Draft Environmental Impact Assessment and Environmental Management Plan for the Amendment to the Bafokeng Rasimone Platinum Mine (BRPM)North Shaft Phase 3 Project Ventilation Shaft Environmental Management

Report Prepared for

Royal Bafokeng Platinum

DMR Reference Number: RDNW (KL) 6/2/2/391

Report Number 420937 / Draft EMPR Amendment

Report Prepared by

srk consulting

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Draft Environmental Impact Assessment and Environmental Management Plan for the Amendment to the Bafokeng Rasimone Platinum Mine (BRPM) North Shaft Phase 3 Project Ventilation Shaft Environmental Management Programme (EMPR)

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SRK Project Number 420937 / Draft EMPR Amendment

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Executive Summary

Bafokeng Rasimone Platinum Mine (BRPM) has an existing Environmental Management programme (EMPR), dated 11 February 1998, for its Mining Operation (Reference Number: (RDNW (KL) 6/2/2/391), in terms of Section 39 of the Minerals Act, 1991 (Act No. 50 of 1991) and an approved Water Use Licence (WUL) (License No: 26032490). An amendment to the existing EMPR is required to incorporate the specific details of the proposed Ventilation Shaft.

Royal Bafokeng Platinum Management Services Pty (Ltd) is the acting management services company for the BRPM Joint Venture (JV), an unincorporated JV between Rustenburg Platinum Mines Limited (RPM), the mining right holder for BRPM, and Royal Bafokeng Resources (Pty) Limited (RBR), the mining right holder for the Styldrift Mine Complex.

The BRPM underground operation requires a Ventilation Shaft for the North Shaft Phase 3 project, to ensure a safe working environment for the underground workers. The operating depths for the phase 3 workings are between 50 and 500 m below surface. The proposed Ventilation Shaft is a vertical passage that will be connecting the North Shaft Phase 3 underground workings with surface atmosphere, functioning to transfer fresh air underground and eradicate stale air.

BRPM must comply with Section 102, read with the environmental requirements covered by Section 37 – 39 and regulations 50 & 51 of the MPRDA, which stipulates the environmental process to be followed when requiring an amendment of the existing EMPR. The amendment to the mine's existing EMPR must be compiled and approved by the Department of Mineral Resources (DMR). The amendment process in terms of the MPRDA requires the compilation of a Scoping Report and an Environmental Impact Assessment (EIA) in terms of Regulation 50 and 51 of the MPRDA (This Report).

SRK Consulting (SA) (Pty) Ltd has been appointed as the independent environmental consultant, by Royal Bafokeng Platinum (RBPlat), to conduct the environmental authorisation for the proposed project.

This report serves the objectives of the EIA phase and will be finalized after the required 30 day review period for Interested and Affected Parties (I&AP's) and key Organs of State.

This report is the EIA / Environmental Management Program (EMP) Report which includes a background description of the proposed project including an overview of the EIA process, together with public participation followed to date. A baseline description of the current environmental status quo as well as the identification of potential environmental issues and impacts which have been identified is provided for in this report. The EIA Report provides a comprehensive Impact Assessment of the proposed impacts in relation to the surrounding environment and land use.

This EIA serves to document the results of work undertaken during the Scoping and Impact Assessment Phase of this project. The EIA/EMP will be submitted to the lead regulatory authority, DMR, for approval.

Who is conducting the EIA/EMP?

SRK Consulting has been appointed as an independent consultant to conduct the EMPR amendment process as well as undertaking the public involvement component.

Environmental Authorisation Process

The EIA process will be conducted in terms of Section 102 of the MPRDA and Regulation 48 – 52.

The process that will be followed to deliver an EMPR amendment will include:

- MPRDA Section 102 Application:

  - Scoping Phase (Completed);
  - EIA/EMP process.
- A Public Participation Process.

Description of the Proposed Development

The North Shaft Phase 3 Ventilation Shaft project will include the following:

- A downcast raise-boring ventilation shaft which will be drilled to a depth of approximately 460 m. The shaft diameter will be 4.1 m, which will supply fresh air underground for the Phase 3 workings;
- The associated civil and structural installations on surface;
- A 4 m wide gravel access road, to the raise-boring ventilation shaft will be built from an existing gravel road with in the Robega Village.

Motivation for the Proposed Project

The continuation of the existing BRPM mining operations will continue to have a significant impact on the economies of the North West Province and the Bojanala Platinum District Municipality District. The Gross Domestic Product (GDP) of the District and the Province will increase. Service industries will additionally benefit resulting in a multiplier effect on the suppliers of goods and services in the surrounding regions.

The "No Project" Option

The proposed North Shaft Phase 3 Ventilation Shaft is absolutely vital as it ensures a safe working environment for the underground mine workers. If the proposed North Shaft Phase 3 Ventilation Shaft does not proceed, it will lead to the safety and health risks for the BRPM Phase 3 underground mine workers. As a result, the Phase 3 development cannot proceed which will ultimately lead to job losses and a negative contribution to the Gross Domestic Product of South Africa. The North Shaft's Merensky operation will extend the profitability and life of the BRPM by 14 years to 2032, and in return create additional employment.

The construction of a Ventilation Shaft is a priority. Without the Ventilation Shaft project, BRPM will not be able to continue current production rates and social demands, resulting in unemployment of a large sum of residents in the Rustenburg area and surrounding communities. Employment at BRPM will be prolonged in parallel to the prolongation of BRPM Phase 3 expansion.

Environmental Assessment Process

Approach to the Environmental Impact Assessment

An EIA seeks to identify the environmental consequences of a proposed project from the beginning and helps to ensure that the project, over its life cycle, will be environmentally acceptable and integrated into the surrounding environment in a sustainable way.

Two parallel processes are being followed during the EMPR amendment process being an Environmental Technical process and the Public Participation Process.

Public Participation Process

Activities	Details
Project announcement and public meeting invitation letter to identified Interested and Affected Parties (I&AP)	The project announcement and public meeting invitation letters to I&AP's were distributed on the 22nd June 2012.
Newspaper advertisement announcing the project and public meeting	An advertisement (English) was advertised in the Rustenburg Herald on 22nd July 2012.
Display of site notices	Sites notices were displayed at various locations within the project area and surrounding sensitive public places.
Public Meeting with I&APs	Public Meeting was held on 17th July 2012 at the BRPM Mine.
Notification of availability of the Scoping Report	The Scoping Report was made available on the 13th September 2012 at a number of easy accessible public places.
Obtaining comments from stakeholders	Comments, issues of concerns and suggestions received from stakeholders during all the meetings, and written submissions by fax, email and mail were captured in a Comments and Response Report.

The following is recommended with regard to the public consultation to be conducted during the EIA/EMP phase of the study:

- A EIA/EMP Report (this report) will then be made available for public comment for a 30 day period;
- All comments received from I&AP will be taken cognisance of and incorporated into the final decision making process;
- Thereafter the report will be finalised and submitted to DMR for a decision regarding the project;
- The environmental authorisation decision will be communicated to all key stakeholders as well as those that have participated in the study to date; and
- The project decision-making process will ensure that affected parties' inputs are being considered. This does not mean that the development should be stopped by public involvement, but rather that decisions be guided by peoples' input.

Anticipated Impacts

It is anticipated that the overall significance of environmental impacts associated with the construction of the ventilation shaft will be low due to the significant positive benefit the project has on the health and safety of the underground miners and the sustainability of the BRPM mine and the direct and indirect employment that represents as compared to a very small negative impact which will occur within the immediate activity area and over a short period of time, and which can be effectively mitigated and managed.

Environmental Management

For the proposed BRPM North Shaft Phase 3 Project, environmental impacts will be managed and mitigated or enhanced through the implementation of the environmental management plan. RBPlat is responsible for ensuring that all environmental obligations pertinent to the ventilation shaft are met. The implementation of Environmental Management Programmes and the meeting of environmental objectives and targets is also the responsibility of RBPlat.

Who will evaluate the EIA Report

The proposed North Shaft Phase 3 Ventilation Shaft project may not proceed prior to the compilation of an EIA /EMP report used to assess the impacts resulting from the proposed development. The EIA report will be used inform the DMR on the impacts that may result from the North Shaft Phase 3 Ventilation Shaft project and the management and monitoring requirements that will be deemed necessary to enhance the positive and minimize the negative biophysical and social impacts.

The DMR in the North West Province will evaluate the EIA/EMP which has been compiled to provide the DMR with sufficient information to make an informed decision on the project. Focusing on sustainable development and cooperative governance, the DMR may request comments on the EIA / EMP from other organs of state. These may include the following:

- North West Department of Economic Development, Environment, Conservation and Tourism;
- North West Department of Agriculture and Rural Development;
- North West Department of Water Affairs;
- Rustenburg Local Municipality;
- Bojanala District Municipality; and
- North West-Regional Chief Director Land Claims Commissioner.

In addition to the DMR requesting comments from these departments, copies of the EIA/EMP were provided to these commenting authorities.

Conclusion

SRK Consulting has undertaken an EIA/EMP for the BRPM North Shaft Phase 3 Ventilation Shaft in accordance with the requirements of the MPRDA. This has included a public participation process. Key environmental aspects have been sought from specialist input.

No fatal flaws have been identified for the BRPM North Shaft Phase 3 Project. However, certain impacts require mitigation and monitoring. These impacts relate to:

- Increased safety hazard associated with construction vehicles and drill rigs;
- Loss of soil resource due to land clearing and infrastructure establishment in areas;
- Soil erosion at the edge of drilling and contamination due to spillages of oil, fuel and chemicals;
- Disturbance of vegetation and flora;
- Silt generation impact on natural systems;
- Contamination of surface and ground water due to incorrect handling and disposal of waste materials, physical drilling process (sludge contains oils and greases) and oil leaks from the drilling rig;
- Dust emissions from the drilling operation itself;
- Methane gas explosion during drilling operations could potentially cause a fire;
- Dust emissions associated with vehicle movement with respect to site preparation and driving to and from the drill site;
- Noise impacts during site establishment and decommissioning activities;
- Noise impacts during drilling operations associated with the use of power tools, transformers and drill rig;
- Visual Impact.

An EMP has been developed as part of this EIA to ensure the mitigation, management and monitoring of identified impacts. It is anticipated that it will be possible to successfully mitigate all the potential negative impacts to acceptable levels and the implementation will be monitored and audited to determine its effectiveness.

It is recommended that the construction and operation of the North Shaft Phase 3 Ventilation Shaft is authorised to proceed, given the significant positive Health and Safety compliance, socio-economic benefits and the small potential contribution of the project to cumulative impacts (given appropriate environmental management).

YOUR COMMENT ON THE EIA/EMP

This EIA/EMP will be available for comment for a period of 30 days from **Wednesday 5th of December 2012 to Thursday 24th of January 2013**. Copies of the EIA/EMP, and the Comments and Response Report, are available at the following public places and upon request from the public participation office:

PUBLIC PLACE	LOCALITY	TELEPHONE
Rustenburg Public Library	Rustenburg	(014) 590 3060/3295
Bojanala Platinum District Municipality	Rustenburg	Bojanala Platinum District Municipality
Robega Village Community Office	Robega	N/A
Chaneng Village Post Office	Chaneng	(014) 5582117
BRPM Main Office Reception	BRPM	(014) 573 1300
Royal Bafokeng Administration Offices	Phokeng	(014) 566 1200
Styldrift Site	Styldrift	(014) 573 2255
SRK Website	Pretoria	(012) 361 9821

The following methods of public review of the Scoping Report are available:

- Written submissions; and
- Comment by email, fax or telephone.

DUE DATE FOR COMMENT

Thursday 24th January 2013

Please submit comments to the public participation officers:

Andrew Caddick
SRK Consulting
P.O. BOX 35290, MENLO PARK, 0102
Phone : (012) 361 9821
Fax : 086 514 9768
Email: mailto:acaddick@srk.co.za

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Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (South Africa) (Pty) Ltd (SRK) by RBPlat. The opinions in this Report are provided in response to a specific request from RBPlat to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

List of Abbreviations

Term / Abbreviation	Description
BIC	Bushveld Igneous Complex
BID	Background Information Document
BMU	Biodiversity Management Units
BRPM	Bafokeng Rasimone Platinum Mine
CARA	Conservation of Agricultural Resources Act (no. 43. Of 1983)
CrVI	Hexavalent Chromium
dBA	Decibels
DEA	Department of Environmental Affairs
DEAT	National Department of Environmental Affairs and Tourism
DEIAR	Draft Environmental Impact Assessment Report
DMR	Department of Mineral Resources
DWA	Department of Water Affairs
DWEA	Department Water and Environmental Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Programme
EMPR	Environmental Management Programme Report
GA	General Authorisation
GAN	Global Africa Network
GDP	Gross Domestic Product
GG	Government Gazette
GN	General Notice
GNR	General Notice Regulation
Ha	Hectares (measure of area, 10 000 square metres)
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IWULA	Integrated Water Use License Application
km	Kilometre (measure of distance)
kV	kilo-volts
masl	Meters Above Sea Level
MHSA	Mine, Health and Safety Act No 29 of 1996
MPRDA	Mineral and Petroleum Resources Development Act, Act 28 of 2002
mtpa	Million tons per annum
MVA	Mega-Volt Ampere
NEM:AQA	National Environmental Management: Air Quality Act, Act 39 of 2004
NEMA	National Environmental Management Act, Act 107 of 1998
NEMWA	National Environmental Management: Waste Act, Act 59 of 2008
NGO	Non-Governmental Organisation
NHRA	National Heritage Resources Act No 25 of 1999
Ni	Nickel
NWA	National Water Act No 36 of 1998

Term / Abbreviation	Description
NW-DEDECT	North West Department: Economic Development, Environment, Conservation and Tourism
NWPG	North West Provincial Government
OEL	Occupational Exposure Limits
OEL-STEL	Occupational Exposure Limit - Short term Exposure Limit
PAIA	Promotion of Access to Information Act (No. 2 of 2000)
PGM	Platinum Group Metals
POS	Plan of Study
RBPlat	Royal Bafokeng Platinum
REM	Remainder
ROM	Run of mine
RLS	Rustenburg Layered Suite
SAHRA	South African National Heritage Resources Agency
SMS	Short Message Service
SO_2	Sulphide
TSP	Total suspended particulate matter
TWA	Time Weighted Averages
UG2	Upper Group 2
WUL	Water Use Licence

1 Introduction and Scope of Report

BRPM has an existing Environmental Management programme (EMPR), dated 11 February 1998, for its Mining Operation (Reference Number: (RDNW (KL) 6/2/2/391), in terms of Section 39 of the Minerals Act, 1991 (Act No. 50 of 1991) and an approved Water Use Licence (WUL) (License No: 26032490). An amendment to the current EMPR is required to incorporate the specific details of the proposed Ventilation Shaft.

Royal Bafokeng Platinum Management Services Pty (Ltd) is the acting management services company for the BRPM Joint Venture (JV), an unincorporated JV between Rustenburg Platinum Mines Limited (RPM), the mining right holder for BRPM, and Royal Bafokeng Resources (Pty) Limited (RBR), the mining right holder for the Styldrift Mine Complex.

The Bafokeng Rasimone Platinum Mine's (BRPM) underground operation requires a Ventilation Shaft for the North Shaft Phase 3 project, to ensure a safe working environment for the underground workers. The operating depth for the phase 3 workings starts at 460 m and ends at 556 m below surface. The proposed Ventilation Shaft is a vertical passage that will be connecting the North Shaft Phase 3 underground workings with surface atmosphere, functioning to transfer fresh air underground and eradicate stale air.

Underground mining activities pose a number of hazards that can be minimized and prevented through an adequate ventilation system for the underground workers. These may include:

- Dust generated from drilling and blasting activities;
- Gases occurring naturally and those produced by mining activities;
- Risk of Oxygen deficiencies underground; and
- Radon progeny concentrations resulting from inadequate ventilation.

BRPM must comply with Section 102, read with the environmental requirements covered by Section 37 – 39 and regulations 50 & 51 of the MPRDA, which stipulates the environmental process to be followed when requiring an amendment of the existing EMPR. The amendment to the mine's existing EMPR must be compiled and approved by the North West Department of Mineral Resources (DMR). The amendment process in terms of the MPRDA requires the compilation of a Scoping Report and an Environmental Impact Assessment (EIA) in terms of Regulation 50 and 51 of the MPRDA (This Report).

SRK Consulting (SA) (Pty) Ltd has been appointed as the independent environmental consultant, by Royal Bafokeng Platinum (RBPlat), to conduct the environmental authorisation for the proposed project.

This report serves the objectives of the EIA phase and will be finalized after the required 30 day review period for Interested and Affected Parties (I&AP's) and relevant key Organs of State.

