been compacted as a result of the construction and operational activities must be ripped and profiled in line with the surrounding area. Before seeding takes place. • Limit driving over the topsoil areas to limit compaction and rip the topsoil after placement. • Conduct regular visual inspections and preventative care and maintenance. • Fertility testing to be undertaken on topsoil to establish the fertility of the soil against the baseline test. Mitigation measures to be establish if fertility of the soil is low or have decreased.	**Low**

Assessment of Potential Impact During the Closure Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Soil monitoring to be done on areas with low growth, amelioration action to be establish based on soil chemical composition.	
	Vegetation and Terrestrial Ecology	Re-establishment of vegetation. Increase in spread of alien vegetation. Incorrect rehabilitation and maintenance can lead to colonization and spread of alien vegetation. Ineffective soil amelioration resulting in poor vegetation establishment	**Medium**	• Re-establishment of vegetation on all rehabilitated areas. Seed mix to be determined by specialist. • Re-seeding to take place on areas where slope or no growth is observed. • In places where hydro seeding can be applied it should be utilized. • A management plan for the control of invasive/exotic weed species needs to be implemented. This is not a once-off activity and needs to be ongoing. • Educate staff and contractors to help the Site Environmental Officer identify and remove alien species on emergence; • Conduct follow up soil sampling and analysis to inform further remediation should it be required; • Conduct regular visual inspections and preventative care and maintenance.	**Low**
	Surface water	Erosion on rehabilitated areas. Ponding of water. Increase in siltation load from stormwater.	**Medium**	• Stormwater measures implemented during operational phase to prevent erosion of exposed soils and increase sediment load. • Water quality monitoring to be maintained during closure and post closure. • Vegetation cover to be establish to reduce surface runoff, erosion and siltation.	**Low**

Assessment of Potential Impact During the Closure Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• In the event that decant takes place, monitoring of the water quality to take place. • The rehabilitated areas should be free draining and erosion control should be implemented.	
	Groundwater	Impact on groundwater and surrounding users. Possible formation of AMD and decant from opencast rehabilitated area. Geo-chemical report indicates that the possibility of AMD formation is very low. Deterioration of water quality of the Klip River (hydrologically linked with the pit)	**Low**	• Groundwater monitoring point to be establish in the low point of the rehabilitated opencast area. This point to be included into the monitoring program. • Groundwater monitoring program to be maintained for 2 years post rehabilitation. • Mitigation measures to be establish and implemented if any formation of AMD is observed in the groundwater. • Utilise the monitoring data to calibrate the ground water models, replacing the inferred data to provide certainty on potential impacts; • Rerun the geochemical model to reflect the preferred closure scenario;	**Low**
	Air Quality	Increase in dust pollution from wind erosion.	**Medium**	• Vegetation to be establish on rehabilitated area to reduce windblown particles. Vegetation binds the soil and reduces the wind velocity • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions. • Vehicles should be fitted with catalytic converters and low sulfur fuel should be used to minimise NO_2 and SO_2 impacts.	**Low**

Assessment of Potential Impact During the Closure Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• The bare soil will be prone to erosion and therefore there is need to reduce the velocity near the surface of the soil by re-vegetation. • Leaving the surface of the soil in a coarse condition reduces wind erosion and ultimately reduces the dust levels. • Management measures should be aimed to reduce the potential for fugitive dust generation and render the impacts on ambient air quality negligible. • Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	
Waste Management	**Waste**	Waste generated during the rehabilitation process and final closure phase has the potential to cause pollution if not managed correctly. Any waste from the chemical fertilizers utilized should be disposed of in the correct manner.	**Medium**	• No waste storage to take place on site. All waste generated should be transported of site to the storage facility from where disposal should take place. • No waste to be burned on site • Waste to be classified and disposed of accordingly.	**Low**
	Soils	Hydrocarbon spills from equipment during final rehabilitation and re-vegetation	**Medium**	• Contaminated soils to be removed and disposal to take place as hazardous waste. • Spill kits to be available on site. • No equipment to be serviced on site. During emergency breakdowns drip trays to be placed under the equipment to prevent hydrocarbon spills.	**Low**

Assessment of Potential Impact During the Closure Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
	Soil	Residue Stockpile – Waste rock to be used in the backfill of the opencast area. Formation of acid mine drainage conditions. Residue material remaining on site in the facility.	**Medium**	• Liner to be in line with the waste classification requirements • Monitoring of groundwater to take place to establish if the residue stockpile (Waste Rock Dump) has any impact on the groundwater or surface quality • Any water discharging from the Waste Rock dump should be prevented from flowing into the receiving environment	**Low**
	Surface Water	Contaminated water generated from the residue stockpile area.	**Medium**	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater to be in line with the requirements Regulation 704 (4 June 1999). • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas. • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River.	**Low**

Assessment of Potential Impact During the Closure Phase					
Activity	**Environmental Aspect**	**Potential Impact**	**SIGNIFICANCE** (not mitigated)	**MITIGATION TYPE**	**SIGNIFICANCE** (mitigated)
				• Any water reporting to the open pit or storm water management areas should be kept in a closes system (classified as contact water) and not be discharged into the environment before treatment to the specific catchment Target Water Quality Guideline (TWQG) standards • Contact water can be recirculated and used in a closed system according to GN704 Best Practise Guideline	
	Groundwater	Impact on groundwater and surrounding users. Possible formation of AMD and decant from opencast rehabilitated area. Geo-chemical report indicates that the possibility of AMD formation is very low.	**Low**	• Groundwater monitoring point to be establish in the low point of the rehabilitated opencast area. This point to be included into the monitoring program. • Groundwater monitoring program to be maintained for 2 years post rehabilitation. • Mitigation measures to be establish and implemented if any formation of AMD is observed in the groundwater. • Utilise the monitoring data to calibrate the ground water models, replacing the inferred data to provide certainty on potential impacts; • Rerun the geochemical model to reflect the preferred closure scenario; • Determine the risk of latent and residual impacts. If required, devise mitigation measures and implement controls, adjust the closure liability calculation if required.	**Low**

d) Summary of specialist reports

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):

LIST OF STUDIES	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS	REFERENCE
Groundwater	Groundwater Basic Assessment Report for the Kimberley West Mining permit was completed by NOA Agencies (Pty) Ltd. The groundwater impact assessment has the following objectives: • Define the current groundwater characteristics for West Wits Kimberly West open pit mining area and surroundings (the Project area); • Define potential receptors in the Project area; • Define the aquifers underlying the Project area, including groundwater table depth, groundwater quality, and flow characteristics; • Develop a numerical model to define groundwater related impacts and groundwater inflow into the Kimberly West open pit (Life of Mine equates to 5 months – 25 m mining depth); • Define the zone of influence (if any) that will be created by mine dewatering, plus the extent of possible contamination originating from the proposed mining areas and mine infrastructure; • Assess whether decant will occur during the operational phase or post closure; and • Recommend a groundwater monitoring network that will enhance the current monitoring of groundwater quality and level changes; during the operational and closure phases. The study concluded that: • Mine dewatering could be expected due to the Kimberley West open pit's proximity to the Klip river (<150m). Once the natural groundwater hydraulic gradient is reversed i.e. from the river to the open pit, dewatering could occur that requires management. Peak volumes of between 350 and 700 m^3/d could report to the open pit. • The geochemical analyses results indicated the waste associated with the Kimberley West open pit is benign. However, for management purposes. Mass migration simulations for operational and post operational was simulated to assess possible migration pathways originating from the WRD. Simulated mass migration is low during operations and within 3 years the potential seepage from the WRD decreased to less than 30%.	X	Basic Assessment Report and EMPR Part B (EMPR)

	Recommendations 1. An updated hydrocensus should be completed in a 500m radius around the Kimberley West open pit project area. The data recorded should be used to update the monitoring protocol and the groundwater flow model and associated management scenarios. 2. A detailed monitoring program should be initiated before mining commence: a. An upstream and downstream surface water sample should be taken in the Klip River. b. A monitoring borehole should be drilled between the open pit and the Klip River. c. One monitoring borehole should be drilled between the WRD and the community to the south. d. One monitoring borehole should be drilled to the north of the open pit. e. All boreholes should be subjected to aquifer tests to assess aquifer properties to be used in the model update. All boreholes should be sampled and analysed for the full spectrum of metalloids, Uranium and Thorium as well as micro and macro chemical parameters. The results should be recorded as the baseline against which all future possible impacts be measured and managed. f. Monitoring (water levels and quality) during mining should be performed monthly due to the short Life of Mine (5 months). Post operational monitoring should be conducted quarterly. g. A monitoring borehole should be drilled into the rehabilitated open pit and included in the post operational monitoring protocol. Water levels and water quality should be monitored on a quarterly bases. h. Monitoring should continue for at least 2 years post rehabilitation of the Kimberley West project area. 3. Any water reporting to the open pit or storm water management areas should be kept in a closed system (classified as contact water) and not be discharged into the environment before treatment to the specific catchment Target Water Quality Guideline (TWQG) standards. 4. Contact water can be recirculated and used in a closed system according to GN704 Best Practice Guideline		
Geo-chemical	GeoDyn Systems (GeoDyn) was requested to conduct a geochemical risk assessment for the proposed Kimberly West open pit gold mine waste rock material. The mine will only produce waste rock as a mineral waste as no processing plant will be on site and therefore there will also be no tailings storage facility on site. The ore will be trucked to another processing facility. The objectives of the geochemical assessment are:	X	Basic Assessment Report and EMPR Part B (EMPR)

	• Conduct a waste classification of the waste rock. • Determine the likelihood of the development of acid mine drainage (AMD) conditions from the waste material. • Determine the likelihood of leaching of potential contaminants from the waste rock material. The waste classified as Type 3, thus requiring a Class C engineered barrier system. However, none of the constituents in the leach test exceeded the regulatory guideline values. In addition, the geochemical model indicated that the waste rock is comprised of minerals which are very stable in the specific mining environment being considered. In addition, the waste rock itself as well as the secondary mineral products forming very slowly as the waste rock minerals weather have the capacity to remove contaminants from solution through the process of adsorption. The waste rock material contains no iron sulphide minerals. Therefore, the risk of the formation of acid mine drainage conditions due to the waste rock material is negligible. The results indicate that the significance of both potential impacts rate as Very Low. The cumulative impacts of the impacts rate as Low. This is predominantly because of the fact that the development of AMD conditions as well as the leaching of contaminants from the waste rock is unlikely. **Recommendation** The waste rock material is classified as Type 3 according to NEMWA Regulation 635. It is recommended, based on the results of this assessment, that the waste material class be reduced to Type 4.		
Terrestrial Ecology	Scientific Terrestrial Services (STS) was appointed to conduct a terrestrial ecological sensitivity scan as part of the Mining Permit Application. Form the field assessment Two habitat units were identified during the field assessment, namely Secondary Grassland Habitat and Transformed Habitat. Historic and ongoing disturbance to the Transformed Habitat Unit was evident, as building rubble and cleared areas were observed within the Kimberley West MP. Further, these on-site disturbances have resulted in alien and invasive plant proliferation within the Kimberley West MP area. No faunal SCC were observed during the field assessment and none are likely to occur within the proposed Kimberley West MP area The majority of the Kimberley West proposed Mining Permit Application Area is already modified and transformed as a result of anthropogenic activities, and alien and invasive floral species proliferation. Mitigation measures set out below are applicable to the Kimberley West proposed Mining Permit Application Area and will further decrease the significance of perceived impacts on the receiving environment.	X	Basic Assessment Report and EMPR Part B (EMPR)

	Mitigation Measures **1. Footprint Areas** • Limit the footprint area of the construction activity to what is absolutely essential in order to minimise environmental damage; • Edge effects of mining activities need to be actively managed so as to minimise further impacts to the receiving environment; • Informal fires by construction personnel within the Kimberley West MP area should be prohibited; • It must be ensured that stormwater is managed on site in a suitable manner as to not increase the risk of erosion and formation of preferential flow paths; • Appropriate sanitary facilities must be provided during all phases and all waste must be removed to an appropriate waste facility as per relevant waste management legislation; • No indiscriminate disposal of waste must be permitted. If any spills occur, they should be immediately cleaned up; and • Upon completion of mining activities, it must be ensured that no bare areas remain, and that indigenous grassland species, representative of the original vegetation type as defined by Mucina and Rutherford (2012) are used to revegetate the disturbed areas. **2. Flora** • Proliferation of alien and invasive plant species are expected within any disturbed areas. These species should be eradicated and controlled, to prevent their spread beyond the proposed development footprint area, particularly given the current extent and degree of occurrence within the proposed Mining Permit Application Area. Alien and invasive plant seed dispersal within the top layers of the soil within the footprint area must be controlled; • Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to possible cross contamination or wind drift if using a foliar spray; and • Should any floral SCC species be encountered, a suitably qualified specialist is to be consulted in order to ascertain the best way forward. Where necessary, arrangements with the relevant authorities in terms of permitting requirements must take place prior to any removal of floral SCC.		

	3. Fauna • Habitat clearing should take place in a phased manner in order to allow for faunal species to relocate into the surrounding habitat on their own with limited human intervention necessary; • Should any SCC or other threatened or protected faunal species be noted within the proposed boundary area, a suitable management plan must be determined with the assistance of a suitable qualified specialist • No trapping or hunting of fauna is to take place. **4. Dust** • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust on flora throughout all mining and development phases. **5. Vehicle access** • Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities; and • In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into topsoil as per the protocols set out within the existing waste management program. **6. Soils** • Edge effects of activities including soil erosion and siltation must be strictly managed; • All soils compacted as a result of construction and operation activities should be ripped and profiled. Special attention should be paid to the stabilisation of these areas, ensuring that adequate natural vegetation regrowth occurs; and • It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil. **7. Rehabilitation** • Disturbed and cleared areas need to be revegetated with indigenous grass species in order to help stabilise the soil surface;		

	• Concurrent/progressive rehabilitation must be implemented at all times and disturbed areas must be rehabilitated as soon as such areas become available. This will not only reduce the total disturbance footprint, but will also reduce the overall rehabilitation effort and cost; • All alien and invasive plant species within the Kimberley West MP and Creswell Park MP areas should be cleared, with follow up activities running concurrently for a minimum of three years; and • Soils that have been compacted as a result of the construction and operational activities must be ripped and profiled in line with the surrounding area Based on the findings of the ecological assessment, from a terrestrial ecological perspective, the proposed mining activity poses minimal risk to the faunal and floral resource management and conservation initiatives for the area, due to the significantly decreased ecological integrity and transformation of the area. However, in order that the significance of perceived impacts remain low, all essential mitigation measures and recommendations presented in this report must be adhered to so as to ensure that the ecology within the proposed Mining Permit Application Area, along with the surrounding zone of influence is protected or adequately rehabilitated where necessary, in order to ensure that the intended post closure land use objectives are met.		
Heritage impact assessment	PGS Heritage (Pty) Ltd was appointed to undertake a Heritage Impact Assessment (HIA) that forms part of the Basic Assessment Reporting process (BAR) for the mining permit application for the proposed opencast pit referred to as Kimberley West. The fieldwork findings confirmed that there are no identified heritage resources situated inside or adjacent to the Kimberley West foot print area. Since no heritage resources were identified within the Kimberley West opencast footprint area, the overall impact of the development on heritage resources is regarded as very low and no mitigation measures are required. **Recommendations** **Palaeontological Resources** - In Palaeontological terms the significance is rated as Low negative. The proposed development is thus unlikely to pose a substantial threat to local fossil heritage. However, should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably in situ) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.	X	Basic Assessment Report and EMPR Part B (EMPR)

	- During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure is implemented. **a. Chance find procedure** - A heritage practitioner should be appointed to develop a heritage induction program and conduct training for the ECO, as well as team leaders, in the identification of heritage resources and artefacts. - An appropriately qualified archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified. - Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities be halted. - The qualified archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and impact on the heritage resource. - The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered. - Construction can commence as soon as the site has been cleared and signed off by the archaeologist. **b. Heritage Management Plan for EMPr implementation** - Implement chance find procedures in case where possible heritage finds area made **c. Palaeontology** - The construction and operation of the development footprint is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area - In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations or removal of vegetation, the ECO in charge for the developments ought to be informed instantly. These finds must be protected (preferably in situ) and the ECO must alert SAHRA (South African Heritage Research Agency) to ensure that mitigation (e.g. recording, collection) can be undertaken by a professional palaeontologist. - Preceding any excavation of fossils, a collection permit from SAHRA must be obtained. The fossil material must be housed in an approved collection (museum or university collection) and the fieldwork and reports need to comply with the minimum standards for palaeontological impact studies developed by SAHRA.		

	It is my considered opinion that, based on the findings of the desktop research together with the fieldwork findings, the overall impact on heritage resources is acceptably low and the project can be approved from a heritage perspective.		
Noise Impact Assessment	Airshed Planning Professionals (Pty) Ltd (Airshed) was commissioned to undertake a specialist environmental noise impact study for the Kimberly West Basic Assessment Report (BAR). The main objective of the noise specialist study was to determine the potential impact on the acoustic environment and noise sensitive receptors (NSRs) as a result of the development of the proposed project and recommend suitable management and mitigation measures. The main findings of the impact assessment are: - A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area. - The noise levels from the project operations exceed the selected noise criteria at the closest NSRs to the southwest of project site with change in day-time noise from baseline conditions expected to be less than 10 dBA. According to SANS 10103 (2008); 'little' reaction with 'sporadic complaints' may be expected from the community for increased noise levels up to 10 dBA. - Construction and closure phase impacts are expected to me similar or slightly lower than simulated noise impacts of the operational phase. The following key recommendations should be included in the project environmental management programme: - A monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103: - Annually during the operational phase at the closest NSR; and - In response to complaints received. Based on the findings of the assessment and provided the measures planned and recommended are in place, it is the specialist opinion that the project may be authorised.	X	Basic Assessment Report and EMPR Part B (EMPR)
Air Quality Baseline Assessment	Airshed Planning Professionals (Pty) Ltd (Airshed) was appointed to undertake an air quality specialist study for the project as part of the Basic Assessment process. **The main findings from the impact assessment are as follows:** The main sources of dust emissions from the Kimberley West operations are likely to be materials handling of ROM and waste rock in the pit and of waste rock at the WRD and vehicle entrainment emissions from haul trucks and other mobile equipment.	X	Basic Assessment Report and EMPR Part B (EMPR)

	With no mitigation measures applied simulated highest daily PM_{10} concentrations exceed the NAAQS at the closest sensitive receptor locations to the south of the operations. With simple mitigation measures such as wet suppression of dust at material handling points and regular water sprays on haul roads, simulated incremental PM_{10} concentrations due to the Kimberley West operations are in compliance with the SA NAAQS at all sensitive receptor locations. Even with no mitigation measures applied simulated $PM_{2.5}$, NO_2, SO_2, and CO concentrations are in compliance with the SA NAAQS for all averaging periods and simulated highest monthly dust fallout rates are in compliance with the SA NDCR residential limit at all sensitive receptor locations and in compliance with the SA NDCR non-residential limit at all off-site areas. With no mitigation measures applied the incremental impact of the Kimberley West project on the receiving environment is expected to be MEDIUM. With 50% mitigation of material handling emissions (achievable with the mitigation measures recommended below) and 30% mitigation of vehicle entrained dust from unpaved roads, the incremental impact of the Kimberley West project is expected to be LOW. The cumulative impact during the mining phase (with mitigation measures applied) is expected to be MEDIUM, but the short life of the Kimberley West operations means that long term impacts (annual average pollutant concentrations) are unlikely to exceed the SA NAAQS. **Based on the findings above the following is recommended:** - A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns; - Wet suppression techniques should be used to control dust emissions, especially in areas where dry material is handled or stockpiled. - Exposed soils and other erodible materials should be re-vegetated or covered promptly; new areas should be cleared and opened-up only when absolutely necessary and surfaces should be re-vegetated or otherwise rendered non-dust forming when inactive; - Storage for dusty materials should be enclosed or operated with efficient dust suppressing measures; - Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems;		

	- Vehicles should be fitted with catalytic converters and low sulfur fuel should be used to minimise NO_2 and SO_2 impacts. - Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions. - Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. - The vehicle fleet be regularly serviced and maintained to minimise CO, NO_2, SO_2 and greenhouse gas emissions. - Older vehicles in the current fleet should be replaced with newer, more fuel-efficient alternatives where feasible. - PM_{10} monitoring is recommended for the duration of the mining and rehabilitation phases. The recommended location for PM_{10} monitoring is at a suitable safe location on the northern edge of Bram Fishersville directly to the south of the operations. - Trucks transporting ore should be cover loads with tarp to prevent dust pollution during transport. - If PM_{10} concentrations are found to be in exceedance of the NAAQS at the closest sensitive receptor locations additional dust suppression measures should be investigated. If the mitigation measures employed are considered best practice, additional offset measures should be considered. Such offset measures include upgrading of public road surfaces, electrification of houses for cooking and heating or supply of cleaner burning fuel for cooking and heating purposes - Emissions report must be made in the format required for NAEIS to the relevant air quality officer.		
Traffic Impact Assessment	Siyazi Gauteng Consulting Services (Pty) Ltd. was appointed to conduct a Traffic Impact Assessment (TIA) for the proposed Kimberley Reef West portion of the proposed West Wits Mining operation The following scenarios were investigated as part of the TIA: a. Scenario 1: 2018 peak hour traffic without background traffic growth, without the proposed mining development (status quo); b. Scenario 2: 2019 peak hour traffic with background traffic growth, with the proposed mining development (operational phase); Based on a site inspection of the existing road network adjacent to the site under investigation, traffic surveys, calculations and reference to the relevant traffic engineering guideline documents, the following findings and recommendations were made: - Summary of Intersections that require improvements without and with the proposed mining development; and - Need for improvements without and with the proposed mining development.	X	Basic Assessment Report and EMPR Part B (EMPR)

	- Road markings, reflective road studs (LED), road signs, overhead lights should be provided and maintained at all the relevant intersections under investigation to ensure visibility during night time, proper visibility of intersection lane geometry and sufficient information to road users; and - As part of the proposed mining development, it is recommended that ore haulage heavy vehicles avoid transporting ore during the relevant Am and PM peak periods. In conclusion of the findings as part of the investigations, Siyazi Gauteng Consulting Services (Pty) Ltd is of the opinion that the proposed mining development would have a manageable impact on the relevant roads network as long as the mitigating measures are implemented as recommended and should thus be granted authorisation.		
Closure Plan	Golder was appointed to undertake the closure plan for the West Wits – Kimberley West mining permit. This primary closure plan, is compiled in the overall approach and structure to align for closely to Appendix 4 of GN.R. 1147, namely minimum content of a final rehabilitation, decommissioning and mine closure plan. This plan also reflects an integration and consolidation of closure-related studies and additional specialist work recently undertaken. • Internal annual rehabilitation audits co-ordinated by the mine and including soils, groundwater and closure specialists. The purpose is to review the CP, the specific rehabilitation actions and results thereof for the previous 12 months, develop the plan for the coming 12 months, review the closure provision and the ARP provision. • External financial audits co-ordinated by the financial manager and the Closure manager, by suitable qualified independent auditors. The aim is to ensure that the closure plan is measurable, appropriate and aligned with the GNR1147 requirements. • Legal compliance audits co-ordinated by the Mine manager aligned with Environmental Authorisation requirements. Relevant aspects relating to closure, such as changes to the risk assessment, changes in closure options and changes in the closure provision will be reported. This primary closure plan, dated May 2018, is compiled in the overall approach and structure to align for closely to Appendix 4 of GN.R. 1147, namely minimum content of a final rehabilitation, decommissioning and mine closure plan. This plan also reflects an integration and consolidation of closure-related studies and additional specialist work recently undertaken. • Develop the conceptual post mining landform to detailed design level prior to the commencement of the concurrent backfill; • Capture improved accuracy regarding the bulking factor into the design and planning; • Develop and include a detailed topsoil balance for the site based on actual survey data to replace the current estimates;	X	Basic Assessment Report and EMPR Part B (EMPR)

	• Utilising the improved topsoil data to accurately plan the topsoil placement depths; • Capture the updated outcomes of the refined ground water model which will be updated with site specific monitoring data from the proposed boreholes; • Incorporate the relevant outcomes of the specialist studies detailed in the scoping report and EIA phase of the larger mining right application; • The detailed social aspects of this closure plan is currently being incorporated into the broader mining right application which have a more comprehensive approach. The relevant components must be used to inform the further development of this closure plan. It is a key aspect that must be addressed; and • Include a revision of the closure costs to improve the accuracy running into the closure phase.		
Radiation	SciRAD Consulting was appointed to provide a statement on radiation impact for West Wits Mining MLI (Pty) Ltd Operations at the proposed Kimberley West pit. The radiation from the ore may present a health risk to the public living close to the mine. The risk to members of the public may come from various sources: • Inhalation of radioactive dust and radon; and • Exposure to the radioactive dust deposited in the area as a result of the mining operations Based on studies in the Witwatersrand area have shown that the radiation dose to members of the public is not expected to exceed the 250 microSievert (0.25 mSv/a) per year dose limit (for a single operation) set by the National Nuclear Regulator (NNR). The expected health risk to member of the public is very low. Workers at the mine will be exposed to the same radiation sources as the public but at higher concentrations, due to closer proximity to these sources. Still, the worker doses are not expected to exceed the worker dose limit of 20 mSv/a. The radiation from the Kimberley West mining operations may therefore present a low health risk to the workers on site. The assumed conclusions can only be confirmed once the radionuclide analyses (of samples from the site) have been received and used as input in the radiological assessments that are currently underway. The following recommendation has been made: • Dust suppression to be applied to the mining areas and haul roads.	X	Basic Assessment Report and EMPR Part B (EMPR)

	• Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material. • Comply with NNR regulation requirements for closure. Site remediation and release from regulatory control • Radiological perspective, must be performed according to the NNR's Regulatory Guide – Site Remediation and Release from Regulatory Control (RG-0026).		
Blasting and Vibration	Cambria CC was appointed to provide an assessment on the possible impact associated with vibration during opencast mining at the West Wits – Kimberley West mining permit area. Vibration measures was undertaken at an existing open cast area (i.e. Sol Plaaitjies) that is utilising the same rock breaking equipment that will be utilised at the proposed Kimberley West mining permit area. The ground vibration levels were highest close to the Xcentric ripper's area of operation. The levels attenuated rapidly with increase in distance. Vibration levels at distances greater than 50m will be negligible in this geological environment. It is recommended that a more comprehensive noise analysis study be carried out as and when required. It may be necessary to carry out control monitoring in the different mining areas as and when required.	X	Basic Assessment Report and EMPR Part B (EMPR)

Full specialist report are attached as appendices (Please refer to ***Appendix G***)

e) Environmental impact statement

(i) Summary of the key findings of the environmental impact assessment;

Table 38: Summary of the Possible Impacts Associated with the Mining Activity

ASPECT	NATURE OF THE IMPACT	SIGNIFICANCE PRE-MITIGATION	SIGNIFICANCE POST-MITIGATION
GEOLOGY AND SOILS	Opencast mining will lead to loss and disturbance to topsoil as a result of clearing of vegetation and excavation of topsoil to stockpile. Loss of soil natural structure and properties (physical and chemical) as a result of stripping and stockpiling of topsoil. The soils natural structure is disturbed and as a result the natural cycle is broken exposing the bare soil to erosion. Decline in topsoil fertility due to mixing of soil's A and B horizons (upper and lower horizons) and due to possible mixing of different soil types	**Medium**	**Low**
	Insufficient topsoil quality and quantity present on site.	**Medium**	**Low**
	Hydrocarbon spills on soils can occur where heavy machinery and vehicles are parked such as the hard park area because they contain large volumes of lubricating oils, hydraulic oils, and diesel to run. There is always a chance of these breaking down and/or leaking.	**Low**	**Very Low**
	Contamination of soil through the utilization of stormwater for dust suppression	**Low**	**Very Low**
	Opencast mining will result in destruction of geological structures. Loss of geological structure, integrity. Loss of natural resources	**High**	**Medium**
TOPOGRAPHY	Change in topography as a result of opencast mining. Change in surface drainage	**Medium**	**Low**
	Change in topography as a result of opencast mining. Change in final land from.	**Medium**	**Low**
LAND CAPABILITY	Loss of soil resources for agricultural and other land uses	**Low**	**Low**
	Change in landforms due to mining activities and rehabilitation of opencast mining area.	**Low**	**Very Low**
HYDROLOGY GROUNDWATER	Dewatering of local aquifer an impacting local and neighboring groundwater users	**Very Low**	**Very Low**
	Mass migration from waste rock dump negatively impacting groundwater quality	**Very Low**	**Very Low**
	Formation of Acid Mine Drainage (AMD) and the generation of AMD decant from the rehabilitated pit area	**Very Low**	**Very Low**

ASPECT	NATURE OF THE IMPACT	SIGNIFICANCE PRE-MITIGATION	SIGNIFICANCE POST-MITIGATION
HYDROLOGY SURFACE WATER	Stormwater, erosion and siltation impacts due to a lack of implementing temporary measures to manage stormwater run-off quantity and quality. Change in flow regimes. The impact is cause by compaction of soil, removal of vegetation	**Medium**	**Low**
	Contamination of stormwater runoff from waste rock dump and water flowing into put area. Changes in water quality. Increase siltation and dissolved solids.	**Medium**	**Low**
	Pollution of Klip River through the discharge of contaminated stormwater	**Low**	**Very Low**
GEOCHEMISTRY	Disposal of waste rock onto the waste rock facility and resulting formation of acid mine drainage conditions	**Very Low**	**Very Low**
	Disposal of waste rock onto the waste rock facility and resulting leaching of metal(liod)s, especially arsenic, from the material	**Very Low**	**Very Low**
TERRESTRIAL ECOLOGY	Impact on Habitat Integrity for Faunal and Floral Species	**Medium**	**Low**
	Impact on Faunal Species of Conservation Concern	**Low**	**Low**
	Introduction and spread of alien invasive species.	**Medium**	**Low**
CULTURAL HERITAGE	Alteration of archaeological, historical and palaeontological resources that may be discovered during earthworks. Destruction of historical areas or structures.	**Very Low**	**Very Low**
	Possible destructions of burial ground and graves	**Very Low**	**Very Low**
	Possible of uncovering subsurface heritage material	**Very Low**	**Very Low**
VISUAL	Visibility from sensitive receptors / visual scarring of the landscape as a result of the mining activities.	**Medium**	**Low**
	Visual impact resulting for dust and air pollution	**Low**	**Low**
NOISE AND VIBRATION	Nuisance and health risks caused by an increase in the ambient noise level as a result of noise and vibration impacts associated with the operation of vehicles, machinery and equipment.	**Medium**	**Low**