This report is the EIA / Environmental Management Program (EMP) Report which includes a background description of the proposed project including an overview of the EIA process, together with public participation followed to date. A baseline description of the current environmental status quo as well as the identification of potential environmental issues and impacts which have been identified is provided for in this report. The EIA Report provides a comprehensive Impact Assessment of the proposed impacts in relation to the surrounding environment and land use.

This EIA serves to document the results of work undertaken during the Scoping and Impact Assessment Phase of this project. The EIA/EMP will be submitted to the lead regulatory authority, DMR, for approval. The EMPR amendment process will include the following:

- MPRDA Section 102 Application;

  - A Scoping Phase;
  - EIA/EMP phase;
- A Public Participation Process.

The North Shaft Phase 3 Ventilation Shaft project will include the following:

- A downcast raise-boring ventilation shaft which will be drilled to a depth of approximately 460 m. The shaft diameter will be 4.1 m, which will supply fresh air underground for the Phase 3 workings;
- The associated civil and structural installations on surface; and
- A 4 m wide gravel access road, to the raise-boring ventilation shaft will be built from an existing gravel road with in the Robega Village.

This report is an addendum to the approved BRPM EMPR and should be read in conjunction with that report if information is required on the overall mining operation. The addendum addresses the proposed BRPM North Shaft Phase 3 Project.

2 Project Details

The BRPM was originally launched through a joint venture between RBPlat Limited and Anglo American Platinum Limited. In January 2010, the operational management was ceded from Anglo Platinum to RBPlat in fulfilment of this joint venture agreement.

RBPlat consists of two operations, namely BRPM and Styldrift Mine, which exploit the platinum group metals mineralisation on the Boschkoppie, Frischgewaagd and Styldrift farms. The BRPM operation includes two twin decline shaft complexes, namely the North and South shafts.

The affected farm is owned by the Royal Bafokeng Nation (RBN) (portion 1 of the farm Boschkoppie 104 JQ). BRPM has an existing EMPR, dated 11 February 1998, for its Mining Operation, in terms of the Minerals Act (Ref No: RDNW (KL) 6/2/2/391).

The following Sections provide details on the various parties involved in the North Shaft Phase 3 Ventilation Shaft project, the affected surface areas, as well as the report structure for this EIA/EMP Report.

2.1 Proponent Details

RBPlat Management Services Pty (Ltd) acting as agent for BRPM JV, an unincorporated Joint Venture between Royal Bafokeng Resources (Pty) Limited (RBR) and Rustenburg Platinum Mines Limited (RPM).

Table 2-1: Name and Address of owners of the mine and mining authorisation

Royal Bafokeng Platinum Management Services Pty (Ltd)	
PO Box 2283	Tel: (011) 530
Fourways	Fax: (011) 530 8049
2055	
Republic of South Africa	

Table 2-2: Name and Address of Mine Manager/Responsible Person

Mr Glenn Harris (General Manager: BRPM)
Private Bag X 82025 Tel: 014 573 1479
Rustenburg
0300
Republic of South Africa

For the purpose of this EMPR amendment the following people in Table 2-3 may be contacted at BRPM.

Table 2-3: Details of the responsible personnel at BRPM

Details	Name	
	Glenn Harris	Tshego Tyira
Designation	General Manager: BRPM	Environmental Coordinator
Telephone	+27 (0) 14 573 1479	+27 (0) 14 573 1528
Cell		+27 (0) 83 259 1053
E Mail	glennh@Bafokengplatinum.co.za	ttyira@bafokengplatinum.co.za

2.2 Details of the properties affected by the proposed development

The affected surface area where the proposed project activities will occur is tabulated in Table 2-4 indicating the affected portions and farm owners.

Table 2-4: Details of the properties affected by the proposed development

Farm name	Extent	Farm number	Portion	Owner	Address
Boschkoppie	1929.2242 H	104	Portion 1	Royal Bafokeng Nation	PO Box 1 Phokeng 0335

2.3 Details of the Environmental Assessment Practitioner

The study has been undertaken by SRK Consulting SA (Pty) Ltd. SRK commenced its practises in 1974 as has since been involved in a large variety of environmental studies. SRK Consulting is a South African founded international organisation of professionals providing a comprehensive range of consulting services to natural resource industries and organisations. SRK's Johannesburg and Pretoria offices are staffed with over 300 professional consultants operating in a range of disciplines, mainly related to the environment, water, social and mining sectors. Back-up and peripheral expertise is available within these offices for all environmental projects.

SRK Consulting has been appointed as lead Environmental Assessment Practitioner (EAP) and the associated project team to undertake the necessary environmental authorisation process. The EAP and project teams' details are provided in Table 2-1.

Table 2-1: Details of the EIA/EMP project team

Details	Name				
	Andrew Wood	Laetitia Coetser	Andrew Caddick	Ilke Nel	Donne Chetty
Designation	Project Partner and Reviewer	Project Manager	Project coordinator, public participation and report preparation.	Project coordinator, public participation and report preparation.	Public participation Coordinator
Address	PO Box 55291, Northlands 2116	PO Box 35290 Menlo Park 0081	PO Box 35290 Menlo Park 0081	PO Box 35290 Menlo Park 0081	PO Box 35290 Menlo Park 0081
Telephone	(011) 441-1237	(012) 361 9821	(012) 361 9821	(012) 361 9821	(012) 361 9821
Fax	(011) 880 8086	(012) 361 9912	(012) 361 9912	(012) 361 9912	(012) 361 9912
Cell	082 600 6071	083 655 8362	072 981 0182	072 697 6266	071 671 9753
E Mail	awood@srk.co.za	lcoetser@srk.co.za	acaddick@srk.co.za	inel@srk.co.za	ddutoit@srk.co.za

The project partner and reviewer (Dr Andrew Wood) is appropriately qualified and registered with the relevant professional bodies. Dr. Wood is also registered as a Chartered Biologist. The CV's of the key SRK Consulting staff members for this project can be found in Table 2-1.

The project manager, Dr. Laetitia Coetser is a Senior Environmental Scientist at SRK Consulting, with 15 years' experience in the environmental consultancy industry. Dr. Laetitia Coetser appropriately qualified and registered with the relevant professional bodies. Dr. Coetser is a registered as Professional Natural Scientists (Pr.Sci.Nat. 403312/06) with the South African Council of Natural Scientific Professions and has extensive experience in compilation, implementation, amendment and assessing environmental compliance of a diverse set of EIA's and EMPS in terms of the MPRDA. She has solid knowledge and understanding of the current environmental legislation pertaining to mining projects.

Mr Andrew Caddick holds a BSc (Honours) in Geography and Environmental Science. He is an Environmental Scientist at SRK consulting with 4 years' experience in the environmental field. His experience lies in the management of EIA and EMP processes, coordination and execution of public consultation processes, and management of multi-disciplinary project teams, mainly for mining related projects. He is also involved in conducting environmental audits and site assessments.

Refer to Appendix B for the project team's Curriculum Vitae.

SRK Consulting SA (Pty) Ltd hereby declares independence on the proposed project. This independence of the Environmental Assessment team is aimed at reducing the potential for bias in the process of the EIA as associated authorizations. SRK nor any Sub consultants and specialists have any correlation or interest in the proposed project or future/present developments influenced by this project in any way.

2.4 Competent Authority Details

Environmental Authorization for this project will only be sought from the DMR. No listed activities will be triggered in terms of the National Environmental Management Act (Act No 107 of 1998) [NEMA] or the National Water Act (Act No 36 of 998) [NWA]. The principles of Section 28 of the NEMA and that on sustainable development must be adhered to through all processes of the proposed development. Table 2-2 provides the contact details for the DMR representative for the North Shaft Phase 3 Ventilation Shaft project.

Table 2-2: Contact Details for the DMR

Department	Contact Person	Contact Details	
DMR	Phumudzo Nethwadzi	Tell	082 467 0886
		Email	Phumudzo.Nethwadzi@dmr.gov.za

2.5 Municipality Details

The project area is located within the jurisdiction of the Rustenburg Local Municipality, which forms part of the greater Bojanala District Municipality. Details of the relevant municipality contact persons associated with the project are given in Table 2-3 below.

Table 2-3: Municipalities in which jurisdiction the proposed project falls

Municipality	Contact Person	Contact Details	
Rustenburg Local Municipality	Mr Victor Makona	Tell	(014) 590 3551
		Email	munman@rustenburg.gov.za
Bojanala District Municipality	Mr I Sirovha	Tell	(014) 590 4502
		Email	lebod@bojanala.gov.za

2.6 Report Structure

This EIA/EMP has been prepared to meet the requirements of Section 50 of the MPRDA, and includes information on the following:

Chapter 1: Introduction

This chapter provides background information to the mining at BRPM and the basis for the amendment to the existing EMPR to include the North Shaft Phase 3 Ventilation Shaft project.

Chapter 2: Project Details

This chapter presents information regarding the applicant the Environmental Assessment Practitioners (EAP) involved in the North Shaft Phase 3 Ventilation Shaft project. In addition, this chapter provided details on the affected surface areas and describes the EIA/EMP report structure.

Chapter 3: Methodology applied to compile the EIA/EMP

This chapter describes the environmental authorization process followed to date for the proposed North Shaft Phase 3 Ventilation Shaft project and explains the legislative framework under which an environmental authorization is necessary and application compiled. This chapter describes the public engagement process that was followed for this project in fulfilment of Section (39)(b)(ii) of the MPRDA read together with Regulation 50(f).

Chapter 4: Background to the project

This chapter provides details on the background to the project and how the current proposed project has transpired.

Chapter 5: Project Alternatives

This chapter will discuss the alternative considered for the North Shaft Phase 3 Ventilation Shaft project as well as the No-Go Option, in fulfilment of the MPRDA Regulation 50(b) and (d).

Chapter 6: Project Description

This chapter will provide details on the project and infrastructure required for the North Shaft Phase 3 Ventilation Shaft project.

Chapter 7: Project Motivation

This chapter will provide information motivating the proposed project, and will discuss the benefits of the project in fulfilment of the MPRDA Regulation 50(b) and (c).

Chapter 8: Description of the Baseline Environment

This chapter will provide a description of the baseline environmental status prior to the commencement of the construction, and subsequent operation phases of the North Shaft Phase 3 Ventilation Shaft project, in compliance with Section 39(3)(a) of the MPRDA read together with Regulation 50(a).

Chapter 9: Methodology for the assessment of impacts

This chapter provides details on the methodology used to assess the anticipated impacts associated with the proposed project.

Chapter 10: Impact Assessment

This chapter identifies all the anticipated impacts and an assessment of these bases on the information provided by both the specialists and professional; judgement of the EAP, in fulfilment of Section 39(3)(b)(i)(ii) and (iii) of the MPRDA read together with Regulation 50(c) and (e).

Chapter 11: Environmental Management Plan

This chapter provides mitigation measures to be implemented in order to mitigate potential negative impacts and enhance the positive impacts of the proposed project. This chapter has been compiled in compliance with Section 39(3)(d) and (4)(a)(i) of the MPRDA, read together with Regulation 50(e), (f), and (i) and 51(b)(i) and (ii) of the MPRDA.

Chapter 12: Monitoring and EMP Performance Assessment

This chapter provides details and commitments of on-going monitoring and performance assessment of the EMP, in fulfilment of the MPRDA Regulation 50(h) and 51(b)(iv).

Chapter 13: Environmental Objectives and Goals

This Chapter describes the environmental, social, heritage and closure objectives and goals to be achieved through the implementation of the EMP should the proposed project be approved and commence, in fulfilment of the MPRDA regulation 51(a).

Chapter 14: Closure Plan

This chapter provides details on the closure plan in fulfilment of the MPRDA Regulations 51(b)(v) and also provides the financial provision in compliance with Section 39(4)(a)(ii) read together with Section 41(1) of the MPRDA.

Chapter 15: Environmental Emergencies and Rehabilitation Procedures

This Chapter provides a summary of the emergencies and remediation procedures, with reference to relevant appendices, applicable to the North Shaft Phase 3 Ventilation Shaft project, inn fulfilment of MPRDA Regulation 51(b)(iii).

Chapter 16: Environmental Awareness Plan

This chapter provides a summary of the environmental awareness plan, with reference to relevant appendices, in compliance with Section 39(3)(c) of the MPRDA read together with regulation 51(vi) and 9(vii).

Chapter 18: Undertaking to Comply with the provisions of the Act

This chapter provides the commitment of BRPM to comply with the relevant legislation applicable to the proposed project.

Chapter 19: Conclusion

This chapter provides the conclusion and recommendations to the study to date as well as concluding remarks of the EAP.

Chapter 20: References

This chapter provides details on the bibliography which was consulted during the compilation of this report.

3 Methodology applied to compile the EIA/EMP

The objectives of the EIA/EMP for the North Shaft Phase 3 Ventilation Shaft project are to:

- Gain a better understanding of the immediate baseline environment of the proposed site;
- Determine and assess the potential direct, indirect and accumulative biophysical and social impacts resulting from the proposed development;
- Identify potential weaknesses associated with the proposed development;
- Consider and assess proposed alternatives in terms of environmental impacts;
- Develop environmental management measures to mitigate negative impacts and enhance positive impacts;
- Engage with stakeholders to ensure feedback on the results of the study is provided and that the assessment and management of impacts are identified and concerns considered;
- Provide sufficient information to the authorities to inform the environmental authorization decision.

The impact assessment phase of the EMPR amendment process has been undertaken in two components: technical investigations and reporting and public involvement feedback (undertaken by SRK Consulting SA (Pty) (Ltd).

3.1 Legal Framework

The following Act and Regulations are applicable during the construction of the proposed project and associated infrastructure. Environmental legislation applicable to the BRPM operations includes, but is not limited to, the following:

- The Constitution of the Republic of South Africa (No. 108 of 1996);
- Mineral and Petroleum Resources Development Act (No. 28 of 2002);
- Mine Health and Safety Act (Act No. 29 of 1996);
- Mine Health and Safety Act (Act No. 29 of 1996) Regulations in terms of Section 98 of the Act;
- Mine Health and Safety Amendment Act (Act No. 74 of 2008);
- National Environmental Management Act (No. 107 of 1998);
- National Environmental Management Air Quality Act (No. 39 of 2004);
- National Environmental Management Waste Act (No. 59 of 2008);
- The National Water Act (No. 36 of 1998);
- The National Heritage Resources Act (25 of 1999);
- Hazardous Substance Act (No. 15 of 1973); and
- Promotion of Access to Information Act (No. 2 of 2000).

The proposed project will not trigger requirements of any other environmental legislation, thus only an EMPR amendment in terms of Section 102 of the MPRDA, and Regulations 47 – 74 printed in terms of the MPRDA will be applied for.

3.1.1 The Constitution of the Republic of South Africa

In terms of Section 24 of the Constitution of the Republic of South Africa (Act No. 108 of 1996) [Constitution], everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for benefit of present and future generations, through reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while prompting justifiable economic and social development. The needs of the environment, as well as affected parties, should thus be integrated into overall project management in order to fulfil the requirements of Section 24 of the Constitution.

This EMPR amendment process for the proposed development focuses on the minimization of environmental impacts resulting from the construction, operation and decommissioning of the North Shaft Phase 3 Ventilation Shaft project in order to fulfil the requirements of Section 24 of the constitution.

3.1.2 The National Environmental Management Act (107 of 1998)

The NEMA as amended in 2010 contains a set of principles in Section 2, Chapter 1 that govern environmental management. These principles must be adhered to and taken into consideration during the impact assessment phase, construction and operation phases of a project. Regardless of the listed activities GNR 543 - 547 printed in terms of the NEMA, which will not be triggered for the project, the principles of NEMA should still be taken into consideration. Section 2(4)(b) of the NEMA incorporates the best practicable environmental option. Environmental management must be integrated. Acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option. This terminology refers to the option that provides the most benefit or causes the least damage to the biophysical and social aspects of the surrounding environment, with a cost that is acceptable to society in the long term as well as in the short term.

The Environment is defined in the NEMA as the following;

"environment " means the surroundings within which humans exist and that are made up of –

1. *the land, water and atmosphere of the earth;*
2. *micro – organisms, plants and animal life;*
3. *any part or combination of (i) or (ii) and the interrelationship among and between them; and;*
4. *the physical, chemical, aesthetic and cultural, properties and conditions of the foregoing that influence human health and wellbeing;*

Section 28 of the NEMA should be adhered to during all times of construction, operation and decommissioning of the proposed project. Section 28 applies to all activities taking place, and not solely focused on the listed activities being applied for.

Section 28 (1) states that:

"Every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or reoccurring. If pollution cannot be prevented then appropriate measures must be taken to minimize or rectify such pollution."