ASPECT	NATURE OF THE IMPACT	SIGNIFICANCE PRE-MITIGATION	SIGNIFICANCE POST-MITIGATION
	Increase in background noise levels as a results of site activities. Transporting of ore.	**Low**	**Low**
	Mining operations, hauling and decommissioning. Noise impacts generated may impact on the social environment, especially residential areas adjacent to the mining area.	**Medium**	**Low**
	Mining operations, hauling and decommissioning. Vibration generated may impact on surrounding communities having a negative impact on structures and social environment.	**Low**	**Very Low**
AIR QUALITY	Increased dust pollution due to vegetation clearance, vehicles driving on gravel road and mining activities. Increase in windblown particles from exposed surfaces, gravel roads, soil and rock dumps and open pit area	**Medium**	**Low**
	Gaseous emissions from vehicles and machinery may cause an impact on ambient air quality. Impact of inhalable gaseous concentrations and dust fallout at sensitive receptor locations	**Low**	**Low**
RADIATION	Risk of exposure to radiation through the inhalation of radioactive dust and radon. Exposure to the radioactive dust deposited in the area as a result of the mining activities.	**Low**	**Very Low**
	Risk of exposure to radiation to the mine workers during the mining and transportation of ore.	**Low**	**Very Low**
	Risk of exposure to land users after rehabilitation of the mining area	**Low**	**Very Low**
WASTE	Generation of additional general waste, litter and building rubble and hazardous waste.	**Medium**	**Low**
	Clearing site and disposing of illegally dumped waste on the site at appropriate waste disposal facility	**Medium**	**Medium**
	Residue Stockpile. Impact the depositing of waste rock and subsoil and have on the receiving environment	**Low**	**Very Low**
SERVICES	Minor impact caused by need for services i.e. water, electricity and sewerage systems during the mining phase causing additional strain on natural resources and service infrastructure.	**Very Low**	**Very Low**
TRAFFIC	Change in traffic patterns as a result of traffic entering and exiting the site on the surrounding road infrastructure and existing traffic.	**Medium**	**Low**

ASPECT	NATURE OF THE IMPACT	SIGNIFICANCE PRE-MITIGATION	SIGNIFICANCE POST-MITIGATION
	Nuisance, health and safety risks caused by increased traffic on and adjacent to the study area including cars, and heavy vehicles.	**Low**	**Very Low**
HEALTH AND SAFETY	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and users	**Low**	**Low**
	Increased risk to public and worker safety: If not fenced off, the public and workers may fall into excavated areas and trenches. Increase in traffic.	**Low**	**Low**
	Increase health risk associated with increase in noise and air pollution	**Medium**	**Low**
	Improved control of the site resulting in reduce health and safety risk associated with illegal waste dumping and illegal mining.	**Medium**	**Medium**
SOCIO-ECONOMIC	Potential creation of employment opportunities for the local community, ensuring job security.	**Low**	**Low**
	Multiplier effects on local economy will be positive, but limited in extent and only short term.	**Low**	**Low**
	Reduction in illegal mining taking place in the area	**Medium**	**Medium**
	Opening areas for housing developments	**Medium**	**Medium**
	Damage to infrastructure on surrounding properties	**Low**	**Very Low**
	Disruptions in daily living and movement patterns	**Low**	**Low**

(ii) Final Site Map

*(Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers. Attach as **Appendix D**)*

The final site layout is presented in Appendix D.

(iii) Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

Positive and negative impact are presented in **Table 38**. No alternatives were considered as part of the proposed operations.

f) Proposed impact management objectives and the impact management outcomes for environmental and social-economic impacts;

(Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPR as well as for inclusion as conditions of authorisation).

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPR as well as for inclusion as conditions of authorisation.

Specific environmental objectives to control, remedy or stop potential impact emanating from the proposed project are provided in **Table 39** below.

Table 39: Environmental Objectives and Outcomes

Aspect	Environmental Objective	Outcome
Geology and Soils	To prevent soil pollution, minimise the loss of topsoil and related land capability through physical disturbance, erosion and compaction	To handle, manage and conserve soil resources to be used as an essential resource in rehabilitation and establishing the land capability to its prior (pre-project) state
Topography	To minimise the impact on the land from and to prevent physical harm to third parties from potentially hazardous excavations	Establish a sustainable final land from. To ensure the safety of people and animals

Land Capacity and land use	To prevent loss of land capability through physical disturbance, erosion and compaction. To prevent unacceptable impacts on surrounding land uses	To handle, manage and conserve soil resources to be used as an essential resource in rehabilitation and establishing the land capability to its prior (pre-project) State. To minimise impacts on existing and surrounding land uses
Groundwater	To prevent pollution of groundwater resources. To prevent any AMD formation. Prevent impact on groundwater users	To ensure groundwater quality remains within acceptable limits based on baseline and water quality targets
Surface Water	To prevent pollution of surface water resources. Prevent siltation of resources.	To ensure groundwater quality remains within acceptable limits based on baseline and water quality targets (Klip River)
Geochemical	To prevent any AMD formation	To ensure that no AMD formation takes place.
Terrestrial Ecology	To prevent the unacceptable disturbance and loss of biodiversity and related ecosystem functionality through physical destruction.	To limit the area of disturbance as far as practically possible
Cultural Heritage	To prevent unacceptable loss of heritage resources	To protect heritage resources where possible. If disturbance is unavoidable, mitigate impact in consultation with a specialist and the SAHRA and in line with regulatory requirements
Visual and Sense of place	To limit negative visual impacts	To limit the area of disturbance as far as possible
Noise and Vibration	To prevent unacceptable noise and vibration impacts	To ensure that any noise and vibration generated is not disturbing to sensitive receptors
Air Quality	To prevent air pollution	To ensure that emissions limits are met
Traffic	To prevent road disturbance impact and reduce the potential for traffic safety related impacts	To minimise impacts on the public and mine road networks
Health and Safety	To prevent risk to human health and safety	To ensure that no impact on human health and safety takes place
Social Economic	To enhance the positive economic impacts and limit the negative economic impacts	To work together with existing structures and organisations to enhance positive impacts.

g) Roles and Responsibilities

The key personnel to ensure compliance to the EMPR and monitoring program is presented below. Responsible persons may differ from those indicated here, the roles and responsibilities would entail the minimum indicated below.

Table 40: Roles and Responsibilities

Aspect	Location	Timeframe	Responsible Person
Implementation of EMPR	Mine Area	Continues through each phase	Mine Manager ECO External Specialist
Groundwater	As per Groundwater specialist report	Monthly – Water levels Monthly – Quality (construction) Quarterly – Quality (Operational and Closure	External service provider – specialists
Surface water	Up and Downstream and discharge	Monthly	External service provider – specialists ECO
Noise	Sensitive Receptors	Annual (once during operation and one during closure) - After complaints	External service provider – specialists
Air Quality	Sensitive Receptors	PM10 – Continues Dust fallout – Monthly	External service provider – specialists
Archaeological	Mine Area	If and when required	External service provider – specialists ECO
Social and Stakeholder engagement	Regional	On-going	Mine Manager Social officer ECO
Crack survey	Houses within 150m	Once off	Mine Manager Social officer ECO
Vibration Monitoring	Local Area	If and when required	External service provider – specialists ECO
Alien Vegetation	Mine Area	Bi-annually	External service provider – specialists ECO

Rehabilitation Monitoring	Mine Area	Bi-annually	External service provider – specialists ECO

h) Aspects for inclusion as conditions of Authorisation

(Any aspects which must be made conditions of the Environmental Authorisation)

From the aspects has been identified by the specialist studies and are recommended to be included as conditions in the Environmental Authorisation:

- An independent environmental control officer (ECO) must be appointed to monitor the implementation of the EMPR and audit reports to be kept by the applicant;
- Submission of a Water Use License Application and the undertaking of all relevant specialist studies for that purpose.
- The EMPR is a contractual document and must be implemented at all times during the prospecting phase;
- An updated hydrocensus should be completed in a 500m radius around the Kimberley West open pit project area. The data recorded should be used to update the monitoring protocol and the groundwater flow model and associated management scenarios.
- A detailed monitoring program should be initiated before mining commence:
    - An upstream and downstream surface water sample should be taken in the Klip River.
    - A monitoring borehole should be drilled between the open pit and the Klip River.
    - One monitoring borehole should be drilled between the WRD and the community to the south.
    - One monitoring borehole should be drilled to the north of the open pit.
    - All boreholes should be subjected to aquifer tests to assess aquifer properties to be used in the model update. All boreholes should be sampled and analysed for the full spectrum of metalloids, Uranium and Thorium as well as micro and macro chemical parameters. The results should be recorded as the baseline against which all future possible impacts be measured and managed.
    - Monitoring (water levels and quality) during mining should be performed monthly due to the short Life of Mine. Post operational monitoring should be conducted quarterly.
    - A monitoring borehole should be drilled into the rehabilitated open pit and included in the post operational monitoring protocol. Water levels and water quality should be monitored on a quarterly bases.

    - Monitoring should continue for at least 2 years post rehabilitation of the Kimberley West project area.
- An alien vegetation management plan should be developed before the mine becomes operational.
- In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations or removal of vegetation, the ECO in charge for the developments ought to be informed instantly. These finds must be protected (preferably in situ) and the ECO must alert SAHRA (South African Heritage Research Agency) to ensure that mitigation (e.g. recording, collection) can be undertaken by a professional palaeontologist.
- A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area.
- A monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103:
    - Annually during the operational phase at the closest NSR; and
    - In response to complaints received.
- PM_{10} monitoring for the duration of the mining and rehabilitation phases to be undertaken. The recommended location for PM_{10} monitoring is at a suitable safe location on the northern edge of Bram Fishersville directly to the south of the operations.
- Ore haulage heavy vehicles avoid transporting ore during the relevant Am and PM peak periods.
- Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material.
- Radiological perspective, must be performed according to the NNR's Regulatory Guide – Site Remediation and Release from Regulatory Control (RG-0026).
- Closure plan and closure cost assessment to be updated annually. The closure plan to be updated based on a thorough assessment of the new regulations, namely GN.R 1228.

i) Description of any assumptions, uncertainties and gaps in knowledge.

(Which relate to the assessment and mitigation measures proposed)

- All information provided to the environmental team by the applicant and I&APs was correct and valid at the time that it was provided;

- It is not always possible to involve all I&APs individually, however, every effort has been made to involve as many affected stakeholders as possible though the extensive public participation process undertaken;
- The information provided by the applicant and specialists was accurate and unbiased;
- The scope of this investigation is limited to assessing the environmental impacts associated with the construction, operation and closure phases of the proposed activity.
- A monitoring and evaluation system, including auditing, will be established, in line with this EMP, to track the implementation of this specific EMP to ensure that management measures are effective to avoid, minimize and mitigate impacts; and that corrective action is being undertaken to address shortcomings and/or non-performances;
- All assumptions and limitations as identified in the specialist studies (See Appendices G) should be taken into consideration.

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

i) Reasons why the activity should be authorised or not

Based on specialist studies and the impact assessment undertaken no fatal flaws have been identified. However, several environmental and social impacts are envisaged from construction phase through to post-closure. The assessment of the proposed project presents the potential for highly negative impacts to occur on the geology and loss of resources before mitigation measures are implemented. The impact on the bio-physical, cultural and socio-economic environments is expected to be medium to low. With mitigation these potential impacts can be prevented or reduced to acceptable levels.

If all the recommendations of the specialists and mitigation measures provided in the Environmental Management Programme (PART B of this report) is effectively implemented and based on the information contained in this report as obtained from specialist there is no environmental, social or economic impact that is of such significant that the project should not proceed.

13. Period for which the Environmental Authorisation is required.

This Environmental Authorisation is required for a period of 2 years. This will be in line with the requirements of the DMR in terms of the period in which a mining permit should be mined.

14. Undertaking

(Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPR and is applicable to both the Basic assessment report and the Environmental Management Programme report).

Please refer to the EMPR in Part B of this document.

15. Financial Provision

(State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation).

The schedule closure cost for the project for rehabilitation of mining aspects and general surface rehabilitation was calculated at R 6 007 651.37 The additional allowances on the project that consisted out of P&G (12%), Contingencies (10%) and Additional Studies were calculated at R 1 410 322.77. Post Closure Aspects were calculated at R 1 157 917.78 for the 5 year post closure monitoring of surface, ground water and 3 years monitoring of rehabilitation and care and maintenance. The total schedule closure cost was calculated at R 8 575 891.92.

ii) Explain how the aforesaid amount was derived

The financial provision for the proposed project was determined in accordance with the NEMA Regulations (1147 of 2015) pertaining to the financial provision for prospecting operations. In this regard, the financial provision was derived through an itemisation of all activities and costs calculated based on actual costs of implementation of measures required for:

- Annual rehabilitation, as reflected in an annual rehabilitation plan
- Final rehabilitation, decommissioning and closure of the prospecting operations at the end of the life of operations, as reflected in a final rehabilitation, decommissioning and closure plan.
- Remediation of latent or residual environmental impacts.

The amount determined for financial provision for the proposed project will be provide during the construction and operational phase and will be updated annually.

iii) Confirm that this amount can be provided for from operating expenditure

(*Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be).*

The amount as presented will be provide after approval of the mining permit.

16. Specific Information required by the competent Authority

iv) Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). the EIA report must include the:-

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

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an Appendix).

Potential impacts on landowners, land occupiers, communities or individuals or competing land uses in the area include:

- Potential soil pollution which may result from any hydrocarbon spills where heavy machinery and vehicles are parked such as the hard park area because they contain large volumes of lubricating oils, hydraulic oils, and diesel to run. There is always a chance of these breaking down and/or leaking;
- Contamination of stormwater runoff and groundwater, caused from mining activities and residue stockpiles.
- Visual impacts: Visibility from sensitive receptors / visual scarring of the landscape as a result of the mining activities.
- Nuisance and health risks caused by an increase in the ambient noise level as a result of noise and vibration impacts associated with the operation of vehicles, machinery and equipment.
- Increased dust pollution due to vegetation clearance and vehicles driving on gravel roads and mining activities.
- Potential health risk (very low) associated with the inhalation of radioactive dust and radon;
- Gaseous emissions from vehicles and machinery may cause an impact on ambient air quality.
- Generation of additional general waste, litter and hazardous waste.
- Change in traffic patterns as a result of traffic entering and exiting the site on the surrounding road infrastructure and existing traffic.
- Changes in traffic patterns as a result of the transportation of ore to offsite facility for treatment
- Nuisance, health and safety risks caused by increased traffic on and adjacent to the study area including cars, and heavy vehicles.

- Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners, visitors and workers.
- Increased risk to public and worker safety: If not fenced off, the public and workers may fall into excavated areas and trenches.
- Potential creation of employment opportunities for the local community, during the construction, operational and closure phases.
- Potential positive impact associated with increased security to the area, limiting illegal mining and dumping;
- Potential positive impact associated with the freeing up of land for housing development
- Multiplier effects on local economy will be positive.

Mitigation measures are included in this report, as well as the EMPR.

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

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

No heritage resources were identified within the Kimberley West opencast footprint area, the overall impact of the development on heritage resources is regarded as very low and no mitigation measures are required. No impact is anticipated to take place on any national estate.

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

(the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist.

The EAP included all aspects as required by the EIA regulations, 2014 for the EIA and EMPR as described in the Executive Summary of this report. Please refer to Part A Section 3 (g).

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1. Draft environmental management programme

a) Details of the EAP

(Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required).

The details and expertise of the EAP's are detailed in Part A, Section 1 and Appendices 1

b) Description of the Aspects of the Activity

(Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1) (h) herein as required).

The details of the aspects of the activity are described above in Part A.

c) Composite Map

(Provide a map (Attached as an Appendix) at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers).

Refer to Appendix E.

d) Description of Impact management objectives including management statements

i) Determination of closure objectives

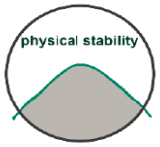
(Ensure that the closure objectives are informed by the type of environment described).

The closure objectives for mining internationally and in South Africa focus on the restoration of previous land use capabilities, the zero net loss of biodiversity, and the satisfaction of communities requirements. The closure objectives for the project will be in line with the above mentioned and is as follows:

- Re-establishment of the pre mining land from, land use and land capability to a level as close as possible to the pre-mining environment.

- Re-establish of function to any biodiversity areas of concern that could and have been affected by the mining operations
- Prevent any form of contamination of soils, surface water and groundwater
- Implement of on-going rehabilitation regulated standards
- Maintenance and monitoring of rehabilitated areas.
- Ensure that there are no safety risks associated with the mining operation, through construction, operation and rehabilitation

Based on the closure plan the following key closure objectives were identified:

	To create a physically stable, safe, rehabilitated landscape that limits long term environmental degradation, erosion and failure / collapse of unavoidably remnant mining residue which are present on the mine site post closure, thus enabling the successful establishment of the planned post-mining land use
	To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contamination arising from the mine site or individual facilities, as well as to sustain catchment yield as far as possible after closure
	To limit the possible health and safety threats to humans and animals using the rehabilitated mine site as it becomes available
	To re-instate a suitable land capability over the mine site to facilitate the progressive implementation of the planned post-mining land use
	To create a landscape that is self-sustaining and over time will converge to the desired ecosystem structure, function and composition
	To encourage, where appropriate and as aligned to the planned post-mining land use, the re-establishment of native vegetation on the rehabilitated mine site such that the terrestrial biodiversity is largely re-instated over time.
	To ensure that there constructive engagement and alignment with local communities and regulatory authorities regarding the proposed end land use

ii) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity.

A groundwater study and Geo-chemical assessment was performed as part of the specialist work for the proposed project. A monitoring point will be establish in the low point of the rehabilitated open pit for groundwater (quality and quantity) to be undertaken post rehabilitation. The geochemical analyses results indicated the waste associated with the Kimberley West open pit is benign. However, for management purposes. Mass migration simulations for operational and post operational was simulated to assess possible migration pathways originating from the WRD. Simulated mass migration is low during operations and within 3 years the potential seepage from the WRD decreased to less than 30%. No decant from the rehabilitated area is expected.

iii) Potential risk of Acid Mine Drainage

The acid base accounting and geochemical modelling have indicated that due to the absence of iron sulphide minerals the risk of the development of AMD conditions in the waste rock environment is negligible. Due to the negligible risk of the formation of AMD conditions as well as the negligible risk of the leaching of contaminants from the waste rock material, no mitigation measures are required for the waste rock material.

iv) Steps taken to investigate, Assess and evaluate the impact of acid mine drainage

A geochemical risk assessment for the proposed Kimberly West open pit gold mine waste rock material. The following laboratory analyses were conducted to for the waste classification, assessment of the likelihood of acid mine drainage (AMD) and the leach potential of contaminants from the waste rock dumps:

- Acid Base Accounting (ABA) analysis
- Net Acid Generation (NAG) analysis
- Sulphur speciation analysis
- Carbon speciation analysis
- Leach test according to R635
- Whole rock analysis (Aqua Regia) according to R635
- Mineralogical analysis (X-Ray Diffraction)

The XRD as well as the sulphur speciation analysis indicates that there are no sulphide minerals associated with the waste rock material. The acid base accounting and net acid generation tests

confirm the above by indicating that the waste rock is not likely to generate acid mine drainage (AMD) conditions due to its insignificant acid generation potential. The leachate results indicate that the material of which the waste rock consists is unreactive. The waste rock material contains no iron sulphide minerals. Therefore, the risk of the formation of acid mine drainage conditions due to the waste rock material is negligible.

v) Engineering or mine design solutions to be implemented to avoid remedy acid mine drainage

Due to the negligible risk of the formation of AMD conditions as well as the negligible risk of the leaching of contaminants from the waste rock material, no mitigation measures are required for the waste rock material.

vi) Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage.

The acid base accounting and geochemical modelling have indicated that due to the absence of iron sulphide minerals the risk of the development of AMD conditions in the waste rock environment is negligible, however the following measured will be put in place to measure if any AMD formation takes place:

- A monitoring borehole should be drilled into the rehabilitated open pit and included in the post operational monitoring protocol. Water levels and water quality should be monitored on a quarterly bases. Monitoring should continue for at least 2 years post rehabilitation of the Kimberley West project area.

vii) **Volumes and rate of water use required for the operation**

Water will be received via a municipality point at the existing Sol Plaaitjie infrastructure area and transported to the site via trucks. Any other water required will be determined in the WULA.

viii) **Has a water use licence been applied for?**

A water use licence application (WULA) has not yet been submitted. A WUL application process will be undertaken at the required time. It should be noted DWS is a stakeholder in this Basic Assessment process.

ix) Impacts to be mitigated in their respective phases

e) Measures to rehabilitate the environment affected by the undertaking of any listed activity

Table 41: Impacts to be mitigated in their respective phases.

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
Soil	8.95 ha	Clear of Vegetation	Vegetation clearing on the site will take place before any construction, mining can take place. The clearing of vegetation will result in loss of topsoil	• Establish a soil management plan before construction of the activity is undertaken. • Clearing of areas to take place a maximum of one month prior to intended mining in the area; • Stripping of topsoil will not take place during rain or excessive wind; and • The top 30 cm of vegetation and topsoil is to be stripped from the area to be mined. • Topsoil (top 30cm) is to be stored in predetermined topsoil berms, (+/- 5m) outside the boundary of the specific area; and • Topsoil stockpiles will be restricted to 1.5 to 2m in height • Seedbank to be preserved during vegetation clearing and topsoil stripping. • Alien vegetation to be cleared to prevent contamination of topsoil. • strip all available soils/growth medium off the pit, pit fringe (5m buffer), stockpile and road footprints prior to mining and store in the berm (depth determined during soil survey);	Construction Operational Phase	Impact avoided. All topsoil used in concurrent rehabilitation. Meet rehabilitation objectives Alien and invasive vegetation management plan implemented and outcomes achieved. Depth and	Rehabilitation objectives and standards Alien and invasive vegetation management plan implemented and outcomes achieved.

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Utilize the stored topsoil for the sole purpose of rehabilitation; and • No topsoil should be used for landscaping or construction purposes such as roads or embankments		methodology of topsoil placement	
Soil	0.93 ha	Construction of haul roads	Soils will be stripped to construct haul roads. This could lead to and mixing of topsoil. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils. Insufficient topsoil quality and quantity present on site.	• Spill kits to be stored on site, and staff trained to act when spills occur. • Contaminated soil to be removed and transported to a facility for remediation. • Drip trays to be used for vehicles that stand overnight. • All vehicles and machinery will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks; • All leaks will be cleaned up immediately using an absorbent material and spill kits, in the prescribed manner; • strip all available soils/growth medium off the pit, pit fringe (5m buffer), stockpile and road footprints prior to mining and store in the berm (depth determined during soil survey); • Utilize the stored topsoil for the sole purpose of rehabilitation; and • No topsoil should be used for landscaping or construction purposes such as roads or embankments.	Construction	Impact avoided. Prevention. No signs of soil contamination and loss of topsoil due to contamination. Spill procedure Meet rehabilitation objectives and standards.	Rehabilitation objectives and standards Spill procedure Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended] Hazardous Chemical Substances Regulations, 1995 (Government Notice 1179 of 1995) SANS 10234: 2008: Globally Harmonized System of classification and labelling of chemicals (GHS)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
Soil	8.95 ha	Stripping and stockpiling of topsoil	Topsoil will be stripped and stockpiled; this may cause deterioration in soil quality. During the stripping process topsoil may be mixed. Due to the presence of vehicles and equipment hydro-carbon spills may occur impacting on the quality of the soils.	• Establish a soil management plan before construction of the activity is undertaken. • Clearing of areas to take place a maximum of one month prior to intended mining in the area; • Stripping of topsoil will not take place during rain or excessive wind; and • The top 30 cm of vegetation and topsoil is to be stripped from the area to be mined. • Topsoil (top 30cm) is to be stored in predetermined topsoil berms, (+/- 5m) outside the boundary of the specific area; and • Topsoil stockpiles will be restricted to 1.5 to 2m in height • Seedbank to be preserved during vegetation clearing and topsoil stripping. • Alien vegetation to be cleared to prevent contamination of topsoil. • strip all available soils/growth medium off the pit, pit fringe (5m buffer), stockpile and road footprints prior to mining and store in the berm (depth determined during soil survey); • Utilize the stored topsoil for the sole purpose of rehabilitation; and • No topsoil should be used for landscaping or construction purposes such as roads or embankments	Construction Operational Phase	Impact avoided. Meet rehabilitation objectives and standards. Soil management procedure	Rehabilitation objectives and standards Final closure plan Consistent with design specifications and procedures

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Visual inspections to be conducted. • Spill kits to be stored on site, and staff trained to act when spills occur. • Contaminated soil to be removed and transported to a facility for remediation. • Drip trays to be used for vehicles that stand overnight. • All vehicles and machinery will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks; • All leaks will be cleaned up immediately using an absorbent material and spill kits, in the prescribed manner; and • Proliferation of alien and invasive plant species are expected within any disturbed areas. These species should be eradicated and controlled, to prevent their spread beyond the proposed development footprint areas. Alien and invasive plant seed dispersal within the top layers of the soil within footprint areas must be controlled;			
Soils	0.53 ha	Storage of overburden material and stockpile	Loss of topsoil as n result of wind and water erosion	• Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area;	Construction Operational Phase	Meet rehabilitation objectives and standards.	Rehabilitation objectives and standards GN704 Regulations in terms of the National

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Height of topsoil and overburden material to be restricted			Water Act, 1998 (Act No 36 of 1998)
Soils	2.53 ha	Waste Management	Residue Stockpile - Disposal of waste rock onto the waste rock facility and resulting formation of acid mine drainage conditions	• Type D liner to be installed • Monitoring of groundwater to take place to establish if the residue stockpile (Waste Rock Dump) has any impact on the groundwater or surface quality • Any water discharging from the Waste Rock dump should be prevented from flowing into the receiving environment	Operational Closure Phase	Waste Classification Norms and standards for disposal of waste. Minimisation of waste. Recycle, reduce, re-use	Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]; Waste Classification, Management Regulations, Norms and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) SANS 10234: 2008: Globally Harmonized System of classification and labelling of chemicals (GHS) Waste Classification and Management Regulations and Norms and Standards for the

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
							assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended] and: Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation (GN R. 632 of 2015)
Soils	4.9565 ha	Opencast mining activities	Loss of soil natural structure and properties (physical and chemical)	• Disturbed and cleared areas need to be revegetated with indigenous grass species in order to help stabilise the soil surface;	Operational Closure phase	Reduce impact	Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended];

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
		including input crushing of ore Concurrent rehabilitation /Roll over mining	as a result of stripping and stockpiling of topsoil. Operating of heavy duty equipment on site. Possible hydrocarbon spills from equipment	• Concurrent/progressive rehabilitation must be implemented at all times and disturbed areas must be rehabilitated as soon as such areas become available. This will not only reduce the total disturbance footprint, but will also reduce the overall rehabilitation effort and cost; • Any hydrocarbon spills to be cleaned in accordance with the spill procedure. • Spill kits and drip trays to be provided and available on site. • Height of topsoil and overburden material to be restricted to decrease possibility of wind erosion • Visual inspection of topsoil to be undertaken. Any alien vegetation observed on topsoil stockpiles to be removed. • Fertility testing to be performed to establish fertilizer requirements during rehabilitation. • Concurrent rehabilitation (roll over mining) to be in line with the closure plan and procedure.		Closure plan and objectives Final land form and land use. Depth and methodology of topsoil placement	Final and Annual Closure plans (GNR 1147). Consistent with design specifications and procedures
Soils	4.9565 ha	Closure of final void and placement of topsoil - Establishment of final land form	Loss of topsoil when loading and from topsoil stockpile and during placement.	• Rehabilitation to be done in line with the requirements of the closure plan • Placement of waste rock, subsoil and topsoil to be done in correct order. • Roads to be ripped before topsoil is place. • Do not overload trucks to prevent spillage of topsoil	Operational Closure phase	Reduce impact Rehabilitation plan	Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]; Final and Annual Closure plans (GNR 1147).

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Limit driving over the topsoil areas to limit compaction and rip the topsoil after placement. • Fertility testing to be undertaken on topsoil to establish the fertility of the soil against the baseline test. Mitigation measures to be establish if fertility of the soil is low or have decreased.		Closure plan and objectives Final land form and land use	Consistent with design specifications and procedures
Soils	8.95 ha	Seeding and re-vegetation of rehabilitated areas	Loss of soil fertility as a result of leaching and compaction. Loss of topsoil due to load and handling of soil and wind, water erosion. Compaction of topsoil as a result of placement and equipment driving over the soil during seeding.	• Disturbed and cleared areas need to be revegetated with indigenous grass species in order to help stabilise the soil surface; • Upon completion of mining activities, it must be ensured that no bare areas remain, and that indigenous grassland species are reintroduced. • Soils that have been compacted as a result of the construction and operational activities must be ripped and profiled in line with the surrounding area. Before seeding takes place. • Limit driving over the topsoil areas to limit compaction and rip the topsoil after placement. • Fertility testing to be undertaken on topsoil to establish the fertility of the soil against the baseline test. Mitigation measures to be establish if fertility of the soil is low or have decreased. • Soil monitoring to be done on areas with low growth, amelioration action to be establish based on soil chemical composition.	Closure phase	Reduce impact Rehabilitation plan Closure plan and objectives Final land form and land use	Final rehabilitation plan Closure objective and final land use and land form.

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
Soils	4.9565 ha	Waste Management	Hydrocarbon spills from equipment during final rehabilitation and re-vegetation	• Contaminated soils to be removed and disposal to take place as hazardous waste. • Spill kits to be available on site. • No equipment to be serviced on site. During emergency breakdowns drip trays to be placed under the equipment to prevent hydrocarbon spills.	Closure	Avoid, manage, mitigate Spill procedure	Act, 2008 (Act No. 59 of 2008) [as amended]; Waste Classification, Management Regulations, Norms and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) SANS 10234: 2008: Globally Harmonized System of classification and labelling of chemicals (GHS) Waste Classification and Management
Soils	2.53 ha	Waste Management	Residue Stockpile – Waste rock to be used in the backfill of the opencast area. Formation of acid mine drainage	• Type D liner to be installed • Monitoring of groundwater to take place to establish if the residue stockpile (Waste Rock Dump) has any impact on the groundwater or surface quality	Operational closure phase	Reduce impact. Mitigate or manage.	Regulations regarding the planning and management of residue stockpiles and residue deposits from a

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
			conditions. Residue material remaining on site in the facility.	• Any water discharging from the Waste Rock dump should be prevented from flowing into the receiving environment		Rehabilitation objectives	prospecting, mining, exploration or production operation (GN R. 632 of 2015)
Geology	4.9565 ha	Opencast mining activities including input crushing of ore Concurrent rehabilitation /Roll over mining	Opencast mining will result in destruction of geological structures. Loss of geological structure and integrity. Low of resources Breaking of rock through modern methods to reduce noise.	• Stockpiling of subsoil and waste rock not to take place on the same stockpile. • Rehabilitation of pit to take place in accordance with rehabilitation plan, procedure to ensure rehabilitation objects are achieve. • Final landform and land use to be achieved through rehabilitation.	Operational Closure phase	Closure plan and objectives Final land form and land use	Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]; Final and Annual Closure plans (GNR 1147).
Topography	4.9565 ha	Opencast mining activities including input crushing of ore Concurrent rehabilitation /Roll over mining	Opencast mining will result in a change in topography. Change in surface drainage and final land from	• Implement of closure plan to ensure effective rehabilitation of the area. • Re-establishment of vegetation to take place after rehabilitation • Monitoring and maintenance program to be establish for the post closure phase. • Final land form to be free draining and erosion control to be implemented. • Final land use and land form to be establish in final closure plan.	Operational Closure phase	Closure plan and objectives Final land form and land use. Design elevations achieved to within 150mm tolerance	Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]; Final and Annual Closure plans (GNR 1147). Consistent with design specifications

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
Topography	4.9565 ha	Closure of final void and placement of topsoil - Establishment of final land form	Change in topography of the area.	• Rehabilitation to be done in line with the requirements of the closure plan. Final land form to be establish as specified in closure plan. Final land form to take settlement into account. • Settlement to be monitored and areas where ponding is taking place to be leveled out. • Ensure that the profile of the rehabilitated area is free-draining and establish a slope similar to the pre-mining slope. • The final backfilled opencast topography should be engineered such that runoff is directed away from the opencast areas. •	Closure	Mitigate impact Closure plan and objectives Final land form and land use. Design elevations achieved to within 150mm tolerance	Final and Annual Closure plans (GNR 1147). Closure objectives. Consistent with design specifications
Vegetation and Terrestrial Ecology	4.9565 ha	Clearing of vegetation	Vegetation clearing can result in loss of species of conservation concern. Reduction in biodiversity of the area. Note that no red data species or species of conservation concern were identified within the proposed mining area.	• Environmental awareness training should include that no hunting, trapping or killing of fauna are allowed; • An alien vegetation management plan should be drawn up and implemented; • Regular removal of invasive alien species should be undertaken. This should extend through to the closure phase of the project; • Rehabilitation of disturbed areas to take place with indigence vegetation. • No clearing of vegetation outside of the footprint area.	Construction Operational Phase	Meet rehabilitation objectives and standards. Re-vegetation of area	Terrestrial ecology report Alien and invasive vegetation management plan implemented and outcomes achieved. NEMBA: National Environmental Management:

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Animals may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-contractors' employees. This includes foraging, food and wood collecting outside of the construction site • No collection of firewood, floral SCC or medicinal floral species must be allowed by construction or mining personnel if any species occur on site; • Should any other floral SCC species be encountered or will be disturbed, ensure effective relocation of individuals to suitable similar habitat. Arrangement with the relevant authorities needs to take place to rescue and relocate the species.			Biodiversity Act, 2004 (Act No. 10 of 2004) Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2016.
Vegetation and Biodiversity	0.92 ha	Construction of haul roads	Vegetation will be removed during the construction of the roads	• Removal and storage of all usable soils to be used in rehabilitation. • Access roads and haul roads to avoid sensitive areas • Clearing of vegetation to be restricted to mining area. • Any animals rescued or recovered will be relocated in a suitable habitat away from the mining operations and associated infrastructure; • Any lizards, snakes or monitors encountered should be allowed to escape to a suitable habitat away from disturbance.	Construction	Meet rehabilitation objectives and standards. Re-vegetation of area	Terrestrial ecology report NEMBA: National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• No reptile should be intentionally killed, caught or collected during any phase of the project; and • General avoidance of snakes is the best policy if encountered. Snakes should not be intentionally harmed or killed and allowed free movement away from the area.			
Vegetation and Biodiversity	8.95 ha	Stripping and stockpiling of topsoil	Vegetation will be removed during the stripping of the topsoil and will also be affected during the stockpiling process. Loss of species of conservation concern Note that no red data species or species of conservation concern were identified within the proposed mining area.	• Environmental awareness training should include that no hunting, trapping or killing of fauna are allowed; • An alien vegetation management plan should be drawn up and implemented; • Regular removal of invasive alien species should be undertaken. This should extend through to the closure phase of the project; and • Rehabilitation of disturbed areas to take place with indigence vegetation. • No clearing of vegetation outside of the footprint area. • Animals may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-contractors' employees. This includes foraging, food and wood collecting outside of the construction site.	Construction Operational Phase	Meet rehabilitation objectives and standards. Re-vegetation of area	Terrestrial ecology report NEMBA: National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• No collection of firewood, floral SCC or medicinal floral species must be allowed by construction or mining personnel if any species occur on site; • Should any other floral SCC species be encountered or will be disturbed, ensure effective relocation of individuals to suitable similar habitat. Arrangement with the relevant authorities needs to take place to rescue and relocate the species.			
Vegetation	8.95 ha	Closure of final void and placement of topsoil - Establishment of final land form	Transport activities can damage/destroy vegetation. Failure to establish vegetation on the areas where the infrastructure was removed can enhance the possibility of the establishment of alien vegetation.	• Trucks should remain on roads and designated areas • Re-establish indigenous vegetation as soon as possible after the placement of the topsoil. Ensure the area remains free of exotic species.	Closure phase	Avoid, reduce mitigate impact Meet rehabilitation objective Closure plan	NEMBA: National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). Rehabilitation objectives and closure plan
Vegetation and biodiversity	8.95 ha	Seeding and re-vegetation of rehabilitated areas	Re-establishment of vegetation. Increase in spread of alien vegetation. Incorrect rehabilitation and maintenance can lead to colonization and spread of alien vegetation.	• Re-establishment of vegetation on all rehabilitated areas. Seed mix to be determined by specialist. • Re-seeding to take place on areas where slope or no growth is observed. • In places where hydro seeding can be applied it should be utilized. • A management plan for the control of invasive/exotic weed species needs to be	Closure phase	Meet Rehabilitation objective. Closure plan Final land form and land use No significant erosion	NEMBA: National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				implemented. This is not a once-off activity and needs to be ongoing			Rehabilitation objectives and closure plan
Surface Water	8.95 ha	Clearing of Vegetation	Increase runoff as a result of vegetation clearing. Increase sediment load resulting in sedimentation of rivers. Altering water quality	• Water quality monitoring program to be stablish in the Klip River, up and downstream of activity. • Proper storm water measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. Strict erosion control to be implemented. • Stormwater management to be in line with the requirements Regulation 704 (4 June 1999). • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas	Construction Operational Phase	Mitigate and manage Stormwater management plan.	Regulation 704 (4 June 1999). National Water Act (Act 36 of 1998). Target Water Quality Guideline (TWQG) standards
Surface Water	0.92 ha	Construction of haul road	Loose material can contaminate surface water in the event of a	• All hydrocarbon spills to be contained and soils removed.	Construction	Stormwater management plan.	Regulation 704 (4 June 1999).

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
			storm water run-off occurring during the construction of the roads. Runoff from areas where hydro-carbon spills are present may also cause deterioration in surface water quality.	• Proper storm water measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas. • Runoff from roads must be managed to avoid erosion and pollution problems.		Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives	National Water Act (Act 36 of 1998). Spill procedure Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended] Hazardous Chemical Substances Regulations, 1995 (Government Notice 1179 of 1995) SANS 10234: 2008: Globally Harmonized System of classification and labelling of chemicals (GHS)
Surface Water	8.9 ha	Stripping and stockpiling of topsoil	Loose material can contaminate surface water in the event of a storm water run-off occurring during the stripping and stockpiling of topsoil. Runoff from areas where hydro-carbon spills are present	• All hydrocarbon spills to be contained and soils removed. • Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater to be in line with the requirements Regulation 704 (4 June 1999). • If necessary, temporary diversion channels should be constructed ahead of the mining area to	Construction Operational phase	Stormwater management plan. Target Water Quality Guideline (TWQG) standards.	Regulation 704 (4 June 1999). National Water Act (Act 36 of 1998). Spill procedure Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended]

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
			may also cause deterioration in surface water quality.	intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas. • Establishment of monitoring points up and downstream of the activity in the Klip River.		Klip River Water Quality Objectives.	Hazardous Chemical Substances Regulations, 1995 (Government Notice 1179 of 1995) SANS 10234: 2008: Globally Harmonized System of classification and labelling of chemicals (GHS) Monitoring Programme Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives.
Surface Water	4.9565 ha	Storage of overburden material and stockpiles	Contaminated runoff from overburden and stockpile areas. Siltation of river systems.	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater to be in line with the requirements Regulation 704 (4 June 1999). • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems;	Construction Operational phase	Stormwater management plan. Target Water Quality Guideline (TWQG) standards.	Regulation 704 (4 June 1999). National Water Act (Act 36 of 1998). Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended] Hazardous Chemical Substances Regulations, 1995 (Government Notice 1179 of 1995)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas. • Establishment of monitoring points up and downstream of the activity in the Klip River.		Klip River Water Quality Objectives.	SANS 10234: 2008: Globally Harmonized System of classification and labelling of chemicals (GHS) Monitoring Programme Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives.
Surface water	4.9565 ha	Waste Management	Contaminated runoff from overburden and stockpile areas. Siltation of river systems. Contaminated stormwater from storage areas.	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater to be in line with the requirements Regulation 704 (4 June 1999). • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area;	Operational and Closure	Prevention of impact. Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended] and: Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation (GN R. 632 of 2015)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• No wastewater may run freely into any of the surrounding naturally areas. • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Any water reporting to the open pit or storm water management areas should be kept in a closes system (classified as contact water) and not be discharged into the environment before treatment to the specific catchment Target Water Quality Guideline (TWQG) standards • Contact water can be recirculated and used in a closed system according to GN704 Best Practise Guideline			Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives. GN 704 (4 June 1999)
Surface Water	4.9565 ha	Opencast mining activities including input crushing of ore Concurrent rehabilitation /Roll over mining	Discharge of polluted water. Increase sediment load. Damage to riparian vegetation	• Stormwater structure to be maintained to prevent uncontaminated stormwater flowing into the pit area. • Clean and dirty water separation to take place. • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Any water reporting to the open pit or storm water management areas should be kept in a closes system (classified as contact water) and not be discharged into the environment before treatment	Operational and Closure	Prevention of impact. Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives	National Water Act 1999 (Act No. 36 of 1999) [as amended] Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives. GN 704 (4 June 1999)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				to the specific catchment Target Water Quality Guideline (TWQG) standards • Contact water can be recirculated and used in a closed system according to GN704 Best Practice Guideline • No contaminated water to be discharge. • Stormwater runoff from the area to be prevented to increase pollution and sediment load of the river system.			
Surface Water	Regional	Pumping of groundwater	Discharge of polluted water. Increase sediment load. Damage to riparian vegetation Increasing flow in Klip river due to groundwater discharge. This can lead to improvement in water quality of stream as the groundwater is uncontaminated. Discharge of polluted water. Increase sediment load. Damage to riparian vegetation	• Stormwater structure to be maintained to prevent uncontaminated stormwater flowing into the pit area. • Clean and dirty water separation to take place. • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Any water reporting to the open pit or storm water management areas should be kept in a closes system (classified as contact water) and not be discharged into the environment before treatment to the specific catchment Target Water Quality Guideline (TWQG) standards • Contact water can be recirculated and used in a closed system according to GN704 Best Practice Guideline • No contaminated water to be discharge.	Operational and Closure	Prevention of impact. Reduce or avoid Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives	National Water Act 1999 (Act No. 36 of 1999) [as amended] Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives. GN 704 (4 June 1999)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
			Increasing flow in Klip river due to groundwater discharge. This can lead to improvement in water quality of stream as the groundwater is uncontaminated.	• Stormwater runoff from the area to be prevented to increase pollution and sediment load of the river system • Any water discharge must be monitored for quality and quantity and must comply with the applicable discharge limits.			
Surface Water	4.9565 ha	Closure of final void and placement of topsoil - Establishment of final land form	Erosion on rehabilitated areas. Ponding of water. Increase in siltation load from stormwater	• Stormwater measures implemented during operational phase to prevent erosion of exposed soils and increase sediment load. • Water quality monitoring to be maintained during closure and post closure. • In the event that decant takes place, monitoring of the water quality to take place. • The rehabilitated areas should be free draining and erosion control should be implemented.	Operational closure phase	Prevention of impact. Reduce or avoid Meet rehabilitation objectives Closure plan	National Water Act 1999 (Act No. 36 of 1999) [as amended] Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives. GN 704 (4 June 1999)
Surface Water	4.9565 ha	Seeding and re-vegetation of rehabilitated areas	Erosion on rehabilitated areas. Ponding of water. Increase in siltation load from stormwater.	• Stormwater measures implemented during operational phase to prevent erosion of exposed soils and increase sediment load. • Water quality monitoring to be maintained during closure and post closure. • Vegetation cover to be establish to reduce surface runoff, erosion and siltation.	Closure phase	Prevention of impact. Reduce or avoid	National Water Act 1999 (Act No. 36 of 1999) [as amended] Target Water Quality Guideline (TWQG) standards.