3.1.3 The National Environmental Management: Waste Act, Act 59 of 2008

The National Environmental Management: Waste Act, Act 59 of 2008 (Act 59 of 2008) [NEM:WA] was implemented on 1 July 2009 and Section 20 of the Environment Conservation Act 73 of 1989, under which waste management was previously governed, was repealed. The main objectives of the NEMWA are to:

Reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; and to provide for:

1. National norms and standards for regulating the management of waste by all spheres of government;
2. Specific waste management measures;
3. The licensing and control of waste management activities;
4. The remediation of contaminated land; to provide for the national waste information system; and
5. Compliance and enforcement;

The objectives of NEMWA involve the protection of health, wellbeing and the environment by providing reasonable measures for the minimization of natural resource consumption, avoiding and minimizing the generation of waste, reducing, recycling and recovering waste, and treating and safely disposal of waste as a last resort.

In general, the act seeks to ensure that people are aware of the impact of waste on their health wellbeing and the environment, and in the process giving effect to Section 24 of the Constitution, in ensuring an environment that is not harmful to health and wellbeing.

Waste is defined in the NEMWA, Act 59 of 2008 as follows:

"waste" means any substance, whether or not that substance can be reduced, re-used, recycled and recovered

a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;
b) which the generator has no further use of for the purposes of production;
c) that must be treated or disposed of; or
d) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but -
    i) a by-product is not considered waste; and
    ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste.

It is envisaged that no activities taking place for the proposed North Shaft Phase 3 Ventilation Shaft project will trigger any activities listed under Government Notice R 718 Category A and Government Notice 718 Category B, printed in terms of the NEMWA. However it is noted that the objectives and principles of this act are to be taken cognisance of, with the ultimate aim of reducing waste generated from activities performed at BRPM and minimization of waste sent to landfills.

3.1.4 The Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)

The main objective of the MPRDA is to recognise the sovereignty of the State over all the mineral and petroleum resources in South Africa and to promote equitable access to the country's resources. The MPRDA allows for previously disadvantaged persons to enter the minerals and petroleum industry and benefit from the exploitation of the country's minerals. This is done through the focus on job creation in the mining industry for previously disadvantaged people. This Act ensures that

holders of existing and new mining and production rights contribute towards the social - economic development in the areas in which they operate, promoting economic growth, employment and advance the social and economic welfare of all South Africans.

BRPM has a mining right approved by the DMR for the mining of the Merensky and UG2 reef. The additional Ventilation Shaft required for the continual safe mining of both reefs was however not included within the existing approved EMPR.

In accordance with Section 102 (amendment of rights, permits, programmes and plans) of the MPRDA, an EMPR amendment is required. This process includes assessing the baseline project area, identifying anticipated environmental and socio-economic impacts and developing mitigation measures to alleviate any potential negative impacts associated with the project. Sections 49 – 74 of the MPRDA further define the reporting requirements when undertaking an EMPR amendment process.

To ensure a diligent environmental authorisation process is completed, the said statutory requirements will be met and incorporated into the environmental process and reports. The DMR will be the competent authority responsible for authorisation of this EMPR amendment process.

3.1.5 The National Heritage Resources Act (25 of 1999)

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act 25 of 1999. The enforcing authority for this act is the South African National Heritage Resources Agency (SAHRA). In terms of the Act, historically important features such as graves, trees, archaeology and fossil beds are protected. Similarly, culturally significant symbols, spaces and landscapes are also afforded protection. In terms of Section 38 of the National Heritage Resources Act, SAHRA can call for a Heritage Impact Assessment (HIA) where certain categories of development are proposed. The Act also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that if such an assessment is deemed adequate, a separate HIA is not required. Should a permit be required for the damage or removal of specific heritage resources, BRPM will submit a separate application for these activities to the SAHRA for approval, should these resources be potentially damaged or removed. The activities identified in the Act as requiring a notification of SAHRA include:

Section 38

(1) (a): "The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;

(c): Any development or other activity which will change the character of a site

- *i. exceeding 5 000 m^2 in extent ; or*
- *ii. involving three or more existing erven or subdivisions thereof ; or*
- *iii. involving three or more erven or divisions thereof which have been consolidated within the past 5 years; or*
- *iv. the costs of which will exceed a sum in terms of regulations by SAHRA or a provincial heritage resource authority.*

The proposed project is located ± 8 Km from the Pilanesberg National Park, 5 km from the Magaliesberg Protected Environment Park; therefore the location is in an area known for its cultural artefacts. The proposed project footprint area has already been fundamentally transformed by the establishment of farming and residential activities over the area, and there is no known formal heritage or sites of cultural interest in the direct footprint area.

3.1.6 Mine Health and Safety Act (Act No. 29 of 1996)

The Mine Health and Safety Act (No. 29 of 1996) as amended in 2008 aims to provide for protection of the health and safety of all employees and other personnel at the mines of South Africa. The main objectives of the act and subsequent amendments are:

- Protection of the health and safety of all persons at the mines;
- Require employers and employees to identify hazards and eliminate, control and minimise the risks relating to health and safety at the mines;
- Give effect to the public international law obligations of the Republic that concern health and safety at all mines;
- Provide for employee participation in matters of health and safety through health and safety representatives and the health and safety committees at the mines;
- Provide for effective monitoring of health and safety conditions at the mines;
- Provide for enforcement of health and safety measures at the mines;
- Provide for investigations and inquiries to improve health and safety at mines; and
- To promote:
    - A culture of health and safety in the mining industry;
    - Training in health and safety in the mining industry; and
    - Co-operation and consultation on health and safety between the State, employers, employees and their representatives.

The proposed project will be located within the BRPM mining lease area and BRPM will therefore need to ensure that this Act and subsequent amendment regulations are adhered to on site by employees, contractors, sub-contractors and visiting personnel. This is especially pertinent during the construction phase of the North Shaft Phase 3 Ventilation Shaft, as well as the practical requirement for the provision of adequate ventilation to the underground mine workings to enable mining to be undertaken.

The MHSA requires a System of Occupational Hygiene Measurements. The action levels for the implementation of a monitoring program are depicted below:

"Section 9.2(2) The employer must establish and maintain a system of occupational hygiene measurements, as contemplated in section 12, of all working places where the following hazard limits prevail:

Airborne pollutants:

- *Particulates > 1/10 of the occupational exposure limit;*
- *Gases and vapours > ½ of the occupational exposure limit;*

Thermal Stress

- *Heat >25,0GC wet bulb and/or >32,0GC dry bulb and/or >32,0GC mean radiant temperature;*
- *Cold <10GC equivalent chill temperature;*

Noise

- *82dBLAeq,8h."*

The Mine Health and Safety act no longer prescribes a minimum air requirement (formerly it was 0.15 m3/s/m2 of face area). The regulations now refer to exposure limits. Schedule 22.9(2)(a) provides a comprehensive list of airborne pollutants with its Occupational Exposure Limits (OEL) and Occupational exposure limit - Short term exposure limit (OEL-STEL) as illustrated in Table 3-1.

Table 3-1: Pollutant exposure limits in term of the Mine Health and Safety Act

Substance	OEL		OEL – STEL	
	ppm	mg/m^3	ppm	mg/m3
Carbon Monoxide (CO)	30	35	100	115
Carbon Dioxide (CO	5 000	9 000	30 000	54 000
Nitric Oxide	25	30	35	45
Nitrous Oxide	50	90	-	-
Nitrogen Monoxide	25	30	35	45
Nitrogen Dioxide	3	5	5	9
Silica dust (respirable)	-	0.1	-	-
Coal dust (respirable)	-	2	-	-
Particles not otherwise classified	-	-	-	-
Inhalable particles	-	10	-	-
Respirable particles	-	3	-	-

In light of the above, as the BRPM mine operations expansion, additional ventilation mechanisms (in the form of ventilation shafts) will become necessary in order to adhere to the MHSA.

3.1.7 National Water Act (Act No. 36 of 1998)

The National Water Act (NWA) is the primary regulatory legislation, controlling and managing the use of water resources as well as the pollution thereof. This act provides for fundamental reformation of legislation relating to water resource use. The preamble to the NWA recognises that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users. The purpose of the Act is stated, in Section 2 and enforced by the DWA. Section 2 of the Act related to the following:

- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources; and
- Meeting international obligations.

The Act presents strategies to facilitate sound management of water resources, provides for the protection of water resources, and regulates use of water by means of Catchment Management Agencies, Water User Associations, Advisory Committees and International Water Management.

As this Act is founded on the principle the government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, an industry (including mines) can only be entitled to use water if the use is permissible under the NWA.

In terms of Section 21 of the NWA, no water uses are anticipated as no activities will be done within the 1:100 year flood line or within 100 m from river courses.

All activities taking place for the proposed North Shaft Phase 3 Ventilation Shaft project will adhere to the pollution prevention principle of the NWA. This proposed project will take cognisance of the definition of pollution as stipulated in the NWA and the mechanisms of resource protection.

GNR.704

This Regulation deals with the control and use of water for mining and related activities aimed at the protection of water resources. It specifically deals with clean and dirty water in a mining environment. BRPM must ensure that all existing infrastructure relating to the GNR.704 complies with this regulation.

3.1.8 Promotion of Access to Information Act (No. 2 of 2000)

The Promotion of Access to Information Act (No. 2 of 2000) (PAIA) recognises that everyone has a right of access to any information held by the state and by another person when that information is required to exercise or protect any right. The purpose of the Act is to promote transparency and accountability in public and private bodies and to promote a society in which people have access to information that enables them to exercise and protect their right. The EIA / EMP process to be undertaken in terms of MPRDA, with the associated stakeholder consultation process, will be aligned with the PAIA in the sense that all I&AP's will be given an opportunity to register as an I&AP prior to the initiation of the project and all registered stakeholders will in turn be provided a fair opportunity to review and comment on any reports submitted to the competent authority for decision making, in this case the DMR.

3.1.9 Conservation of Agricultural Resources Act (No 43 of 1983)

The Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) aims to provide for control over the utilisation of natural agricultural resources in order to promote the conservation of soil, water resources and vegetation and to combat weeds and invader plants. The Act makes provision for control measures to be applied in order to achieve the objectives of the Act, these measures relate to inter alia:

- Cultivation of virgin soil;
- Utilisation / protection of wetlands, marshes, water sponges, water courses / sources;
- The regulating of the flow pattern of run-off water;
- The utilisation and protection of vegetation;
- The grazing capacity of veld and the number and type of animals;
- The control of weeds and invader plants; and
- The restoration or reclamation of eroded land or land which is disturbed or denuded.

BRPM is an operational mine with both underground and surface mining rights. However, the surface of the mining area is also utilised by the local communities for grazing of their livestock. The proposed project should not be situated in an area which is utilised for grazing by the community's livestock. The areas proposed for the North Shaft Phase 3 Ventilation Shaft project is located in disturbed areas resulting from human activities. Nonetheless, BRPM should pay cognisance to the requirements of this Act where applicable.

3.1.10 Provincial and Municipal Bylaws

The Rustenburg Local and Bojanala Platinum District municipalities as well as the North West Province has developed local bylaws and various policies relating to waste disposal, water, economic development, etc. BRPM must ensure that such policies and bylaws, as far as possible, during the installation and operation of the water treatment plant are adhered to.

3.2 Guidelines

In addition to the above mentioned Acts, the following guidelines will be taken cognisance of during the EIA / EMP phase of the proposed project:

- DEAT. 2002. Integrated Environmental Management, Information series 2: Scoping (Department of Environmental Affairs and Tourism (DEAT. 2002));
- DEAT. 2002. Integrated Environmental Management, Information series 3: Stakeholder Engagement (Department of Environmental Affairs and Tourism(DEAT. 2002));
- DEAT. 2002. Integrated Environmental Management, Information series 12: Environmental Management Plans (Department of Environmental Affairs and Tourism (DEAT. 2002));
- DEA (2010), Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 5, Department of Environmental Affairs;
- DEA (2010), Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs;
- DEA&DP (2010), Guideline on Public Participation 2010, EIA Guideline and Information Document Series;
- DMR, 2002. Guideline for Consultation with Communities and Interested and Affected Parties. As required in terms of Sections 10(1)(B), 22(4)(B), and 39, read together with Regulation 49 (2) of the Mineral and Petroleum Resources Development Act (Act 28 of 2002); and
- DMR, 2002. Guideline for the Compilation of a Scoping Report. As required in terms of Sections 10(1) (B), 22(4) (B), and 39, read together with Regulation 49 (2) of the Mineral and Petroleum Resources Development Act (Act 28 of 2002).

3.3 BRPM Safety Health and Environmental Policy

BRPM's Safety Health and Environmental Policy can be found in Appendix F.

3.4 Specialist Investigation and Reporting

The initial Scoping Phase of the North Shaft Phase 3 Ventilation Shaft project identified a number of potential impacts although minimal impacts results from the proposed development. Considering the size of the development and the minimal envisaged impacts, as well as the extensive specialist studies that were conducted as part of the original BRPM and Styldrift Project EMPR, only specialist statements were sought from a few specialists relating to the most prominent impacts of the North Shaft Phase 3 Ventilation Shaft project.

3.4.1 Specialist Studies

Existing baseline information was obtained from previous studies undertaken in the BRPM and Styldrift mining lease area and the existing original EMPR, which was supplemented by extensive specialist investigation and consideration during the comprehensive assessment phase of the mining license.

The following specialist statements were sought, and can be found in Appendix C. The specialist team can be found in Table 3-1.

Table 3-1: Specialist investigation teams for the North Shaft Phase 3 Ventilation Shaft project

Specialist	Company	Contact Person
Noise Specialist	dBAcoustics	Barend Van Der Merwe
Vibration Specialist	Blast Management and Consulting	Danie Zeeman
Heritage Specialist	UNISA	Francoise Coetzee

3.4.2 Assessment of Impacts

An assessment of the anticipated impacts was undertaken for both pre and post mitigation. The impact assessment methodology is provided for in Section 10.

3.4.3 Reporting and Development of an Environmental Management Programme

An Environmental Impact Assessment and Environmental Management Programme specific to the North Shaft Phase 3 Ventilation Shaft project was developed to mitigate and manage the negative impacts and enhance the positive impacts resulting from the proposed development.

The results of this study were collated and recorded in the EIA/EMP and will be released for public comment from the Monday 3rd of December 2012 to Monday 24th of January 2013.

3.5 Public Participation Process

This section provides details on the public participation process conducted for the North Shaft Phase 3 Ventilation Shaft project, in adherence to Section 39(3)(b) of the MPRDA read together with Regulation 50(f).

The principles that govern the communication and consultation with I&AP's at large are best described in the NEMA, South African overarching environmental law. Public Participation is an essential and regulatory requirement for an environmental authorization process, and is guided by Regulations under the NEMA, specifically the EIA Regulations (GNR 543).

Additional objectives of Public Participation include the following;

- Providing details on EIA process, as well as the requisite Environmental Authorisation required prior to implementation of the project;
- Allowing I&APs to comment on the contents and findings of the Scoping Report;
- Providing an opportunity for I&APs to give input and comment on the proposed development;
- Allowing I&APs the opportunity to provide suggestions for alternatives and enhanced benefits related to the proposed development;
- Assisting I&APs to raise concerns or matters, and ensuring that the matters brought forward are captured and taken into consideration;
- Providing Interested and Affected Parties (I&APs) with an opportunity to obtain information about the project; and
- Facilitating and ensuring effective public participation.

3.5.1 Public Participation Process followed during the Scoping Phase

The following Sections summarize the public participation process followed for the North Shaft Phase 3 Ventilation Shaft project. All supporting documentation (Background Information Documents [BID], advertisements, site notices, attendance registers, meeting minutes, review comments from the general public and authorities) is included in the Comments and Response Report found in Appendix D.

Section 3.5.2 presents a summary of the issues raised during the public participation process.

Identification of I&AP's

The stakeholder engagement process forms an important part of the EMPR amendment process of a project. The Public Participation Process (PPP) is primarily aimed at affording Interested and Affected Parties (I&APs) and Stakeholders the opportunity to gain an understanding of the project. In addition, the purpose of consultation with the landowner, affected parties and communities is to provide them with the necessary information about the proposed project so that they can make informed decisions as to whether the project will affect them.

The initial database for this project comprised approximately 1200 individuals in and around the proposed project. This comprehensive database was compiled using BPRM's existing database, attendance registers from previous projects in the area, monthly community meetings with the surrounding communities, and individual identification of I&AP.

The database will be maintained for the duration study where the details of stakeholders are captured and automatically updated upon communication to the EAP. The identification, registration, and comments from stakeholders will be an on-going activity (Appendix D) for the stakeholder database.

This database contained a broad spectrum of sectors of society in and around the Rustenburg area of the North West Province including, but not limited to:

- Commenting Authorities;
- Traditional authorities;
- The relevant Government Departments (including The Department of Land Affairs (DLA), The Department of Water Affairs (DWA) and The Department of Department Economic Development, Environment, Conservation and Tourism (DEDECT)), agencies and institutions responsible for the various aspects of the environment and for infrastructure which may be affected by the proposed project (Appendix D).
- Local community members;
- Local and District Municipalities;
- Identified other persons whose socio-economic conditions may be directly affected by the proposed project;
- Identified other persons who are interested in the proposed development;
- Environmental bodies and Non-Governmental Organizations (NGO);
- Land Occupiers; and
- Directly affected and adjacent land owners.

A number of additional stakeholders were registered and included on the database during the Scoping Phase. This entire database has and will be used for the continual communication with I&AP's. All identified I&AP have been continually consulted with during the EMPR amendment process.

Contacting I&AP's

I&AP's were contacted by means of placing an advertisement in the local newspaper, site notices, BID's and invitation letters to I&AP's to create awareness of the project. An invitation letter to the public meeting and accompanying BIDs were emailed to I&AP's and key stakeholders. I&AP's whom no e-mail address could be located were sent a Short Message Service (SMS) notifying them of the proposed project, and contact number of SRK Consulting personnel, whereby additional information could be obtained.

An advertisement relating to the announcement of the proposed project was placed in the following newspaper:

- Rustenburg Herald – 22nd June 2012.

Invitation letters were sent to all the contacts recorded in the I&AP database with e mail address, accompanied by a BID and registration and comment sheet in English.

Site Notices

Sites notices (Size A2: 600 mm X 420 mm) notifying I&APs of the proposed activity were placed in and around the project area (Appendix D).

Notices were put up on at the following areas:

- Entrance gate to the Chaneng Clinic;
- Notice board at the Chaneng clinic;
- Chaneng Village Council Offices;
- Robega Community Offices;
- Rasimone Police Station;
- Rasimone Village Council Offices; and
- Mafenya Middle School.

It should be noted that members from the Chaneng Community prevented the project team from putting up site notices and to distribute flyers in the area. As such, notices in the Chaneng area were only put up one week after the original date of commencement of public participation.

Background Information Document (BID)

The purpose of the BID was to provide background information on the proposed project, outlining the environmental authorization process and to notify stakeholders of the public meeting. A locality map indicating the location of the project was and associated infrastructure was included in the BID. The BID provided stakeholders, who were interested in the project the opportunity to register as an I&AP.

Flyers and BIDs were placed at the various places to inform residents and local communities of the proposed project. Flyers and BIDs were also provided to the Headman of Chaneng, Mafenya, Robega and Rasimone.

Public Meeting

The initial public meeting was held on the 17th July 2012 at the BRPM protection service offices.

Letters of invitation (Appendix D) to the public meeting were provided via:

- E-mails to all identified I&APs;
- Physical delivery of invites to Headmen of the Chaneng, Mafenya, Robega and Rasimone (Appendix D).

SMS's were also sent to all registered I&APs inviting them to attend the meeting.

In order to provide all community members an opportunity to attend the public meeting, transportation via busses were also arranged from various locations within the different communities.

The aim of the meeting was to inform the public on the proposed project, giving the public technical background on the activities proposed to take place and the environmental process that will be followed. The public meeting gave additional opportunity for the public to register as I&AP's, and raise their concerns, issues and queries relating to the proposed project.

An English PowerPoint presentation was used to illustrate the objectives of the proposed project (Appendix D). The facilitator translated the presentation as well as questions and answers in Tswana. Flyers were distributed at this meeting in order to provide additional information. Attendance registers were signed by the attendees and the SRK stakeholder database updated accordingly (Appendix D). Meeting minutes are attached in Appendix D.

Authority Consultation

Consultation with relevant authorities was conducted before formal announcement of the project and throughout the public participation process. The purpose of meetings with the Department of Mineral Resources (DMR), Department of Water Affairs (DWA) and the North West Department of Economic Development, Environment, Conservation and Tourism (NWDEDECT) was to describe the proposed project and obtain input from them regarding the requirements and scope of work for specialist studies.

Comments and Response Report

A Comments and Response Report was compiled that detailed the outcomes of the authority and stakeholder consultation process. Issues raised during the scoping phase are captured in a Comments and Response Report. This report will be updated on an on-going basis to include any additional I&AP contributions that may be received as the EIA process proceeds, and as the findings of the EIA become available. The Comments and Response Report is attached as Appendix D.

This report recorded the following:

- The person / organization who raised the comments / concerns;
- Where / how the issue was raised; and
- Response to the issue given by the project team.

External review of the Scoping Report

The Scoping Report was made available for public comment for a 30 day period from Wednesday 5th of December 2012 to Thursday 24th of January 2013. A hard copy of the Scoping Report was made available at the following venues:

- Rustenburg Public Library;
- Bojanala Platinum District Municipality;
- Robega Village community offices;
- Chaneng Village post office;
- BRPM main office reception;
- Royal Bafokeng administration offices; and
- SRK Website: http://www.srk.co.za/en/page/za-public-documents.

Letters and SMS's were sent to all identified I&AP, notifying them on the availability of the Scoping Report for review and comment. The Scoping Report was submitted to the DMR in alignment with the Scoping Report being made available for public comment.

A number of comments were received from the Federation for a Sustainable Environment (FSE) on the Scoping Report (Appendix D). The Rustenburg Municipality furthermore provided comments on the Scoping Report (Appendix D). A number of organizations and I&AP requested further information on the project, which was provided to them upon their request. Copies of comments received to date can be found in Appendix D.

3.5.2 Issues Raised during the Scoping Phase

This Section provides details on the issues and concerns raised by the I&AP's during the Scoping Phase on the project. The Section aims to meet the requirements of Section 39(3)(b)(i)(ii) and (iii) of the MPRDA, read in conjunction with Regulation 50(c).

All comments raised during the EIA process to date have been included in the comments and response report and can be found in Appendix D.

The key comments, issues of concern and suggestions raised by stakeholders to data are summarized below (Details can be found in the Comments and Responses Report (Appendix D):

- Cumulative impact of BRPM and neighbouring mines upon, inter alia, the sense of space (visual impact), quality and quantity of surface- and groundwater, air quality, land use (in the context of subsistence farming and food security, and limited access to commercial food sources) with associated water use, economic development and job creation etc. within the Pilansberg/Rustenburg area;
- Management measures to reduce visual impact be implemented;

- That a regional and accumulative risk approach should be adopted to minimise adverse long-term socio-economic and environmental impacts;
- Impact on water quality i.e. elevated concentrations of nitrates in groundwater;
- Water supply limitations;
- Impact on air quality;
- Land end use;
- Impact of vibration on wood and mud structures;
- Impact of vibration on both humans and animals;
- Impact of mining explosive activities; and
- Job creation.

3.5.3 Public Participation Process followed during the EIA phase of the EMPR amendment

The Public Participation Process will be on-going during the EIA phase of the project.

On the 9th November 2012, the DMR issued comments on the Scoping Report, requesting the following:

- An impact Assessment in relation to the proposed area and mitigation appropriate mitigation measures; and
- The DMR authorized the compilation of the EIA/EMP (this report), and must be submitted to the DMR no later than the 2nd May 2013.

The following activities are envisaged for the remainder of the EIA/EMP phase:

EIA / EMP Report

Notifications will be sent to all I&AP notifying them on the availability of the EIA/EMP report for review. Headmen of Chaneng, Robega, Rasimone and Mafenya will be notified on the availability of the EIA/EMP report. Those who do not have an e-mail or postal address will be sent SMS's notifying them on the contact personnel at SRK Consulting who can be contacted for further information.

The EIA/EMP will be made available for a 30 Day commenting period, whereby the Report will be submitted to the DMR in alignment with the Public Participation Process. The EIA/EMP report will be made available at the following locations:

- Rustenburg Public Library;
- Bojanala Platinum District Municipality;
- Robega Village community offices;
- Chaneng Village post office;
- BRPM main office reception;
- Royal Bafokeng administration offices; and
- SRK Website: http://www.srk.co.za/en/page/za-public-documents.

Ad hoc consultation meetings will be held with the DMR and commenting authorities should this be deemed necessary throughout the EIA/EMP process.

Where necessary the EIA/EMP and specialist report will be amended following comment received during the public review period. The EIA/EMP Report and associated specialist studies will be submitted to the DMR for a decision on the proposed North Shaft Phase 3 Ventilation Shaft project.

The final decision of the DMR will be made known to all I&APs through letters and SMS's sent out to the I&AP's. In addition to this a newspaper advert will be placed in the Rustenburg Herald newspaper. The notification of the final decision via letters, SMS's and the newspaper advert, will provide information on obtaining the Environmental Authorization should the I&AP's find this

necessary, as well as who to contact at SRK Consulting with regards to the Environmental Authorization.

4 Background to the Project

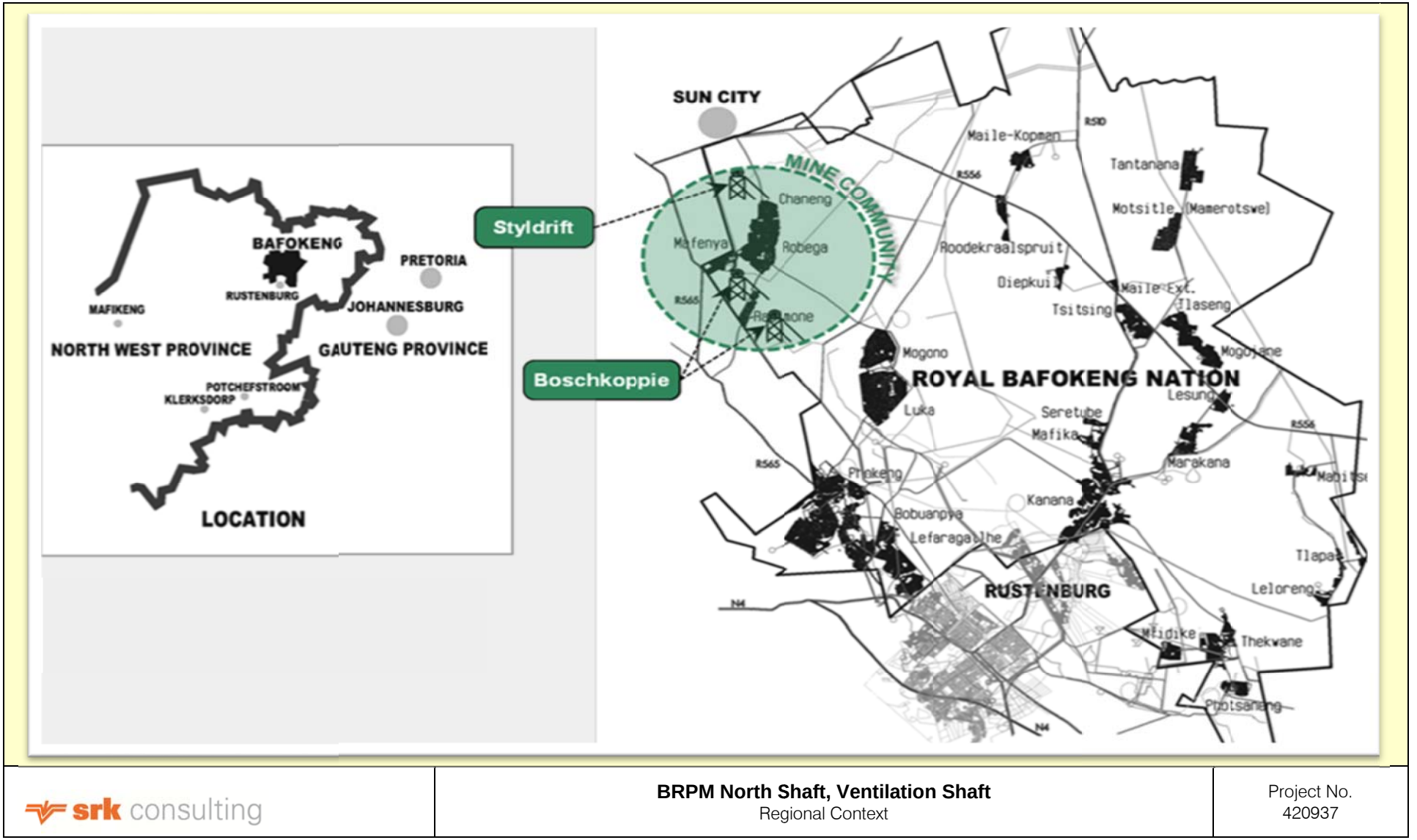
BRPM is situated in the North West Province of South Africa, approximately 120 km north-west of Johannesburg and approximately 30 km north of the town of Rustenburg, within the Bojanala District Municipality. The regional context of the proposed North Shaft Phase 3 Ventilation Shaft is depicted in Figure 4-1. A satellite image is presented in Figure 4-2. Immediately outside the Bafokeng boundaries, Sun City can be found to the north and Rustenburg to the south. BRPM is surrounded by several other mining operations, communities and roads.

The Styldrift Merensky Phase 1 Shaft Complex is located approximately 12 km to the north, from the proposed Ventilation Shaft. The villages of Rasimone and Robega are situated on the mine surface lease area, while Chaneng, Boshoek and Mafenya are situated in the surrounding areas.

BRPM is situated in the western lobe of the Bushveld Igneous Complex. The Bushveld Igneous Complex (or BIC) is a large layered igneous intrusion within the Earth's crust which has been tilted and eroded and now outcrops around what appears to be the edge of a great geological basin, the Transvaal Basin. Located in South Africa, the BIC contains some of the richest ore deposits on Earth. It underlies an area of some 65,000 km², spanning parts of the Limpopo, North West, Gauteng and Mpumalanga Provinces. (Wikipedia, 2012). There are two economic reefs which occur within the chromotite layers, namely the Merensky and the UG2 reefs. Parallel and about 90 m below the Merensky reef, lies the UG2 reef, with a typical thickness of appropriately 0.7 m.

BRPM is an underground operation and consists of two decline shafts namely North Shaft and South Shaft which have been established to exploit the Merensky platinum group metal ore reserve and UG2. The BRPM Phase 3 project, which was approved in November 2010, provides further replacement of Merensky production at the North Shaft complex, through the extension of the existing decline shaft by an additional five lower levels. The project is an integral part of the BRPM Mine, as it will extend the profitability and life of North Shaft's Merensky operation by 14 years to 2032, and in return create continual employment. Development already started in 2010 and will end in 2017. The operating depths for the current workings are between 50 m and 500 m below surface. Figure 4-3 illustrates a typical isometric view of an underground mining operation within the Merensky reef.

Although the proposed North Shaft Phase 3 Ventilation Shaft does not trigger any listed activities in terms of the NEMA, the principles of this Act will be taken cognisance of in terms of Section 28 of the NEMA. The MPRDA requires that any changes made to infrastructure at a mining operation should be approved in terms of this act. An amendment to the current EMPR is required to incorporate the specific details of the proposed project.



srk consulting	**BRPM North Shaft, Ventilation Shaft** Regional Context	Project No. 420937

Figure 4-1: Regional Context of the Proposed BRPM North Shaft's North Shaft Phase 3 Ventilation Shaft

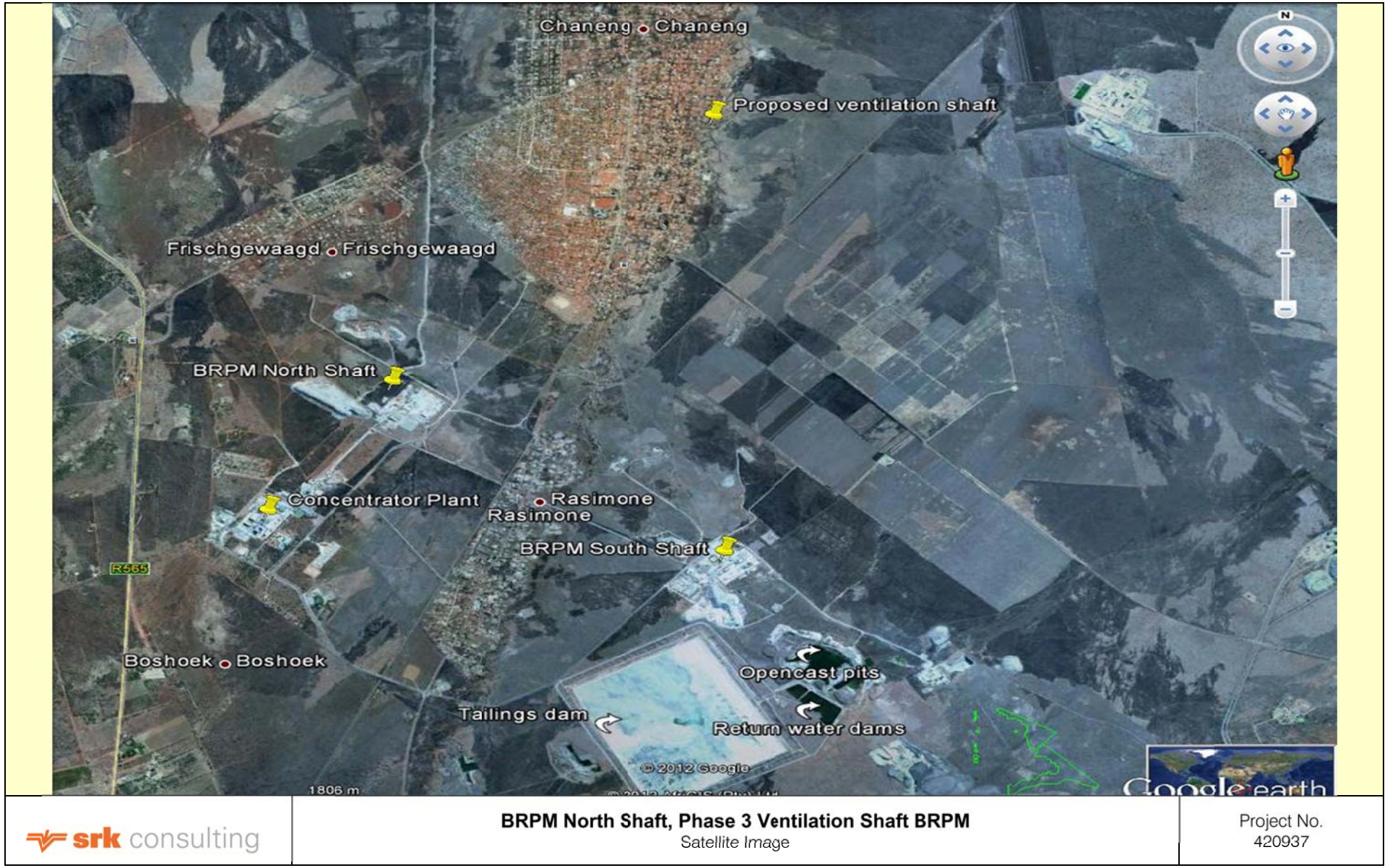
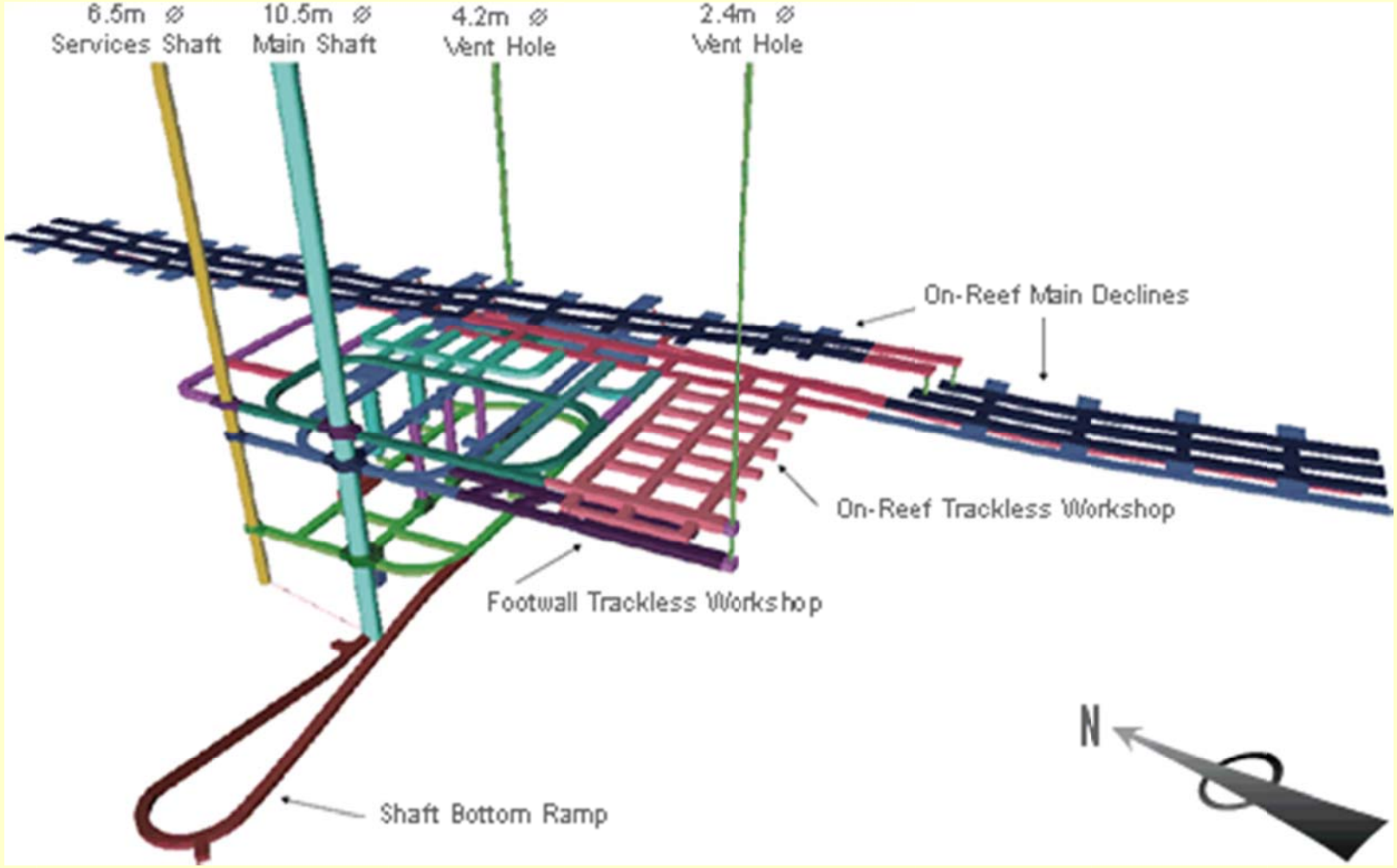


Figure 4-2: Satellite Image of BRPM (Google Earth, 2012)



srk consulting	**BRPM North Shaft Phase 3, Ventilation Shaft** Typical Isometric View of an Underground Mining Operation	Project No. 420937

Figure 4-3: Typical Isometric View of an Underground Mining Operation

5 Project Alternatives

This section detailed the project alternatives that were considered for the proposed North Shaft Phase 3 Ventilation Shaft project. This section will meet the requirements of Section 49(d) of the MPRDA read in conjunction with Section 50(b) and (d) of the Regulations.

Land use or development alternatives to the proposed operation, alternative means of carrying out the proposed operation and the consequence of not proceeding with the proposed operation must be identified and described. This section of the EIA provides a description on these alternatives to the proposed activity, including the advantageous and disadvantageous that the activity or alternative may have on the environment as well as how the community may be affected by the activity.

5.1 Location Alternatives

Figure 5-1 illustrates the underground geology of the farm Boschkoppie 104 JQ.

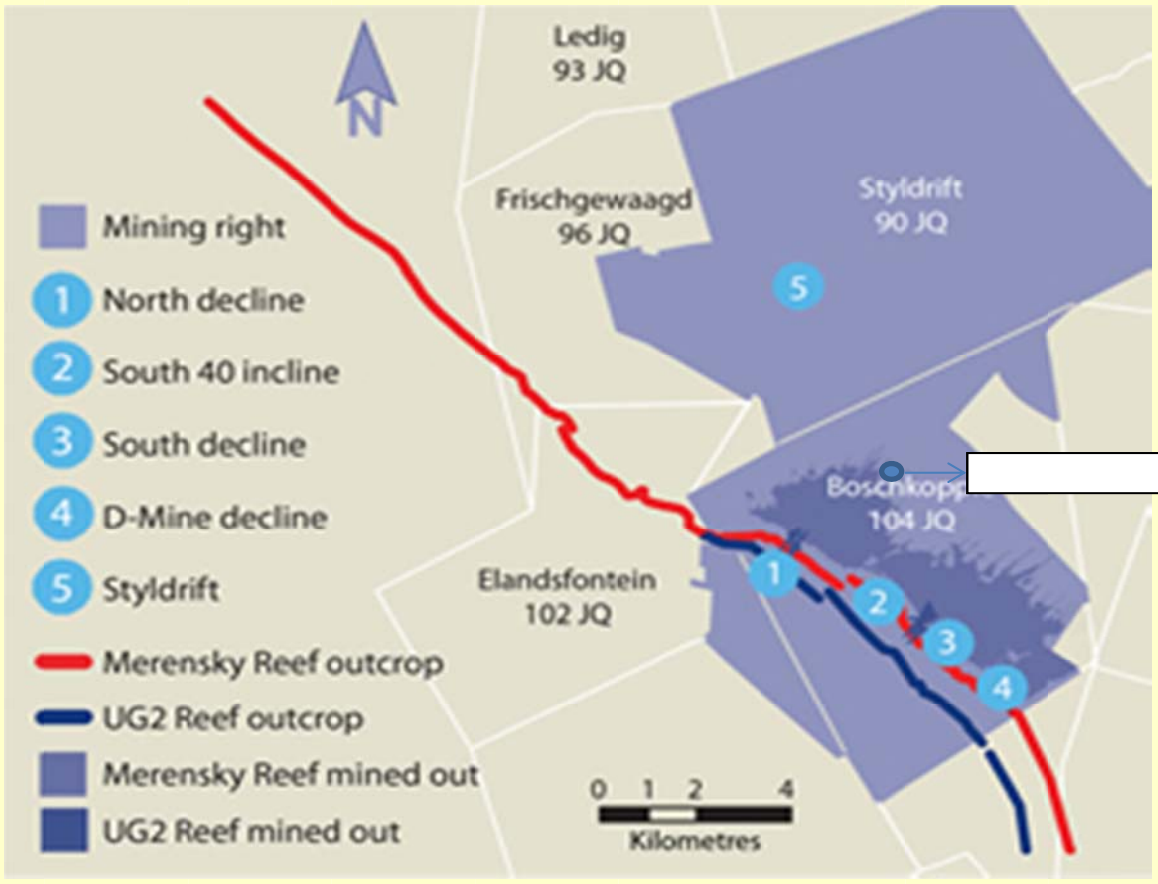


Figure 5-1: Boschkoppie Geology

5.1.1 Proposed Alternative / Alternative A:

Considering the limited location alternatives due to the current mining infrastructure and existing underground operations, the Proposed Alternative is located between the eastern edge of the Robega Village residential area and western banks of the Matlopyane stream. The alternative is located outside of the 1:100 year flood line, and more than 35 m from the edge of the Matlopyane stream, which is still behind the development setback line. Alternative A is located approximately 80 m from the nearest house and illustrated in Figure 6-1.

Access to site Alternative A will be along the existing D 1813 Road, from the Robega Village. The service road to the downcast ventilation shaft will require earthworks to remove the top clay layer in order that an all-weather road can be constructed.

5.1.2 Location Alternatives B

Further away from the Robega Village, alternative B is located on the eastern banks of the Matlopyane stream, outside the 1:100 year flood line. This alternative is located more than 35 m from the edge of the Matlopyane stream, which is still behind the obligatory development setback line (Figure 6-1). Alternative B is approximately 135 m from the nearest house. Access to this alternative may pose a challenge considering the position on the other side of the Matlopyane stream. A river crossing may be required for construction machinery including the Raise Bore machine to gain access. This will in turn require an amendment to the BRPM existing Water Use License. No formal road network or easy access is available from the east.

5.1.3 Location Alternatives C

Alternative C is positioned more to the east, away from the Robega residential area, roughly 155 m from the nearest resident's house and on the eastern side of the Matlopyane stream (Figure 6-1). The alternative is located outside of the 1:100 year flood line, and more than 35 m from the edge of the Matlopyane stream. A river crossing may be required for machinery and the raise boring machine to gain access. This will in turn require an amendment to the BRPM existing Water Use License. No formal road network or easy access is available from the east.

5.1.4 Alternatives to the type of type of activity, design, layout and technology

If underground access is already available to the position of the bottom of the proposed shaft, the method known as raise-boring may be employed. The process is discussed in Section 6. Many Platinum Mines have successfully used this technique during the development of their underground programs. The raise-boring method has many advantages to the mine including, lowers cost, saves time; and reduction in safety hazards associated with the older methods. This method engages a number of mitigation methods, leaning towards a more environmentally sustainable development. These may include the following:

- During the pre-cementation phase the North Shaft Phase 3 Ventilation Shaft is sealed off to prevent the entrance of groundwater from the surrounding area into the shaft. This minimizes the risk of the shaft impacting on boreholes in the area;
- The operations of the raise-bore machine makes use of suitable water management activities reducing the dust emission during construction;
- A temporary water recycling dam is constructed within the North Shaft Phase 3 Ventilation Shaft footprint. The dam functions to store and reuses water during construction, ultimately opening up opportunities for water conservation measures; and
- No waste rock will be brought to surface, thus minimizing the surface disturbance and waste management impacts.

Due to the advantages associated with using the raiseboring method, and the minimal spatial impact on land resources, no alternatives to the activity, design, technology and operational aspects have been assessed.

5.1.5 No-go alternative

The mining industry is a very important economic sector in South Africa, accounting for approximately one third of the country's Gross Domestic Product.

Mining is one of the key sectors of the North West Province, which produces 70% of the world's platinum from the mines in the Rustenburg region. In 1994 there were 87 mines in North West out of a total of 843 in South Africa (NWPG. 2011).

The North West Province, known as the Platinum Province, is responsible for 94% of South Africa's platinum, 46% of the granite and 25% of the gold produced in the country.

Mining is responsible for more than a third of the province's GDP. Platinum comes from the Rustenburg and Brits districts which produce more platinum than any other single platinum-production in the world.

Over the past decade, mining production in the North West Province has continued to reflect positive growth with the Province increasing its contribution to the overall mining output of the country from 26.4 % in 1990 to 29.2% in 1999.

Five of the 12 platinum group metal producing mines in South Africa are situated in the Rustenburg area of what is known as the Bushveld Igneous Complex. This contains the world's richest platinum reserves and is situated in the north-eastern part of the North West Province.

The proposed North Shaft Phase 3 Ventilation Shaft is absolutely vital as it ensures a safe working environment for the underground mine workers. If the proposed North Shaft Phase 3 Ventilation Shaft does not proceed, it could mean that the ventilation available to the underground miners is not adequate to comply with the Mines Health and Safety Act Regulations. As a result, the Phase 3 development cannot proceed which will ultimately lead to job losses and a negative contribution to the Gross Domestic Product of South Africa.

6 Project Description

Ventilation shafts are placed at specified locations along the underground workings to optimise ventilation capacity as required by the Mines Health and Safety Act Regulations, whilst considering energy demands and disturbance that may accrue to attempt to ventilate over prolonged distances. Thus, considering the current mining infrastructure, the location alternatives for the North Shaft Phase 3 Ventilation Shaft are limited.

The proposed North Shaft Phase 3 Ventilation Shaft is located on portion 1 of the farm Boschkoppie 104 JQ. There are three alternative site locations for the proposed North Shaft Phase 3 Ventilation Shaft, all located on the eastern edge of the Robega Village, on opposite sides, outside the flood-lines of the Matlopyane stream (Figure 6-1).

A photo of an existing typical completed Ventilation Shaft is illustrated in Figure 6-2.

The Proposed North Shaft Phase 3 Ventilation Shaft project includes the following:

- A downcast raise-boring Ventilation Shaft that will be drilled to a depth of approximately 460 m. The shaft diameter will be 4.1 m which will supply fresh air underground for the Phase 3 workings;
- The associated civil and structural installations on surface. The completed North Shaft Phase 3 Ventilation Shaft footprint area will be approximately 7 x 7 m (49 m²) including the concrete platform surrounding it. The shaft's outlet will be roughly 2.5 m high and have a diameter of 4.1 m;
- Installation of additional equipment such as underground ventilation fans; and
- A 4 m wide gravel service road of approximately 120 m, providing access to the North Shaft Phase 3 Ventilation Shaft. Servitude will be required for the service road. (The road will be made suitable for all types of weather through the removal of the top clay layer).

During the construction period, the construction area will be fenced off with a 70 x 50 m (3 500 m²) security fence. The construction site will include the proposed North Shaft Phase 3 Ventilation Shaft, including the access area, surface parking facilities for employees, site offices, change house, temporary settler ponds, operator's cabin, main substation, power pack store and the drill pipe stacking area. Consideration was given to install the fan drive mechanisms underground to further alleviate noise levels. This will provide an added environmental advantage in reducing the visual impact and nuisance noise to the neighbouring communities. A water recycling dam will be constructed for the temporary storage and recycling of water used during construction processes. An appropriate dust suppression system will be implemented in order to minimize the generation of dust originating from the raise boring machine and construction activities.

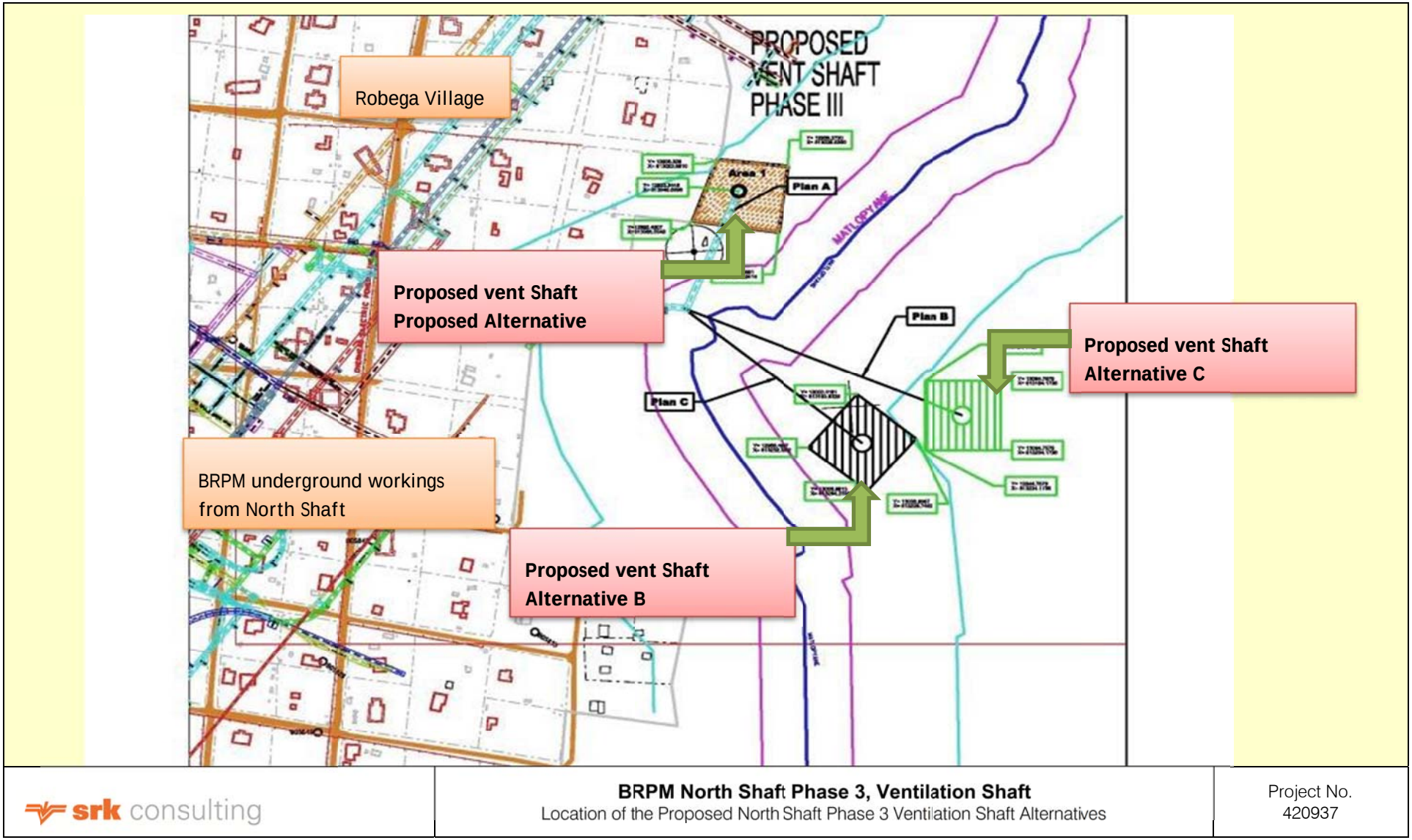


Figure 6-1: Layout of the Proposed North Shaft Phase 3 Ventilation Shaft Alternatives

srk consulting	**BRPM North Shaft Phase 3, Ventilation Shaft** Typical Ventilation Shaft	Project No. 420937

Figure 6-2: Typical Ventilation Shaft after construction

6.1 North Shaft Phase 3 Ventilation Shaft

A raise-boring machine will be used for drilling. This type of machine is used to enable the excavation of a circular hole without the use of explosives. Taking the size of the machine and the force exercised from the machine into consideration, a suitable stable foundation will be required for effective and safe drilling.

Geotechnical Drilling and Service Hole

A 150 mm geotechnical hole will be drilled before any work commences. The information obtained will be utilised in determining the pre-cementation requirements. This hole will also be used as a service hole to potentially provide electrical power from underground to surface.

Pre-cementation

Pending the outcome of the above drilling, typical pre-cementation is as follows: The foundation is first constructed on pillions of concrete that will be installed around the shaft position. Thirty six piles of 750 mm diameter will be drilled and installed around the shaft. This will be filled with concrete to secure the foundation. A 750 mm hole will then be drilled. Steel reinforcing will be lowered into the hole and filled with concrete.

This process is used to seal off the area around the North Shaft Phase 3 Ventilation Shaft position to prevent the ingress of groundwater from the surrounding area into the Shaft. This ensures that the North Shaft Phase 3 Ventilation Shaft should not have any significant impact on the boreholes and groundwater use in the area through the prevention of accumulation of

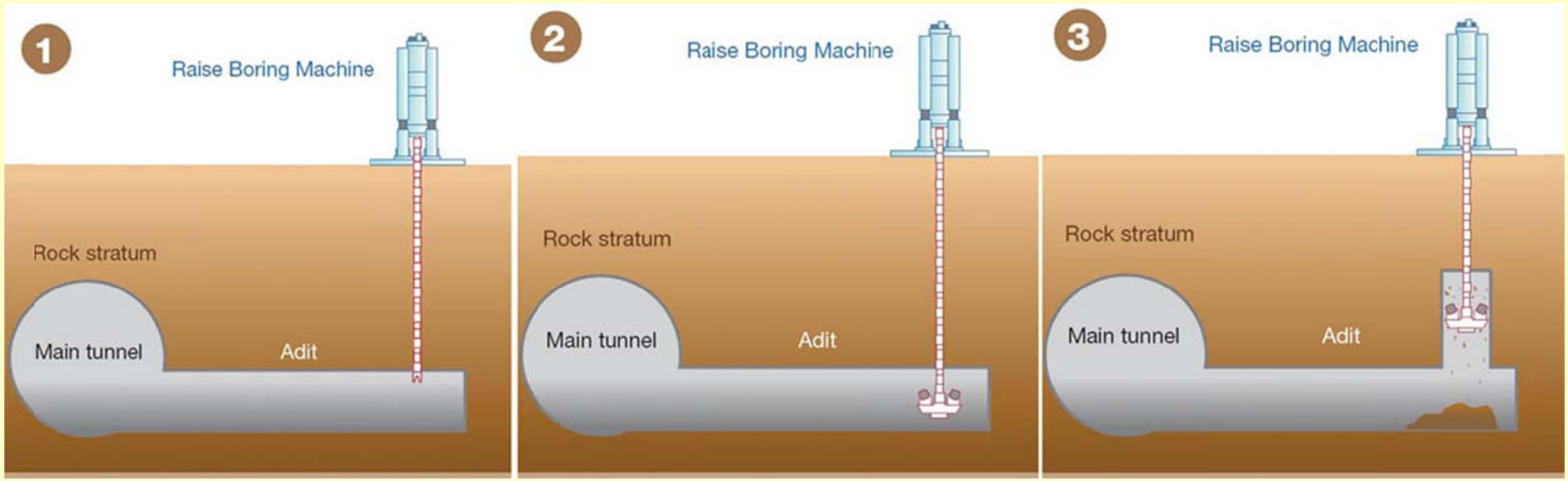
groundwater into the underground workings. Through this the flooding risk of the underground mining operations will also be minimized.

The dust from the machine depends on the soil formation of the top 30 m. BRPM does not foresee excessive dust due to the specific soil type at the sites. Dust suppression methods will be introduced to reduce the dust emissions as much as possible.

Raise-Boring

Figure 6-3 contains an illustration of the raise-boring method.

At first a 381 mm pilot hole will be drilled from surface to the North Shaft Phase 3 Ventilation Shaft position underground. The reamer head will then be attached to the drill steel at the bottom of the North Shaft Phase 3 Ventilation Shaft underground. The raise-bore machine slowly turns and pulls the reamer to surface. The drill chips (rock) will fall to the bottom of the shaft from where the underground machines will remove it. The broken rock therefore falls to the bottom of the hole and the technique allows for greater flexibility in handling the spoil.



srk consulting	**BRPM North Shaft Phase 3, Ventilation Shaft** Illustration of the Raise Boring Method	Project No. 420937

Figure 6-3: Illustration of the Raise-Boring Method

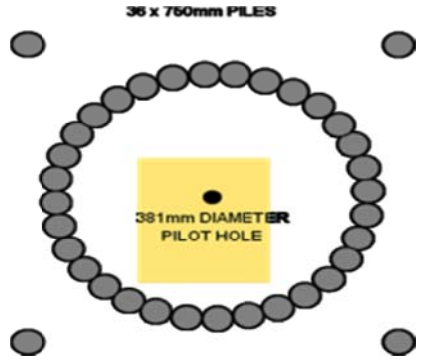
			
The 750 mm piles that will be drilled and installed around the shaft.	Pre cementation drill rig with a dedicate compressor.	The first piling hole of 750 mm.	The boxing of foundation for the raisebore machine.
			
The final concrete foundation for raisebore machine.	The raisebore rig with the water re-cycling dam	The raisebore rig.	The raisebore machine in operation.
srk consulting	**BRPM North Shaft Phase 3, Ventilation Shaft** Photographic Illustration of the Sinking Operation		Project No. 420937

Figure 6-4: Photographic Illustration of the Sinking Operation

Gravel Service / Access Road.

Considering the location of the proposed North Shaft Phase 3 Ventilation Shaft, a 120 m long and 4 m wide gravel service road will be constructed to provide access during the construction period. This road will be utilized during operation of the North Shaft Phase 3 Ventilation Shaft for maintenance purposes. The newly constructed service road will connect with existing gravel and paved roads, which will all be used during the construction and operation phase of the proposed North Shaft Phase 3 Ventilation Shaft project. Access is planned to be along the D 1813 Road, from the Robega Village.

7 Motivation of the Proposed Project

This section describes the motivation to the proposed North Shaft Phase 3 Ventilation Shaft. This section is in adherence to Regulation 50(b) and (d). The construction of North Shaft Phase 3 Ventilation Shaft has become a priority. Without the North Shaft Phase 3 Ventilation Shaft project, BRPM will not be able to continue current production rates and social demands, resulting in unemployment of a large sum of residents in the Rustenburg area and surrounding communities. In adherence to the Mine Health and Safety Act, sufficient ventilation is required for the underground workers. Considering the current expansion circumstance at BRPM, this will not be achieved without the construction of an additional Ventilation fan, whereby employees will be protected against harmful temperatures and emissions from underground activities. Employment at BRPM will thus be prolonged in parallel to the prolongation of BRPM Phase 3 expansion, therefore retaining the lifestyle of the surrounding communities.

8 Description of the Baseline Environment

This section provides an overview of the baseline environment within which the proposed North Shaft Phase 3 Ventilation Shaft will be located.

The proposed location of the North Shaft Phase 3 Ventilation Shaft will be located within degraded areas. The footprint of North Shaft Phase 3 Ventilation Shaft will be minute and any envisaged biophysical and social impacts can be managed. Minimal environmental change, with regards to the baseline environment in the immediate area will be expected. The baseline environmental description was compiled on the basis of the following available information:

- Available information from the existing EMPR for the BRPM on the farm Boschkoppie 104 JQ, 1998;
- Previous studies undertaken in the area;
- Existing information on the environmental parameters of the area; and
- Various approved EMP and supporting environmental reports.

8.1 Regional Setting

The proposed project will be situated to the east of the Robega rural traditional community and approximately 38 and 8 km from the towns of Rustenburg and Boshoek in the North West Province respectively.

The current land use of the proposed project is dominantly relating to residential activities. The surrounding land uses include the Robega Community immediately to the west of the proposed North Shaft Phase 3 Ventilation Shaft. To the east of the proposed North Shaft Phase 3 Ventilation Shaft, the land is not utilized for any purpose, and is open land.

BRPM is surrounded by several other mining operations, communities, railways and roads. The village of Robega is located in close proximity to the proposed project. The surrounding villages lease the land from the Royal Bafokeng Nation. None of the communities in close proximity of the North Shaft Phase 3 Ventilation Shaft are land owners. The villages of Robega is situated on the mine surface lease area and utilize the open areas mainly as grazing land for local subsistence livestock farmers. Chaneng, Boshoek and Mafenya are situated in the surrounding areas. The adjacent land owners are those who share a common border with BRPM, Anglo American Platinum and Rustenburg Platinum Mine on the eastern and western boundary.

The proposed project will be located the farm Boschkoppie 104 JQ. The farm name, surface owner and proposed use are stipulated in Table 8-1.

Table 8-1: Affected farms

Farm name and Portion	Surface owner	Proposed use
Portion 1 of the farm Boschkoppie 102 JQ	Royal Bafokeng Nation	North Shaft Phase 3 Ventilation Shaft footprint

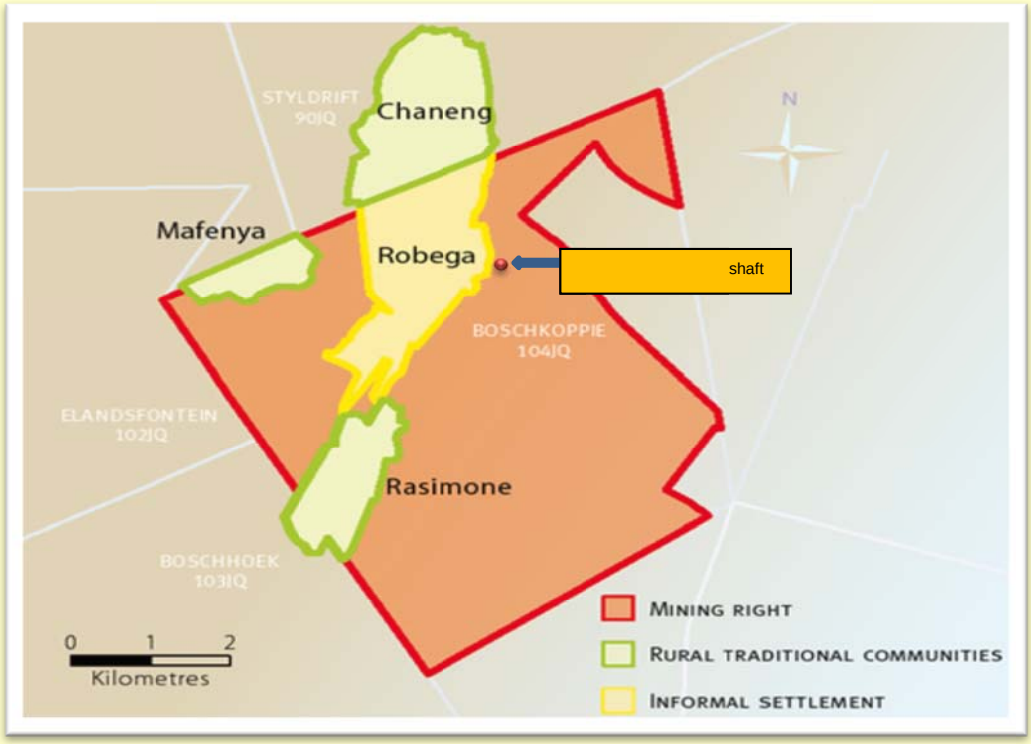
8.1.1 Magisterial District

In terms of the administrative boundaries, the proposed project is located within the North West province. The project is located within the Bojanala District Municipality, Ward 2 of the Rustenburg Local Municipality and Magisterial District. Access to the proposed site is through the regional road R 566. The regional location of the proposed project is shown in Figure 8-1.

The owners of the mining authorisation are Rustenburg Platinum Mines Limited and Anglo American Platinum Corporation. The surface rights of land are owned by the Royal Bafokeng Nation (RBN).

8.1.2 Nearest Town

The towns of Rasimone and Robega are situated on the mine surface lease area. Chaneng is situated partly on the lease area to the north (Figure 8-1). The village of Robega is situated in close proximity to the proposed North Shaft Phase 3 Ventilation Shaft.



srk consulting	**BRPM North Shaft Phase 3, Ventilation Shaft** Nearby residential areas	Project No. 420937

Figure 8-1: Nearby residential areas

The nearby towns cities and residential areas to the Mining right area is given in Table 8-2(line of sight distances).

Table 8-2: Nearest towns to the proposed development

Town	Distance (km)
Rustenburg Central	25 km (South)
Boshoek	1.5 km (South west)
Rasimone Central	4.5 km
Robega	<0.1 km
Chaneng	2.5 km

8.2 Geology

BRPM is underlain by the mafic rocks of the Lower, Critical and Main Zones within the Western Limb of the Rustenburg Layered Suite (RLS), Bushveld Igneous Complex, with a small portion of the Pilanesberg Complex to the north of BRPM (Cawthorn et al., 2006; RBP, 2010). The RLS can be divided into five distinguishable portions, namely the western, far western, eastern, south eastern (Bethal) and northern (Potgietersrus) limbs (Cawthorn et al., 2006).

In terms of the underlying structure, the BRPM lease area is dissected by two major normal faults which strike northwest to southeast, and east-north-east to west-south-west. Caldera faults are identified to have the largest down-throws of approximately 100 m and 1,000 m, respectively, in the area (RBP, 2010).

In addition, the Chaneng Graben and Pilanesberg dyke system have been recognised within the mine lease area (RBP, 2010). The Chaneng Graben, or Chaneng Corridor, strikes east-north-east to west-south-west, while the Pilanesberg dyke system strikes north-north-west to south-south-east (RBP, 2010).

The position of the proposed North Shaft Phase 3 Ventilation Shaft is completely located on RLS of Mafic/ultra mafic intrusive rocks lithology (dolerite, diabase, diorite, gabbro, dunite, pyroxenite, norite, anorthosite, hornblendite, carbonatite). No faults or Dykes are evident in close proximity to the North Shaft Phase 3 Ventilation Shaft proposed position or alternatives.

The significance of impact of the geology due to the BRPM North Shaft Phase 3 Ventilation Shaft will remain the same as that predicted in the BRPM EMPR (Heymann, E.F., 1997), as no additional underground mining is proposed which will affect the structural geology in the area. Appropriate geological and rock mechanics will be applied to the design of the BRPM North Shaft Phase 3 Ventilation Shaftto ensure safe construction and subsequent operation, according to established construction activity management controls applied by BRPM for their existing ventilation shafts.

8.3 Topography

The general topography of the proposed project area is situated on a flat undulating plain, sloping to the east from the Robega village with an altitude of 1060 meters above seas level (masl). Surface runoff for the proposed project will ultimately flow into the Matlopyane stream, which in turn flows into the Elands River to the north of the site.

Considering the size of the proposed development it is not expected that the proposed project will drastically affect the drainage in and around the proposed project or on the topography.

The proposed project is located in close proximity to existing residential areas (Robega) and although not visible from public areas, it will be visible to the houses located in close proximity of the proposed North Shaft Phase 3 Ventilation Shaft.

The protrusion of the North Shaft Phase 3 Ventilation Shaft above surface will remain a permanent feature during operation of the mine. The decommissioning phase of will make provision for the dismantling of the Ventilation Shaft canopy, the shaft will be sealed with concrete, backfill placed on the concrete seal, followed by topsoil. The area will then be re-vegetated in order to turn the landscape back to the pre-mining state.

Please also refer to Section 8.12.

8.4 Climate

The proposed project is situated in a semi-tropical region with reasonable high summer and winter daytime temperatures. Average summer temperatures range from 13-30 °C and approximately 2 -24 °C in winter. It is warm to hot with moist summers and cool dry winters (Heymann, E.F., 1997).

The rainy season typically occurs in the summer months (October to March) with afternoon thundershowers which occur most often from August to March. The mean annual rainfall for the area is 513 mm approximately 84 % of which occurs in the summer months (Heymann, E.F., 1997). North easterly and south westerly wind directions prevail throughout the year as stipulated in Figure 8-2.

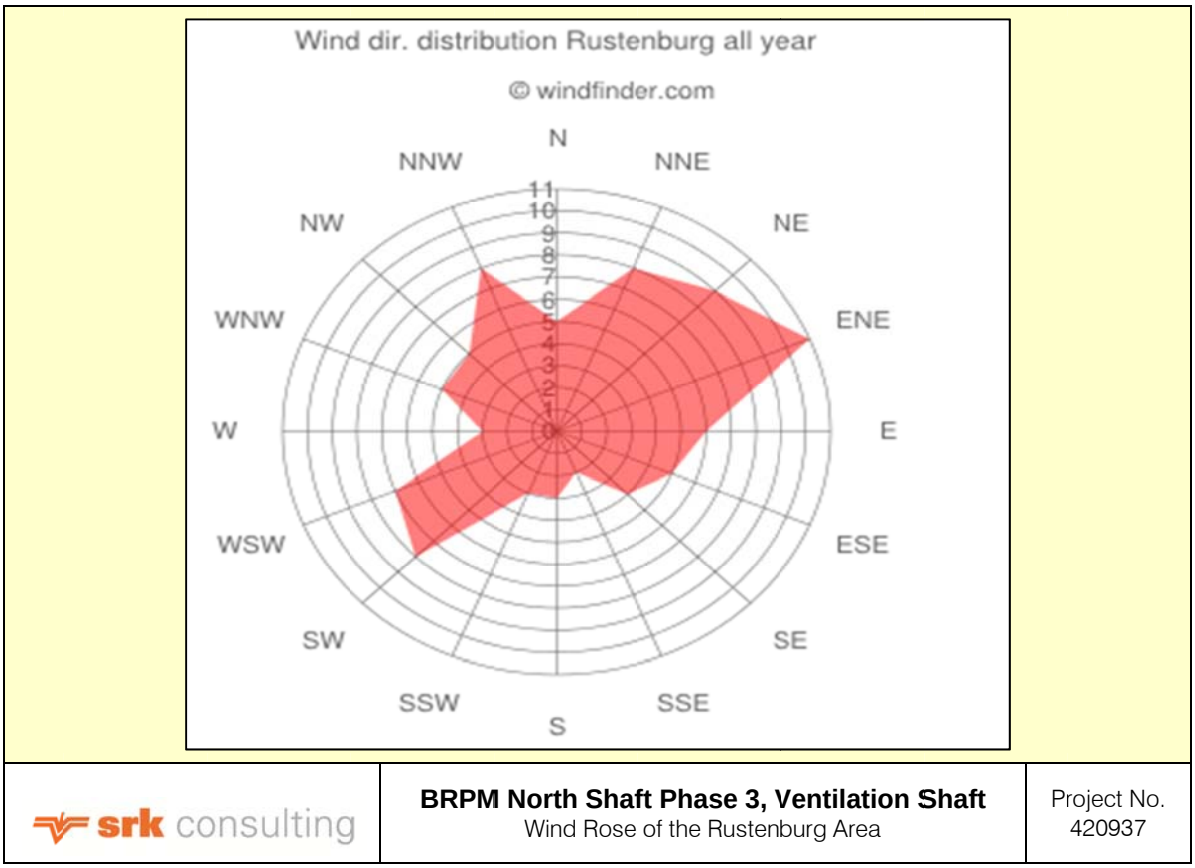


Figure 8-2: Wind Rose Indicating the Dominant Wind Direction Distribution for the Rustenburg Area during the Year (Windfinder, 2012)

Table 8-3and Table 8-4 describe the mean monthly rainfall and temperatures of the Rustenburg area (WorldWeatherOnLine, 2012).

Table 8-3: Mean monthly and annual rainfall data for the Rustenburg area

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average (mm)	94	64	61	42	7	3	13	7	10	51	84	73
Rainfall days	15	11	10	8	3	2	1	1	3	9	13	13

Table 8-4: Mean monthly and annual temperatures for the Rustenburg area

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high temp (°C)	31	31	29	27	25	22	22	25	29	31	31	31
Average low temp (°C)	17	17	16	12	7	4	3	6	10	14	16	17

The project area is situated in a semi-tropical region with a mean annual precipitation of between 650 mm and 750 mm. This area is characterized by high evaporation rates exceeding 1650 mm.

8.5 Ambient Air Quality

Air Quality in the project area is monitored by Royal Bafokeng Resources as part of the Styldrift Mining Complex. Considering the close proximity of the North Shaft Phase 3 Ventilation Shaft to the Styldrift Mining Complex, air quality monitoring points utilized for this operation and that of BRPM can be used to incorporate the additional North Shaft Phase 3 Ventilation Shaft. The location of these Dust Fall Out and Particulate Matter (PM) 10 sampling points are illustrated in Figure 8-3.

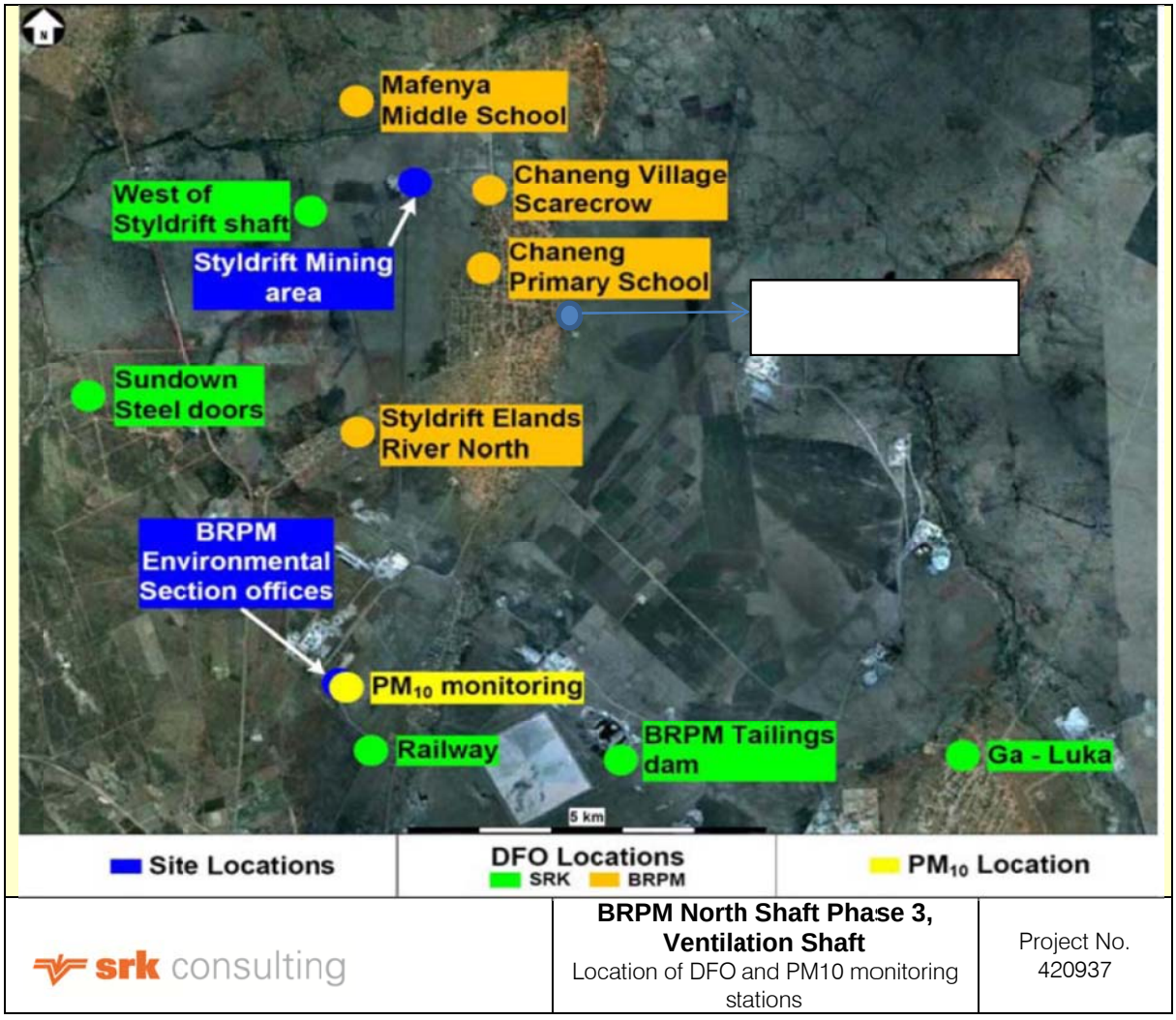


Figure 8-3: Location of DFO and PM10 monitoring stations

To date minimal exceedance to the annual average targets (600) have been experienced. Guidelines for residential values were exceeded at the Railway and Ga-Luka. However, these points are considered to be located within industrial areas with higher guidelines values (1200). In addition to this, these points are influenced by surrounding land users.

The ambient air quality of Rustenburg shows particularly elevated levels of sulphur dioxide and particulate dust. However, the ambient air pollutant concentrations within the Rustenburg region occur not only due to local sources but also as a result of emissions from various remote sources.

Methane gas occurs sporadically within the Bushveld Complex in the form of pockets. Methane emissions do occur when drilling intersects a methane pocket.

Due to the close proximity of some of the Robega houses to the BRPM North Shaft Phase 3 Ventilation Shaft, it could be expected that some nuisance dust may be generated during the construction phase of the project. With the implementation of mitigation measures to suppress dust generation, it is however expected that minimal impacts on air quality can be expected.

It must be noted that the proposed BRPM North Shaft Phase 3 Ventilation Shaft is a downcast ventilation shaft, which allows the passage of air from surface to flow into the mine. The construction and subsequent operation of the BRPM North Shaft Phase 3 Ventilation Shaft should therefore have no direct material impact on the local air quality.

8.6 Soils Land Use and Land Capability

The footprint areas to be affected by the establishment of the North Shaft Phase 3 Ventilation Shaft, and short access road will be approximately 3 500 m2. The ventilation shaft and canopy will be approximately 49 m2 in terms of a 4.1 m diameter ventilation shaft with a final nominal 7 m x 7 m foundation. The area will be fenced in order to restrict any un-authorized access to the shaft area.

The property of the proposed North Shaft Phase 3 Ventilation Shaft is however very flat and no signs of extensive erosion were noticed.

The soil on the property is mainly black turf - Arcadia - consisting of a homogenous vertic turf, the depth of which fluctuates between half a meters to two metres. This Arcadia turf has high clay content, up to 35%, with the result that it swells much after rain and again shrinks when it dries out. The clay was derived from predominant montmorillonitic clays. The turf has been deposited on weathered norite, which is common to the Bushveld Igneous Complex (Haymann. 1997).

Arcadia soils have good arable and grazing potential. However this potential is not realised due to the erratic rainfall in the area. There are no natural wetlands or natural wilderness areas on the mining lease area (Evans, R., &Mnisi, N. 2006).

The footprint area to be affected by the establishment of the BRPM North Shaft Phase 3 Ventilation Shaft and short access road will be 3500 m^2 during the construction period and 49 m^3 when completed. This area will be fenced to restrict un-authorised access to the shaft area.

During site establishment, drilling and rehabilitation soil resource will be lost from the landscape, albeit that stripping and stockpiling of the soils occurs during site establishment and drilling. As areas are rehabilitated after the construction phase, the secondary impacts on the community as a result of the loss of these soils are not currently considered significant.

The land capability for grazing and agricultural use is largely hindered by human activities i.e. residential area adjacent to the proposed North Shaft Phase 3 Ventilation Shaft.

The construction and subsequent operation of the BRPM North Shaft Phase 3 Ventilation Shaft should therefore have no direct material impact on the local soils and land use capability.

8.7 Biodiversity

The area around the North Shaft Phase 3 Ventilation Shaft has been left fallow and veld species are dominant. The animal life with access to the ventilation shaft location consists primarily of avifauna, small mammals, reptiles and insects. No endangered or rare species have been observed during previous specialist studies undertaken in this area (Heymann, E.F., 1997). As mentioned previously, houses have been constructed in this area which will also hinder the natural occurrence of animal life.

The footprint of the North Shaft Phase 3 Ventilation Shaft is a nominal 3 500 m^2 during construction with a final footprint of 49 m^2. As areas are rehabilitated after the construction phase, the secondary impacts on the community as a result of the loss of these soils biodiversity are not currently considered significant.

The vent shaft development will not be using conventional drilling and blasting operations. Instead Raise Boring technology will be used. This process is expected to have significant less influence on the surroundings with regards to ground vibration. Due to the proximity of the BRPM North Shaft Phase 3 Ventilation Shaft to the Pilanesberg Game Reserve and Sun City (approximately 8 km) and

that conventional drilling and blasting operations will not be used, the impact on vulnerable fauna species should not be material.

8.8 Surface Water

BRPM receives potable water from the Magalies Water Service Provider. A number of measures have been implemented at BRPM to prevent pollution from entering the environment, as stipulated in the existing Water Use License.

The non-perennial streams of Bonwakgogo, Matlopyane and Majapele originate on Boschkoppie. The Matlopyane originates some 5 km south of the farm Boschkoppie. These streams drain northwards into the Elands River which in turn drains into the Crocodile River. The farm, Boschkoppie 104 JQ is thus located in the greater Crocodile River catchment (Evans, R., &Mnisi, N. 2006). These rivers mainly flow after heavy rain events, therefore no permanent surface water sources, such as wetlands, occur. Resulting from this, there are no permanent surface water users (Heymann, 1997).

The affected stream courses are those streams originating on the farm as well as those draining from upstream through the farm. The receiving water bodies are the streams directly downstream of Boschkoppie in other words the Elands River.

The drainage density is the kilometres of drainage path on Boschkoppie divided by the square kilometres of the land area. In terms of the entire Boschkoppie this is about 0.21 km/km².

The proposed development is on the northern section of portion 1 of the farm Boschkoppie 104 JQ, somewhat 4 km from the origination of the Bonwakgogo non – perennial stream. The proposed North Shaft Phase 3 Ventilation Shaft is situated in the Drainage Region A, within the Limpopo Water Management Area according to GN 547 of the NWA.

BRPM currently undertakes surface water monitoring as per the existing BRPM Water Use License (WUL). Four monitoring points are located within the Elands River. BRPM will continue to monitor the surface water flow and qualities as per existing WUL.

The impact on surface water is primarily related to the management of materials, wastes and spills from the drilling operation and unauthorised disposal of contaminated substances. In addition soil erosion may occur during the construction phase. It is envisaged that the proposed project will not detrimentally impact the surface water resources in the area with the correct implementation of mitigation measures.

8.9 Ground Water

Water level information was obtained from the BRPM operations EMPR, as well as results from the 2006 hydrocensus. A map depicting the depth to water table distribution for the hydrocensus boreholes is attached as Figure 2.10.1(A). Historical water levels measured by DWA in the greater study area yielded information on 359 boreholes. The database shows initial ground water intersection on an average of 23.8 m, with rest water levels at around 12.1 m. The average weathering depth of norite/pyroxenite units is 31.7 m, indicating a well-established, saturated shallow weathered zone aquifer. Ground water level fluctuations of up to 5 m over the geohydrological cycle show a distinct seasonal trend (Evans, R., &Mnisi, N. 2006).

Ground water levels appear to resemble the local topography i.e. regional ground water drainage takes place in a predominant north-easterly direction although locally, drainage may take place towards the surface drainage features. At least three different intrusions by dykes of dolerite sub-compartmentalise the farm but they appear not to influence ground water levels i.e. the depth to ground water level seems to be almost the same from south to north. However, it should be noted that no boreholes are located in close proximity to these structures (Evans, R., &Mnisi, N. 2006).

There are at least:

- 13 borehole water sources on the farms south-west and north of the mining area;
- 16 borehole water sources in the village Rasimone;
- 40 borehole water sources in the village Robega; and
- 40 borehole water sources in the village Chaneng.

Many of these boreholes have been drilled by the defunct Department of Water Affairs of Bophuthatswana. There are no indications at the surface of shallow ground water discharges through seeps and sprigs (Evans, R., &Mnisi, N. 2006).

BRPM currently have 48 groundwater monitoring points, of which 31 are currently still being monitoring and do not have constricted access. Any contaminated or reduced groundwater quality is actively identified through the continual groundwater monitoring network, although the proposed project is not expected to contribute to the reduction in groundwater quality.

The impact on groundwater is primarily related to the management of materials, wastes and spills from the drilling operation and unauthorised disposal of contaminated substances.

The construction and subsequent operation of the BRPMNorth Shaft Phase 3 Ventilation Shaft should have no direct material impact on the local or regional groundwater resources.

8.10 Noise

A pre-mining base-line ambient noise survey was conducted and this survey indicates that the current noise levels of the areas in the vicinity of the proposed mine are higher than that expected for rural areas. In fact most noise level measurements are above those which are expected in suburban districts. Numerous trains passed through the area during the survey, which obviously increased the noise levels.

As current mining operations are underway, ambient noise monitoring is conducted at various locations around BRPM. The noise monitoring locations are situated at the following areas:

- North Shaft;
- South Shaft;
- Processing Plant;
- Conveyor belts; and
- Nearby the Village of Rasimone, Robega and Chaneng.

BRPM are committed to incorporate noise reduction measures though the area of mining activities. As a result of mining operations and underground blasting, a degree of vibrations can be felt, although not contributing to surface noise pollution.

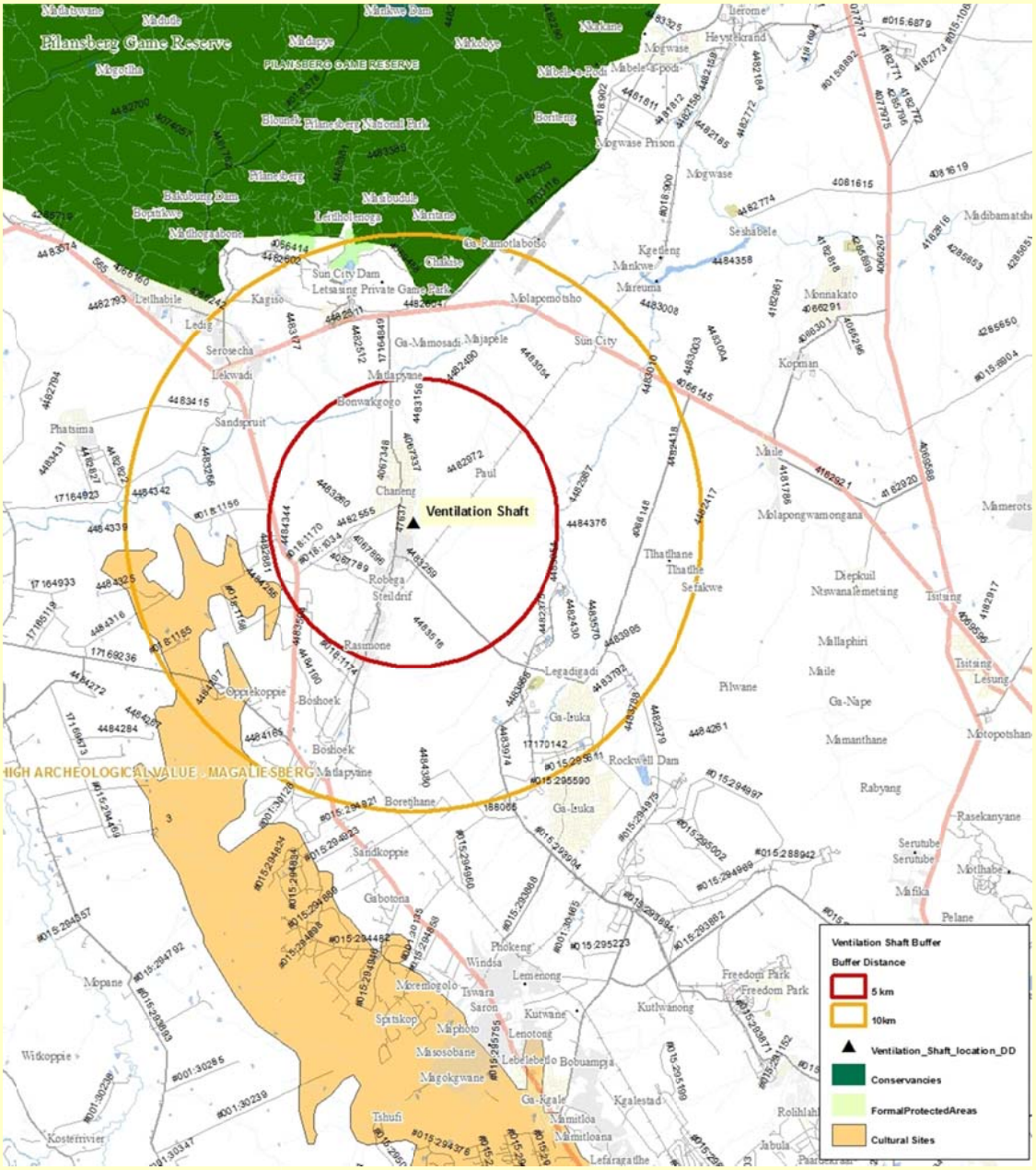
The proposed North Shaft Phase 3 Ventilation Shaft sites are situated on the east of the Robega Village along the vacant land between the village and an existing gravel road east of the village. The proposed construction phase will take between 6 to 8 months after which all construction vehicles and activities will stop and removed from the site (v/d Merwe, B. 2012). The construction activities will take place mostly during the daytime when the prevailing ambient noise levels are higher. The following construction activities will take place such as drilling, excavations, removal of waste material from the site, power generation and the assembling of the duct. There will be an increase in the ambient noise level caused by some of these activities of which some will be for short periods in the far field (500 m from the site) but most will be close to the source(site specific).

Test done on previous drill rigs show that the noise levels further than 10 m away from the raisebore drill rig is lower than the legal limit and will not cause any noise induced hearing loss to people in the vicinity of the machine.

Whilst there will be some noise impacts during construction activities of the shaft establishment, it will be operated as a downcast ventilation shaft, allowing the inflow of air into the mining operations. No ventilation fans will be located on surface. Consequently, the operation of the North Shaft Phase 3 Ventilation Shaft should have no direct material impact on the local noise levels.

8.11 Archaeology

Based on the available information no sites of archaeological interest have been identified. It should be kept in mind that archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (Coetzee, F.P. 2012). The possible presence of archaeological sites and artefacts are further enhanced by the proximity of the Pilanesberg National Park and other protected areas nearby. The proximity of the Pilanesberg and Magaliesberg Protected areas to the BRPM North Shaft Phase 3 Ventilation Shaft are illustrated in Figure 8-4.



srk consulting	**BRPM North Shaft Phase 3, Ventilation Shaft** Proximity of Proposed North Shaft Phase 3 Ventilation Shaft to Protected Areas	Project No. 420937

Figure 8-4: Proximity of Proposed North Shaft Phase 3 Ventilation Shaft to Protected Areas

The construction and subsequent operation of the BRPM North Shaft Phase 3 Ventilation Shaft should have no direct material impact on archaeology.

8.12 Visual

The North Shaft Phase 3 Ventilation Shaft will have a canopy of approximately 2.5 m high, with a diameter of 4.1 m. The final footprint of the shaft will be approximately 49 m2, thus having minimal visual impact to any other stakeholders in the immediate vicinity. The shaft will be located in close proximity to the Robega community and will thus be clearly visible by the community. Mitigation and management measures will be implemented during the construction and operation phases of the project. The BRPM North Shaft Phase 3 Ventilation Shaft will not be visible from any public areas.

It should be noted that mitigation on the visual impact of the proposed North Shaft Phase 3 Ventilation Shaft is severely limited, taking health and safety and the MHSA Regulations into consideration. According to Section 8.6(1) of the MHSA Regulations, no combustible material or natural vegetation may be located in close proximity to the fan installations. The reasoning behind this focuses on the protection of the underground employees and the flow of fresh air to the underground working place. This may be hindered by natural vegetation catching fire and significantly risking the inflow of clean air into the underground working place, as well as the possible damage to the fan installation and switch gear by growth of natural vegetation.

The construction and subsequent operation of the BRPM North Shaft Phase 3 Ventilation Shaft should have no direct material impact on the visual environment.

8.13 Vibration

The effects from raise-boring with regards to ground vibration are expected to be well contained within 25 m from the North Shaft Phase 3 Ventilation Shaft. Levels from raise-boring are considered similar to certain construction equipment. The levels yielded from this equipment are well below damaging criteria for structures but could possibly be felt at distances of 15 m and closer. There is no specific ground vibration related reason indicating that this project cannot continue (Zeeman, J.D. 2012).

Vibration monitoring is conducted as part of the Styldrift Mining complex situated to the north west of the proposed North Shaft Phase 3 Ventilation Shaft. Minimal ground vibration and air blast readings have been identified during blasting activities from Styldrift. Those reading that were recorded showed minimal impacts on infrastructure damage to the closed residents. Continual vibration monitoring will be conducted in adherence to the Styldrift EMPR. The proposed ventilation shaft will fall within the ambit of this monitoring. Thus any material deviations to the vibration environment during construction and operation of the North Shaft Phase 3 Ventilation Shaft will be monitored.

As mentioned previously, the vent shaft development will not be using conventional drilling and blasting operations. Instead Raise Boring technology will be used. This process is expected to have significant less influence on the surroundings with regards to ground vibration. Due to the proximity of the BRPM North Shaft Phase 3 Ventilation Shaft to the Pilanesberg Game Reserve and Sun City (approximately 8 km) and that conventional drilling and blasting operations will not be used, the impact on vulnerable fauna species should not be material.

Additionally, vibration levels expected from raise-boring are not expected to be able to damage houses. The construction and subsequent operation of the BRPM North Shaft Phase 3 Ventilation Shaft should have no direct material impact associated with vibration.

8.14 Traffic capacities

Mine personnel currently use the existing road network from the BRPM concentrator plant to Rustenburg to transport PGM concentrate in trucks to Anglo Platinum Ltd.'s Smelters and refineries. Other traffic volumes in the area relate to the local community daily activities. The current road used by the communities will be utilized for access to the North Shaft Phase 3 Ventilation Shaft.

Although the expectation is that construction vehicles and drill rigs generally travel at low speeds, these vehicles sometimes have a tendency to travel at relatively high speeds leading to potential safety hazards.

As a result of the construction phase, traffic may temporarily increase along the roads leading to the North Shaft Phase 3 Ventilation Shaft position, although this will cease after construction.

8.15 Socio Economic

8.15.1 Regional Socio - Economic structure

The closest neighbouring communities to the project, namely Chaneng, Rasimone, Mafenya and Robega Villages, constitute Ward 2 of the Rustenburg Local Municipality in the Bojanala Platinum District. The Royal Bafokeng Nation is the dominant ethnic group in the Ward which had a relatively young population (38% less than 20 years of age) of 12 715 people in 2001 (Statistics South Africa, 2001). The employment level amongst the economically active population (aged 15 to 65) is 37% in Chaneng, 38% in Robega and 39% in Rasimone (Statistics South Africa, 2001). Unemployment remains a critical issue in the project and broader Rustenburg area.

8.15.2 Employment

As a consequence of changes to the Regulations in respect of ventilation of underground working areas, BRPM has been required to establish an additional ventilation shaft to service its existing BRPM underground mine development operations. North Shaft Phase 3 Ventilation shaft is motivated to comply with the mines occupational health and safety requirements, which are required to continue the underground mining operations at BRPM. In the absence of compliance with the mining ventilation regulations, BRPM mine could be required to cease operations, with direct impact on the current and potential future employees at the BRPM Mine. Approximately 6 600 people are currently dependent on BRPM for employment and income, which include sub-contractors, the wider community and service providers.

Therefore construction of the North Shaft Phase 3 Ventilation Shaft will have a positive impact on the project, keeping BRPM in operation and ensuring the employment opportunities for both current and future employees for an extended period of years.

9 Methodology for the Assessment of Impacts

The anticipated impacts associated with the proposed project have been assessed according to SRK's standardised impact assessment methodology which is presented below. This methodology has been utilised for the assessment of environmental impacts where the consequence (severity of impact, spatial scope of impact and duration of impact) and likelihood (frequency of activity and frequency of impact) have been considered in parallel to provide an impact rating and hence an interpretation in terms of the level of environmental management required for each impact.

The first stage of any impact assessment is the identification of potential environmental activities1, aspects2 and impacts which may occur during the commencement and implementation of a project. This is supported by the identification of receptors3 and resources4, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. Environmental impacts5(social and biophysical) are then identified based on the potential interaction between the aspects and the receptors/resources.

The significance of the impact is then assessed by rating each variable numerically according to defined criteria as outlined in Table 9-1. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity6, spatial scope7 and duration8 of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity9 and the frequency of the impact10 together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance rating matrix table as shown in Table 9-2.

This matrix thus provides a rating on a scale of 1 to 150 (low, medium low, medium high or high) based on the consequence and likelihood of an environmental impact occurring.

Natural and existing mitigation measures, including built-in engineering designs, are included in the pre-mitigation assessment of significance. Measures such as demolishing of infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

[1]An ***activity*** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation.
[2]An ***environmental aspect*** is an 'element of an organisations activities, products and services which can interact with the environment'. The interaction of an aspect with the environment may result in an impact.
[3]***Receptors*** comprise, but are not limited to people or man-made structures.
[4]***Resources*** include components of the biophysical environment.
[5]***Environmental impacts*** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. Receptors can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as aquifers, flora and palaeontology. In the case where the impact is on human health or well-being, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
[6]***Severity*** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
[7]***Spatial scope*** refers to the geographical scale of the impact.
[8]***Duration*** refers to the length of time over which the stressor will cause a change in the resource or receptor.
[9]***Frequency of activity*** refers to how often the proposed activity will take place.
[10]***Frequency of impact*** refers to the frequency with which a stressor (aspect) will impact on the receptor.

Table 9-1: Criteria for assessing significance of impacts

SEVERITY OF IMPACT	RATING
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful	5

SPATIAL SCOPE OF IMPACT	RATING
Activity specific	1
Mine specific (within the mine boundary)	2
Local area