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• In the event that decant takes place, monitoring of the water quality to take place. • The rehabilitated areas should be free draining and erosion control should be implemented.		Meet rehabilitation objectives Closure plan	Klip River Water Quality Objectives. GN 704 (4 June 1999) Closure objectives and final land use
Surface Water	4.9565 ha	Waste Management	Contaminated water generated from the residue stockpile area.	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Stormwater to be in line with the requirements Regulation 704 (4 June 1999). • If necessary, temporary diversion channels should be constructed ahead of the mining area to intercept clean run-off and divert it around disturbed areas into the natural drainage system; • Existing vegetation must be retained as far as possible to minimise erosion problems; • Sediment-laden run-off from cleared areas should be prevented from entering rivers and streams; • No river or surface water may be affected by silt emanating from the area; • No wastewater may run freely into any of the surrounding naturally areas.	Operational closure phase	Prevention of impact. Reduce or avoid Meet rehabilitation objectives Closure plan	National Water Act 1999 (Act No. 36 of 1999) [as amended] Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives. GN 704 (4 June 1999)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Any water reporting to the open pit or storm water management areas should be kept in a closes system (classified as contact water) and not be discharged into the environment before treatment to the specific catchment Target Water Quality Guideline (TWQG) standards • Contact water can be recirculated and used in a closed system according to GN704 Best Practice Guideline			
Groundwater	4.9565 ha	Storage of overburden material and stockpiles	The formation of acid mine drainage as a result of ingress water and oxygen into the stockpiled overburden. Mass migration from waste rock dump negatively impacting groundwater According to the Geo-chemical assessment the overburden is considered inert and therefore does not have a great potential for AMD.	• Proper stormwater measures to be put in placer to prevent contamination of surface water. This will include the construction of berms and trenches. • Establishment of monitoring points up and downstream of the activity in the Klip River. • A monitoring borehole should be drilled between the open pit and the Klip River. • Two monitoring boreholes should be drilled between the WRD and the community to the south. • Monitoring (water levels and quality) during construction should be performed monthly due to the construction period (1 months). • A groundwater monitoring program to be establish. All boreholes should be sampled and analysed for	Construction Operational Closure phase	Meet objectives Monitoring Programme Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives.	Monitoring Programme Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives. Regulation 704 (4 June 1999). National Water Act (Act 36 of 1998).

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				the full spectrum of metalloids, Uranium and Thorium as well as micro and macro chemical parameters. Monthly sampling during construction and operation. • Monitoring (water levels and quality) during mining should be performed monthly due to the short Life of Mine (5 months). • Maintain a surface water monitoring program, sampling points up and downstream of the activity in the Klip River. • Maintain groundwater monitoring program as establish in construction phase. Should consist out of up-gradient and down-gradient monitoring points as specified by specialist.			
Ground water	Local	Opencast mining activities including input crushing of ore Concurrent rehabilitation /Roll over mining	Dewatering of local aquifer an impacting local and neighboring groundwater users. Abstraction of groundwater to prevent pit flooding Deterioration of groundwater quality down gradient of the mining operations	• Maintain groundwater monitoring program as establish in construction phase. Should consist out of up-gradient and down-gradient monitoring points as specified by specialist. • Monitoring (water levels and quality) during mining should be performed monthly due to the short Life of Mine (5 months). • All boreholes should be subjected to aquifer tests to assess aquifer properties to be used in the model update. All boreholes should be sampled and analysed for the full spectrum of metalloids,	Operational Closure phase	Meet objective of Monitoring Programme Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives.	Monitoring Programme Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives. Regulation 704 (4 June 1999).

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				Uranium and Thorium as well as micro and macro chemical parameters. • An updated hydrocensus should be completed in a 500m radius around the Kimberley West open pit project area. The data recorded should be used to update the monitoring protocol and the groundwater flow model and associated management scenarios • Utilise the monitoring data to calibrate the ground water models, replacing the inferred data to provide certainty on potential impacts; • Rerun the geochemical model to reflect the preferred closure scenario; • Determine the risk of latent and residual impacts. If required, devise mitigation measures and implement controls, adjust the closure liability calculation if required.			National Water Act (Act 36 of 1998).
Ground water	4.9565 ha	Waste Management	Impact on groundwater and surrounding users. Possible formation of AMD and decant from waste management facility – residue stockpile Geo-chemical report indicates that the	• Groundwater monitoring point to be establish in the low point of the rehabilitated opencast area. This point to be included into the monitoring program. • Groundwater monitoring program to be maintained for 2 years post rehabilitation. • Mitigation measures to be establish and implemented if any formation of AMD is observed in the groundwater.	Operational closure phase	Meet objective of Monitoring Programme Target Water Quality Guideline (TWQG) standards. Klip River	Monitoring Programme Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives. Regulation 704 (4 June 1999).

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
			possibility of AMD formation is very low			Water Quality Objectives.	National Water Act (Act 36 of 1998).
Ground water	4.9565 ha	Establishment of final land form. Seeding and re-vegetation of rehabilitated areas	Impact on groundwater and surrounding users. Possible formation of AMD and decant from opencast rehabilitated area. Geo-chemical report indicates that the possibility of AMD formation is very low.	• Groundwater monitoring point to be establish in the low point of the rehabilitated opencast area. This point to be included into the monitoring program. • Groundwater monitoring program to be maintained for 2 years post rehabilitation. • Mitigation measures to be establish and implemented if any formation of AMD is observed in the groundwater.	Closure phase	Meet objective of Monitoring Programme and closure objectives Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives.	Monitoring Programme Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives. Regulation 704 (4 June 1999). National Water Act (Act 36 of 1998). Closure objectives
Geo chemistry	4.9565 ha	Storage of overburden material and stockpiles	Disposal of water rock onto waste rock facility and resulting formation of acid mine drainage and the leaching of metal(liods), especially arsenic from the material	• A monitoring borehole should be drilled between the open pit and the Klip River. • Two monitoring boreholes should be drilled between the WRD and the community to the south. • Monitoring (water levels and quality) during construction should be performed monthly due to the construction period (1 months). • A groundwater monitoring program to be establish. All boreholes should be sampled and analysed for	Construction Operational & Closure phase	Monitoring Programme Target Water Quality Guideline (TWQG) standards.	Target Water Quality Guideline (TWQG) standards. Klip River Water Quality Objectives. Waste Classification and Management

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				the full spectrum of metalloids, Uranium and Thorium as well as micro and macro chemical parameters. Monthly sampling during construction and operation. • Utilise the monitoring data to calibrate the ground water models, replacing the inferred data to provide certainty on potential impacts; • Rerun the geochemical model to reflect the preferred closure scenario; • Determine the risk of latent and residual impacts. If required, devise mitigation measures and implement controls, adjust the closure liability calculation if required.		Klip River Water Quality Objectives.	Regulations and Norms and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended] and: Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation (GN R. 632 of 2015)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
Land Capability	8.95 ha	Stripping and Stockpiling of topsoil	Stripping of topsoil will result in the current possible land use to cease completely. No agricultural activities are taking place on the area.	• Rehabilitation of disturbed areas to take place with indigence vegetation. • Land use after rehabilitation to be open space for housing development. • Soil fertility testing to be performed before construction and before rehabilitation to establish the need to improve the soil fertility.	Construction Operational	Meet rehabilitation objectives and standards.	Final land use requirements. Assessment against pre-mining capability
Air Quality	8.95 ha	Clearing of Vegetation	Clearing of Vegetation may cause dust that will influence the quality of air. Vehicle emissions can also cause deterioration in air quality.	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns. • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rate. • Loading, transfer, and placement of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems;	Construction Operational phase	Monitoring program Speed limit NAEIS Reporting	South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Emissions report must be made in the format required for NAEIS to the relevant air quality officer.			National Ambient Air Quality Standards (NAAQS) NAEIS Reporting requirements
Air Quality	4.9565 ha	Construction of haul roads	Construction activities may cause dust that will influence the quality of air. Vehicle emissions can also cause deterioration in air quality	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rate. • Loading, transfer, and placement of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Emissions report must be made in the format required for NAEIS to the relevant air quality officer.	Construction phase	Monitoring program Measures to reduce, avoid Speed limit	South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004 National Ambient Air Quality Standards (NAAQS)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
							NAEIS Reporting requirements
Air Quality	4.9565 ha	Stripping and stockpiling of topsoil	Stripping and stockpiling of topsoil may cause dust due to vehicle movement that will influence the quality of air. Material handling (topsoil) will generate dust and this and vehicle emissions can potentially cause deterioration in air quality	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Loading, transfer, and placement of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Emissions report must be made in the format required for NAEIS to the relevant air quality officer	Construction Operational phase	Monitoring program Measures to reduce, avoid Speed limit	South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004 National Ambient Air Quality Standards (NAAQS) NAEIS Reporting requirements.

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
							Vaal Triangle Priority Area
Air Quality	0.25 ha	Storage of overburden material and stockpiles	Increase in air pollution as a result of wind erosion.	• Establishment of air quality monitoring program as specified by specialist • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Roll over mining to limit amount of overburden • Emissions report must be made in the format required for NAEIS to the relevant air quality officer	Construction Operational phase	Measures to reduce, avoid Monitoring program	South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004. Vaal Triangle Priority area National Ambient Air Quality Standards (NAAQS)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
							NAEIS Reporting requirements. Vaal Triangle Priority Area
Air Quality	3.2 ha	Opencast mining activities including input crushing of ore Concurrent rehabilitation /Roll over mining	Opencast mining can have a negative impact on surround air quality. Increase dust and emissions. Breaking of rocks, stripping of overburden. Load, haul and transporting of overburden. Breaking of rock through modern methods	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • PM_{10} monitoring is recommended for the duration of the mining and rehabilitation phases. The recommended location for PM_{10} monitoring is at a	Operational phase	Measures to reduce, avoid Monitoring program	South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004 National Ambient Air Quality Standards (NAAQS)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				suitable safe location on the northern edge of Bram Fishersville directly to the south of the operations. • Modern rock breaking equipment to be used to reduce the risk to air quality associated with blasting. No blasting to be performed. • Emissions report must be made in the format required for NAEIS to the relevant air quality officer			NAEIS Reporting requirements. Vaal Triangle Priority Area
Air Quality	Local	Load and Haul	Increase in air pollution as n result of equipment movement, handling of overburden and ore, and placement of overburden on stockpiles.	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • Wet suppression techniques should be used to control dust emissions, especially in areas where dry material is handled or stockpiled. • Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions.	Operational closure phase	Measures to reduce, avoid Monitoring program	South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Vehicles should be fitted with catalytic converters and low sulfur fuel should be used to minimise NO_2 and SO_2 impacts. • Emissions report must be made in the format required for NAEIS to the relevant air quality officer			NAEIS Reporting requirements. Vaal Triangle Priority Area National Ambient Air Quality Standards (NAAQS)
Air Quality	Local	Transporting of Ore to treatment facility	Increase in dust and gas pollution associated with transportation of ore to offsite treatment facility.	• An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised. • Wet suppression techniques should be used to control dust emissions, especially in areas where dry material is handled or stockpiled. • Loading of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions. • Emissions report must be made in the format required for NAEIS to the relevant air quality officer	Operational closure phase	Measures to reduce, avoid Monitoring program	South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental Management: Air Quality Act 39 of 2004

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Vehicles should be fitted with catalytic converters and low sulfur fuel should be used to minimise NO_2 and SO_2 impacts. • Truck transporting ore must covered loads by means of a tarp to prevent dust pollution during transport.			Vaal Triangle Priority Area National Ambient Air Quality Standards (NAAQS) National Ambient Air Quality Standards (NAAQS)
Air Quality	4.9565 ha	Closure of final void and placement of topsoil - Establishment of final land form	Rehabilitation (spreading of soil, re-vegetation and profiling/ contouring) activities can lead to an increase in dust emission and emissions from equipment.	• Wet suppression techniques should be used to control dust emissions, especially in areas where dry material is handled; • Loading of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions. • Vehicles should be fitted with catalytic converters and low sulfur fuel should be used to minimise NO_2 and SO_2 impacts.	Operational closure phase	Measures to reduce, avoid Monitoring program	South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National Environmental

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• The bare soil will be prone to erosion and therefore there is need to reduce the velocity near the surface of the soil by re-vegetation. • Leaving the surface of the soil in a coarse condition reduces wind erosion and ultimately reduces the dust levels. • Management measures should be aimed to reduce the potential for fugitive dust generation and render the impacts on ambient air quality negligible. • Emissions report must be made in the format required for NAEIS to the relevant air quality officer			Management: Air Quality Act 39 of 2004 National Ambient Air Quality Standards (NAAQS) Vaal Triangle Priority Area National Ambient Air Quality Standards (NAAQS)
Air Quality	8.95 ha	Seeding and re-vegetation of rehabilitated areas	Increase in dust pollution from wind erosion.	• Vegetation to be establish on rehabilitated area to reduce windblown particles. Vegetation binds the soil and reduces the wind velocity • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions. • Vehicles should be fitted with catalytic converters and low sulfur fuel should be used to minimise NO_2 and SO_2 impacts. • The bare soil will be prone to erosion and therefore there is need to reduce the velocity near the surface of the soil by re-vegetation.	Operational closure phase	Measures to reduce, avoid Meeting plan objectives Monitoring program	South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution Meet the requirements of the National Dust Control regulations, 2013, as published in the Government Gazette (No. 36974) of 1 November 2013 (GNR 827 of 1 November 2013), in terms of the National

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Leaving the surface of the soil in a coarse condition reduces wind erosion and ultimately reduces the dust levels. • Management measures should be aimed to reduce the potential for fugitive dust generation and render the impacts on ambient air quality negligible.			Environmental Management: Air Quality Act 39 of 2004 National Ambient Air Quality Standards (NAAQS)
Noise and Vibration	Local	Load and Haul	Increase in baseline noise as a result of equipment. Low vibration level is expected from equipment	• A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area. • Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. • Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday	Construction Operational Closure phase	Reduce and avoid Management measures Meeting plan objectives SANS 10103 (2008)	Finance Corporation (IFC) and SANS 10103. National Environmental Management Air Quality Act (NEMAQA) (Act. 39 of 2004) WHO guidelines for Community Noise (WHO, 1999)
Background Noise levels	Local	Clearing of Vegetation	Clearing of vegetation activities may cause an increase in background noise levels.	• A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all noise related problems. Frequent community	Construction Operational phase	Reduce and avoid Management measures	Finance Corporation (IFC) and SANS 10103.

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
			Noise generated by equipment. Vegetation acts as a natural noise boundary.	liaison meetings should be held with the neighbouring communities to address noise related concerns. • Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Implement noise monitoring programme as specified by specialist study. • Activities to be restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday		Meeting plan objectives SANS 10103 (2008)	National Environmental Management Air Quality Act (NEMAQA) (Act. 39 of 2004) WHO guidelines for Community Noise (WHO, 1999)
Background Noise levels	Local	Construction of haul roads	Construction activities may cause an increase in background noise levels.	• Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Construction of Waste Rock will limit noise levels to the residential area to the south of the mine • Implement noise monitoring programme. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday • Heavy vehicle traffic should be routed away from noise sensitive areas where possible; • Noise levels should be kept within acceptable limits. All noise and sounds generated should adhere to	Construction	SANS 10103 (2008) Meeting plan objectives	Finance Corporation (IFC) and SANS 10103. National Environmental Management Air Quality Act (NEMAQA) (Act. 39 of 2004) WHO guidelines for Community Noise (WHO, 1999)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				South African Bureau of Standards (SABS) specifications for maximum allowable noise levels for construction sites. No pure tone sirens or hooters may be utilised except where required in terms of SABS standards or in emergencies			
Background Noise levels	Local	Stripping and stockpiling of topsoil	Stripping and stockpiling activities may cause an increase in background noise levels.	• Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday • Establish noise monitoring program as specified by specialist study.	Construction Operational Phase	SANS 10103 (2008) Meeting plan objectives	Finance Corporation (IFC) and SANS 10103. National Environmental Management Air Quality Act (NEMAQA) (Act. 39 of 2004) WHO guidelines for Community Noise (WHO, 1999)
Noise and Vibration	Local	Opencast mining activities including input crushing of ore	Increase in background noise levels from the increase activities and use of heavy equipment. Breaking of rock through modern methods. Excavation of overburden and reef.	• A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area. • A monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103. Annually during the operational phase at the closest NSR; and in response to complaints received.	Operational	SANS 10103 (2008) Meeting plan objectives	Finance Corporation (IFC) and SANS 10103. National Environmental Management Air Quality Act (NEMAQA) (Act. 39 of 2004)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
		Concurrent rehabilitation /Roll over mining		• The waste rock storage facility to be utilized as a noise barrier between the mining operation and sensitive receptors. • Basic rule of thumb for barrier height is: Any noise barrier should be at least as tall as the line-of-sight between the noise source and the receiver, plus 30%. So if the line-of-sight is 10m high, then the barrier should be at least 13m tall for best performance • Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. • The operation to use modern rock breaking equipment to reduce the noise and vibration. • No blasting to take place. If any blasting is required approval should be obtained from surrounding communities. • Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Maintain a noise monitoring programme. A monitoring programme as per the requirements of the International Finance Corporation (IFC) and SANS 10103:			WHO guidelines for Community Noise (WHO, 1999) Mine Health and Safety Act (Act 29 of 1996)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday			
Noise and Vibration	Local	Transporting of Ore to treatment facility	Increase in background noise as a result of the transportation of ore to offsite treatment facility.	• A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area. • Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. • Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday. Ore haulage heavy vehicles avoid transporting ore during the relevant Am and PM peak periods.	Operational closure phase	SANS 10103 (2008) Meeting plan objectives	Finance Corporation (IFC) and SANS 10103. National Environmental Management Air Quality Act (NEMAQA) (Act. 39 of 2004) WHO guidelines for Community Noise (WHO, 1999) Mine Health and Safety Act (Act 29 of 1996)
Noise and Vibration	Local	Closure of final void and placement of topsoil - Establishme	Rehabilitation (spreading of soil, re-vegetation and profiling/ contouring) activities can lead to an	• A management and mitigation plan are recommended to minimise noise impacts from the project on the surrounding area. For all phases of the project.	Closure phase	SANS 10103 (2008) Meeting plan objectives	Finance Corporation (IFC) and SANS 10103.

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
		nt of final land form	increase in background noise levels	• Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. • Servicing of all vehicles to be undertaken on a regular basis to prevent excessive noise from machinery. • Activities to restrict to: 5.5-day working week, one shift system per day between 06:00 to 18:00 Monday to Friday and between 06:00 to 14:00 on Saturday.			National Environmental Management Air Quality Act (NEMAQA) (Act. 39 of 2004) WHO guidelines for Community Noise (WHO, 1999) Mine Health and Safety Act (Act 29 of 1996)
Radiation	Local	Establishment of waste facility, Waste Management. Transport of waste and ore	Risk of exposure to radiation through the inhalation of radioactive dust and radon. Exposure to the radioactive dust deposited in the area as a result of the mining activities. Risk of exposure during transport of overburden and dumping of waste.	• Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material. • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised.	Construction and Operation phase	NNR requirements. Reduce, avoid risk	Mine Health and Safety Act (Act 29 of 1996) National Nuclear Regulator Act (No. 47 of 1999) – Certificate requirements

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
Radiation	Local	**Opencast mining activities including input crushing of ore Concurrent rehabilitation /Roll over mining. Closure of final void and placement of topsoil - Establishment of final land form**	Risk of exposure to radiation through the inhalation of radioactive dust and radon. Exposure to the radioactive dust deposited in the area as a result of the mining activities. Risk of exposure during transport of overburden. Risk of exposure to land users after rehabilitation of the mining area	• Obtain registration in terms of the National Nuclear Regulator Act (No. 47 of 1999) (NNR) for the handling and management of gold and uranium containing material. • Comply with NNR regulation requirements for closure. Site remediation and release from regulatory control • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised.	Operation closure phase	NNR requirements. Reduce, avoid risk	Mine Health and Safety Act (Act 29 of 1996) National Nuclear Regulator Act (No. 47 of 1999) – Certificate requirements
Waste	8.95 ha	Waste management	Waste generated of waste from construction. Clearance and removal of waste dumped illegally on the site	• Low volumes of waste will be produced on site during construction and all maintenance of equipment will take place of site. Disposal of any waste produce during emergency maintenance to be disposed of at the correct waste management facility.	Construction Operational phase	Waste Classification Norms and standards for disposal of waste.	Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]; Waste Classification, Management Regulations, Norms

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Waste generated (hazardous and general) on site to be disposed within 30 days. • Waste generated (illegally dumped) from clearing of site must be disposed at the correct waste management facility. • Waste from chemical toilets to dispose by supplier. • No chemical storage to take place on site. • No waste storage to take place on site, all waste to be removed to offsite facility.		Minimisation of waste. Recycle, reduce, re-use	and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) SANS 10234: 2008: Globally Harmonized System of classification and labelling of chemicals (GHS)
Waste	4.9565 ha	Waste Management	Waste generated during the rehabilitation process and final closure phase has the potential to cause pollution if not managed correctly. Any waste from the chemical fertilizers utilized should be disposed of in the correct manner.	• No waste storage to take place on site. All waste generated should be transported of site to the storage facility from where disposal should take place. • No waste to be burned on site • Waste to be classified and disposed of accordingly.	Operational closure phase	Waste Classification Norms and standards for disposal of waste. Minimisation of waste. Recycle, reduce, re-use	Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]; Waste Classification, Management Regulations, Norms and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
							(Government Notice 634 – 635 of 2013) SANS 10234: 2008: Globally Harmonized System of classification and labelling of chemicals (GHS)
Palaeontological	4.9565 ha	Opencast mining activities including input crushing of ore Concurrent rehabilitation /Roll over mining	Alteration of archaeological palaeontological resources that may be discovered during earthworks	• An appropriately qualified archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified. • The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered. • In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations or removal of vegetation, the ECO in charge for the developments ought to be informed instantly. These finds must be protected (preferably in situ) and the ECO must alert SAHRA (South African Heritage Research Agency) to ensure that mitigation (e.g. recording, collection) can be undertaken by a professional paleontologist.	Operational phase	No loss of newly discovered material.	National Heritage Resources Act, 1999 (Act No. 25 of 1999) and associated regulations. South African Heritage Resources Agency Guidelines.

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Preceding any excavation of fossils, a collection permit from SAHRA must be obtained. The fossil material must be housed in an approved collection (museum or university collection) and the fieldwork and reports need to comply with the minimum standards for palaeontological impact studies developed by SAHRA.			
Cultural Heritage	4.9565 ha	Clearing of Vegetation	Alteration of archaeological, historical and palaeontological resources that may be discovered during earthworks	• Implement chance find procedures in case where possible heritage finds area made • In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations or removal of vegetation, the ECO in charge for the developments ought to be informed instantly. These finds must be protected (preferably in situ) and the ECO must alert SAHRA (South African Heritage Research Agency) to ensure that mitigation (e.g. recording, collection) can be undertaken by a professional paleontologist. • Preceding any excavation of fossils, a collection permit from SAHRA must be obtained.	Construction Operational phase	No loss of newly discovered material.	National Heritage Resources Act, 1999 (Act No. 25 of 1999) and associated regulations. South African Heritage Resources Agency Guidelines.
Traffic	Local	Construction of haul roads.	Increase in traffic on roads surrounding the mining area. Impact on surround road network users	• Road markings, reflective road studs, road signs should be provide and maintained. • Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits.	Construction Closure phase	Reduce through controlling measures Set Speed Limits	Gauteng Transport Infrastructure Act, 2001 (Act No. 8 of 2001) [as amended];

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
		Replacement of soil during rehabilitation		• Ensure drivers are informed that off-road travelling is prohibited. • All traffic accommodation measures are to conform to the latest edition of the South African Road Signs Manual.		South African Road Signs Manual	Mine Health and Safety Act (Act 29 of 1996)
Traffic	Local	Load and Haul	Increase in traffic surrounding the site	• Road markings, reflective road studs, road signs should be provide and maintained. • Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits. • Ensure drivers are informed that off-road travelling is prohibited. • All traffic accommodation measures are to conform to the latest edition of the South African Road Signs Manual. • Place point's men at intersections to ensure safe use. • All traffic laws to be inforce on and surround site.	Operational Closure phase	Reduce through controlling measures Set Speed Limits South African Road Signs Manual Traffic management plan	Gauteng Transport Infrastructure Act, 2001 (Act No. 8 of 2001) [as amended]; Mine Health and Safety Act (Act 29 of 1996)
Traffic	Regional	Transporting of Ore to treatment facility	Increase in traffic as a result of the transportation of ore to offsite treatment facility.	• Road markings, reflective road studs, road signs should be provide and maintained. • Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits. • Ensure drivers are informed that off-road travelling is prohibited.	Operational Closure phase	Reduce through controlling measures Set Speed Limits South African Road Signs Manual	Gauteng Transport Infrastructure Act, 2001 (Act No. 8 of 2001) [as amended]; Mine Health and Safety Act (Act 29 of 1996)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• All traffic accommodation measures are to conform to the latest edition of the South African Road Signs Manual. • Place point's men at intersections to ensure safe use. • All traffic laws to be inforce on and surround site. • It is expected that 6 trucks will be utilized for the transport of ore. 18 trips per day. Ore haulage heavy vehicles avoid transporting ore during the relevant Am and PM peak periods. • Traffic management to be done in accordance with the Traffic Impact Assessment • Detailed investigations should be conducted in conjunction with the relevant road authority in terms of the existing quality and potential life span of the existing road surface layers of the roads where consumables, ROM ore and workers will be transported;		Traffic management plan	
Cultural Heritage	4.9565 ha	Stripping and stockpiling of topsoil	Alteration of archaeological, historical and palaeontological resources that may be discovered during earthworks	• A heritage practitioner should be appointed to develop a heritage induction program and conduct training for the ECO, as well as team leaders, in the identification of heritage resources and artefacts. • Implement chance find procedures in case where possible heritage finds area made • In the event that fossil remains are discovered during any phase of construction, either on the	Construction Operational phase	No loss of newly discovered material.	National Heritage Resources Act, 1999 (Act No. 25 of 1999) and associated regulations.

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				surface or exposed by new excavations or removal of vegetation, the ECO in charge for the developments ought to be informed instantly. These finds must be protected (preferably in situ) and the ECO must alert SAHRA (South African Heritage Research Agency) to ensure that mitigation (e.g. recording, collection) can be undertaken by a professional paleontologist. • Preceding any excavation of fossils, a collection permit from SAHRA must be obtained. The fossil material must be housed in an approved collection (museum or university collection) and the fieldwork and reports need to comply with the minimum standards for palaeontological impact studies developed by SAHRA.			South African Heritage Resources Agency Guidelines.
Aesthetic quality and sense of place	Local	**Clearing of Vegetation**	A visual impact will be created as a result of the clearing of vegetation and dust pollution	• No clearing of vegetation outside of the footprint area. • Dust suppression to be applied • Visual barriers to be created with topsoil stockpile.	Construction Operational phase	Reduce visual impact.	Improve baseline environment
Aesthetic quality and sense of place	Local	Storage of overburden material and stockpiles	Visibility from sensitive receptors / visual scarring of the landscape as a result of the overburden and stockpiles.	• Reduce amount of overburden stockpiles by implementing roll over mining. • Restricted height of overburden to designed high. • Use overburden as a visual barrier to shield mining operation.	Construction Operational phase	Reduce visual impact.	Improve baseline environment

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
Visual Aesthetic Impact	Local	Opencast mining activities including input crushing of ore Concurrent rehabilitation /Roll over mining	Visibility from sensitive receptors / visual scarring of the landscape as a result of the mining activities	• The waste rock storage facility to be utilized as a visual barrier between the mining operation and sensitive receptors. • Dust from Stockpile areas, roads and other activities must be managed by means of dust suppression to prevent excessive dust. • Stockpiles should not exceed 20m in height. • The retention of as much existing vegetation as possible • Placement of stockpiles and waster rock to be used to reduce visual impact of mining. • Reduce time of stockpiling topsoil and waster rock through concurrent rehabilitation	Operational phase	Reduce visual impact.	Improve baseline environment
Visual Aesthetic Impact	Local	Closure of final void and placement of topsoil - Establishment of final land form	Removal of stockpiles and waste rock dump. Establishing a final land form. Possible reduction in visual impact	• Rehabilitation of the area must be done as the mining is completed. • Bare areas will be re-vegetated and regularly inspected to ensure good cover and erosion prevention.	Operational closure phase	Reduce impact	Improve baseline environment
Health and Safety	Local	Opencast mining activities including input	Health and safety risks for workers Inadequate management of the mining process and general operation related activities could result in	• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety; • Implement measures to suppress dust - spraying of gravel roads, surfaces and stock piles with water on a regular basis.	Operational Closure phase	Reduce impact. Zero incidents Meet H&S objectives	Mine Health and Safety Act (Act 29 of 1996) Gauteng Transport Infrastructure Act, 2001

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
		crushing of ore Concurrent rehabilitation /Roll over mining Transporting of Ore to treatment facility	health and safety risks for workers. Increase in traffic.	• Mine workers to wear personal protective equipment; • Any health and safety incidents should be reported to the Site Manager (SM) immediately; • First aid facilities should be available on site at all times; • Workers have the right to refuse work in unsafe conditions; • Material stockpiles or stacks should be stable and well secured to avoid collapse and possible injury to site workers. • Access to excavation must be controlled; • Excavated areas should be temporarily • Provide sufficient ablution facilities (chemical/portable toilets, etc.) at strategic locations that are cleaned regularly. • Potable water to be provide to workers. • Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits. • Monitoring of water quality, air quality and noise. • Equipment not use to be switch off to prevent air pollution, dangerous gasses. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions.			(Act No. 8 of 2001) [as amended];

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Equipment should have lights and ensure that they are visible			
Health and Safety	Regional	Transporting of Ore to treatment facility	Transport of ore to the offsite facility can increase the risk of accidents and safety risk to works and communities	• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety; • Mine workers to wear personal protective equipment; • Any health and safety incidents should be reported to the Site Manager (SM) immediately; • Equipment not use to be switch off to prevent air pollution, dangerous gasses. • Vehicle idle times should be kept to a minimum to minimise CO, NO_2, SO_2 and greenhouse gas emissions. • Equipment should have lights and ensure that they are visible	Operational Closure phase	Reduce impact. Zero incidents Meet H&S objectives	Mine Health and Safety Act (Act 29 of 1996) Gauteng Transport Infrastructure Act, 2001 (Act No. 8 of 2001) [as amended];
Social economic impact	Local	West Wits project	Impacts on local employment - Opencast mining operations: Contractor would require between 40 and 50 employees.	• Apply employment/procurement policies and procedures (e.g. do not employ at the mine gate) to prevent unnecessary influx by job-seekers; • Ensure compliance with socio-economic tools and legal requirements (BBBEE and Mining Charter); • First source people from the local community before jobs are advertise • Implement a skills development program	Construction Operational Closure phase	Sustainable opportunities for social and economic growth Meet objectives	Social and Labour plan Social and community programmes Mine Health and Safety Act (Act 29 of 1996)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
Social economic impact	Local	West Wits project	Disruptions in daily living and movement patterns for surrounding communities, land owners and road users could manifest in the form of traffic and intrusion impacts resulting in short-term disruptions and safety hazards.	• Erect signboards indicating accesses to the construction site. • Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and un-roadworthy vehicles that could lead to accidents. • The mine to consult with adjacent landowners whose private residences, crops, livestock and other infrastructure could be affected by dust, noise and other impacts that result from traffic movement. Provide a schedule of the construction activities to landowners and relevant I&APs if required.	Construction Operational Closure phase	Sustainable opportunities for social and economic growth Meet objectives	Social and Labour plan Social and community programmes Mine Health and Safety Act (Act 29 of 1996)
Social economic impact	Local	West Wits project	Health and safety risks for workers Inadequate management of the construction process and general construction related activities could result in health and safety risks for workers.	• A health and safety plan in terms of the Mine Health and Safety Act (Act 29 of 1996) should be drawn up and implemented to ensure worker safety; • Implement measures to suppress dust - spraying of gravel roads, surfaces and stock piles with water on a regular basis. • Construction workers to wear personal protective equipment; • Any health and safety incidents should be reported to the Site Manager (SM) immediately; • First aid facilities should be available on site at all times; • Workers have the right to refuse work in unsafe conditions;	Construction Operational Closure phase	Sustainable opportunities for social and economic growth Meet objectives	Social and Labour plan Social and community programmes Health and Safety Act (Act 29 of 1996) Mine Health and Safety Act (Act 29 of 1996)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• Material stockpiles or stacks should be stable and well secured to avoid collapse and possible injury to site workers. • Access to excavation must be controlled; • Excavated areas should be temporarily • Provide sufficient ablution facilities (chemical/portable toilets, etc.) at strategic locations that are cleaned regularly. • Potable water to be provide to workers.			
Social economic impact	Local	West Wits project	Possibility of construction activities, mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners, visitors and workers.	• All workers will be sensitised to the risk of fire; • Smoking is only allowed in designated smoking areas and disposal of cigarette butts safely in sand buckets; • The Applicant shall ensure that the basic fire-fighting equipment is available on the site; • Extinguishers should be located outside hazardous materials and chemicals storage containers; • Fire response and evacuation: • An Emergency Plan (including Fire Protection, Response and Evacuation Plan) is to be prepared by the Applicant and conveyed to all staff on the site' • Identify major risks to minimise the environmental impacts e.g., air pollution and contaminated effluent runoff.	Construction Operational Closure phase	No one smoking in unauthorised areas. Proof / records of training in terms of the risk of fire and of the emergency management plan. Basic fire-fighting equipment located in the correct	Social and Labour plan Social and community programmes Mine Health and Safety Act (Act 29 of 1996) Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) [as amended] - Section 12 (1) Duty of the landowner to prevent fire from spreading to neighbouring properties.

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
						locations on site.	An Emergency Plan (including Fire Protection, Response and Evacuation Plan)
Social economic impact	Local	West Wits project	Improvement of security in and surround mining area.	• Eradication of illegal mining in the area through removal of resource and rehabilitation of area. • Cleaning of area of illegally dump waste • Freeing up land for housing developments after rehabilitation of area.	Construction Operational Closure phase	Meet objectives	Social and Labour plan Social and community programmes Mine Health and Safety Act (Act 29 of 1996)
Social economic impact	Local	West Wits project	Reducing quality of life. Damage to property and infrastructure	• Equipment and trucks that produce loud noise must be fitted with appropriate silencers where possible. • Dust suppression measures must be implemented to reduce the amount of dust released into the air. • Low vibration equipment to be used to prevent damage to house and infrastructure. • Houses within close proximity of mining area to be surveyed for crack before any operations commence. • Equipment should not be overload, this will prevent damage to roads. • An effective dust management plan must be designed and implemented in order to mitigate the impact of dust throughout all mining and development phases. Water cars to be used to make sure dust impact are minimised.	Construction Operational Closure phase	Reduce, mitigate and avoid where possible	Social and Labour plan Social and community programmes Mine Health and Safety Act (Act 29 of 1996)

Aspect	Size Scale	Activity	Aspects and potential impacts	Mitigation type and Measures	Phase	Standards to be achieved	Compliance with standards
				• A complaints register be kept on-site once operations commence and that staff and the neighbouring communities be encouraged to report all air quality related problems. Frequent community liaison meetings should be held with the neighbouring communities to address air quality related concerns • Groundwater monitoring (quality and quantity) to be monitored to ensure that groundwater users are not negatively affected. • PM_{10} monitoring is recommended for the duration of the mining and rehabilitation phases. The recommended location for PM_{10} monitoring is at a suitable safe location on the northern edge of Bram Fishersville directly to the south of the operations. • If PM_{10} concentrations are found to be in exceedance of the NAAQS at the closest sensitive receptor locations additional dust suppression measures should be investigated. If the mitigation measures employed are considered best practice, additional offset measures should be considered. Such offset measures include upgrading of public road surfaces, electrification of houses for cooking and heating or supply of cleaner burning fuel for cooking and heating purposes			

f) Impact Management Outcomes

See Table 41: Impacts to be mitigated in their respective phases.

g) Impact Management Actions

See Table 41: Impacts to be mitigated in their respective phases.

i) Financial Provision

(1) Determination of the amount of Financial Provision

(a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation

The closure objectives for mining internationally and in South Africa focuses on the restoration of previous land use capabilities, the zero net loss of biodiversity, and the satisfaction of community requirements. Project closure objectives for Kimberley West will be in line with the above mentioned and is as follows:

- Re-establishment of the pre mining land use and land capability to a level as close as possible to the pre-mining environment
- Re-establishment of function to any biodiversity areas of concern that could and have been affected by the mining operations
- Prevent any form of contamination of soils, surface water and ground water.
- Implementation of on-going rehabilitation to regulated standards
- Maintenance and Monitoring of rehabilitated areas.

See section appendix G for closure plan for the project.

(b) Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties

This Basic Assessment Report and Environmental Management Programme will be subjected to a public consultation period, whereby I&APs are given 30 days to comment. Comments from the I&AP's will be included in the specialist studies and closure plan where required.

(c) Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure

See Appendices G-ix for the closure plan and schedule. Please see Figure 2 for aerial extent of the main mining activities

(d) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives

Due to the short timeframe and extent of the activities as shown in the Environmental Impact Assessment, the impacts will be of a medium to low significance. Rehabilitation will be conducted concurrently and will include closure of final void and re-vegetation. Detailed mitigation measures are provided in the EMPR to ensure the closure objectives are met.

(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline

The schedule closure cost for the project for rehabilitation of mining aspects and general surface rehabilitation was calculated at R 6 007 651.37. The additional allowances on the project that consisted out of P&G (12%), Contingencies (10%) and Additional Studies were calculated at R 1 410 322.77. Post Closure Aspects were calculated at R 1 157 917.78 for the 5 year post closure monitoring of surface, ground water and 3 years monitoring of rehabilitation and care and maintenance. The total schedule closure cost was calculated at R 8 575 891.92.

(f) Confirm that the financial provision will be provided as determined.

Financial provision of the schedule closure cost will be made for the first year of operation when the mining permit has been approved.

h) Monitoring and reporting frequency

The table below outlines the monitoring and compliance requirements for the proposed operation. The monitoring program should be updated when a water use licence is obtained from the operation.

Table 42: Aspects to be monitored

Aspect	Location	Monitoring and Reporting Frequency and Time periods	Responsible Person	Function Requirements for monitoring
Construction, Operational and closure phase				
Implementation of EMPR	Mine Area	Continues through each phase Annual report	Mine Manager ECO External Specialist	Annual EMPr performance assessment – NEMA Regulations (Appendix 7)
Groundwater	As per Groundwater specialist report	Monthly – Water levels Monthly – Quality (construction) Quarterly – Quality (Operational and Closure Quarterly report	External service provider – specialists	WUL requirements Monitoring program - Tracking of any possible pollution - Impact on water level
Surface water	Up and Downstream and discharge	Monthly Monthly Report	External service provider – specialists ECO	WUL requirements Monitoring program - Performance of the mine - Detection of pollution - Impact on water quality
Noise	Sensitive Receptors	Annual (once during operation and one during closure) - After complaints	External service provider – specialists	Finance Corporation (IFC) and SANS 10103. - Establish noise impact on sensitive receptors
Air Quality	Sensitive Receptors	PM10 – Continues Dust fallout – Monthly	External service provider – specialists	National Dust Control Regulations (GN 827, November 2013). ASTM D1739.

		Monthly Report NAEIS Reporting		South Africa National Standard 1929:2005: Ambient Air Quality: Limits for common pollution - Tracking of progress NAEIS report to be reported to the relevant air quality officer
Archaeological	Mine Area	If required	External service provider – specialists ECO	Heritage reports requirements National Heritage Resources Act, 1999 (Act No. 25 of 1999) and associated regulations. South African Heritage Resources Agency Guidelines.
Social and Stakeholder engagement	Local	On-going Monthly Feedback	Mine Manager Social officer ECO	Social and labour Plan Stakeholder engagement meetings
Crack survey	Houses within 150m	Once off	Mine Manager Social officer ECO	- Establish baseline conditions - Evaluate any change in baseline conditions
Vibration Monitoring	Local Area	If and when required	External service provider – specialists ECO	Vibration assessment requirements
Alien Vegetation	Mine Area	Bi-annually Bi-annually reporting	External service provider – specialists ECO	Alien Vegetation Management Plan. Specialist monitoring on Faunal and Flora aspects. - Alien vegetation control and management; - Habitat and vegetation management; - Rehabilitation services include the rehabilitation of operational disturbed areas
Rehabilitation Monitoring	Mine Area	Bi-annually Bi-annually reporting	External service provider – specialists ECO	Final Closure Plan Alien Vegetation Management Plan WUL and monitoring requirements

i) Indicate the frequency of the submission of the performance assessment/ environmental audit report.

A Performance Assessment Review of the EMPR should be conducted annually and the environmental audit report will be submitted annually. The first audit should be performed within 3 months from the commencement of the mining activity.

Operational internal environmental inspections will need to be done once a month by the mines Environmental personnel. A yearly internal audit needs to be undertaken by the mines environmental department.

j) Environmental Awareness Plan

(1) Manner in which the applicant intends to inform his or her employees of any the environmental risk which may result from their work

The environmental awareness plan will include the following:

- Induction of all staff and workers;
- Monthly 'toolbox' talks (awareness talks);
- Environmental Awareness Training
- Risk assessments for specific tasks with supervisors and staff involved in the task on a daily basis, or as often as the task is taking place.

The following principles and training will apply to the Environmental Awareness Plan (safety, health and environmental (SHE) training;

- All personnel, including contactors will as a minimum undergo general SHE induction and awareness training;
- The Safety, Health, Environmental and Quality (SHEQ) Manager will identify the SHE training requirements for all personnel and contractors. The training requirements will be recorded in a training needs matrix indicating particular training that must be undertaken by identified personnel and contractors. The training matrix will be administered by the Training Department; and Development of the Training Programme, which will include:

    - Job specific training – training for personnel performing tasks which could cause potentially significant environmental impacts;
    - Assessment of extent to which personnel are equipped to manage environmental impacts;

- Basic environmental training;
- Comprehensive training – on emergency response, spill management, etc;
- Specialised skills;
- Training verification and record keeping; and
- Periodic re-assessment of training needs, with specific reference to new developments, newly identified issues and impacts and associated mitigation measures.

Environmental Awareness Training

- The ECO shall be responsible for compiling and Environmental Awareness Training Programme for all staff members that aims at explaining the mitigation measures described in this report.
- Before commencing with any work, all staff members shall attend the Environmental Awareness Training Programme. After attending the programme, all contractors and sub-contractors shall sign an Environmental Training register as proof of their training; which shall be kept as proof for auditing purposes.
- The environmental training should, as a minimum, include (but not be limited to) the following:
    - The importance of conformance with all environmental policies;
    - The environmental impacts, actual or potential, of the proposed activities;
    - The environmental benefits of improved personal performance;
    - Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with this EMP, including associated procedures and emergency preparedness and response requirements;
    - The potential consequences of departure from specified operating procedures; and
    - The mitigation measures required to be implemented when carrying out their work activities

Emergency Procedures

The environmental management programme and associated management options are intended to minimise environmental risk as far as possible.

- Emergency procedures, as relevant to this project, shall be implemented;
- The SHEQ Manager shall define emergency reporting procedures for the project;
- All personnel shall be made aware of emergency reporting procedures and their responsibilities;
- Any spills will be cleaned up immediately in accordance with relevant legislation; and

- Telephone numbers of emergency services, including the local firefighting service, shall be conspicuously displayed.

(2) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

The procedure for dealing with environmental risk including the objectives, identification and calculation of environmental risks is described in the existing approved EMPR. A spill procedure should be developed and implemented by the applicant.

k) Specific information required by the Competent Authority

(Among others, confirm that the financial provision will be reviewed annually)

The following documents will be submitted to the DMR from the start of construction until mine closure

- EMPR performance assessment as required by Regulation 34 of GNR 982 of NEMA [as amended] the report will comply with the requirements as set out in Appendix 6 (GNR 982) – Environmental Audits.
- Financial provision will be updated on an annual basis and submitted to the DMR.

2) UNDERTAKING

I, DuToit Wilken the Environmental Assessment Practitioners responsible for compiling tis EMPR hereby confirm;

- the correctness of the information provided in the reports
- the inclusion of comments and inputs from stakeholders and I&APs ;
- the inclusion of inputs and recommendations from the specialist reports where relevant; and
- that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein.

2018/06/14

Signature of EAP Date:

2018/06/18

Signature of Review/EAP Date: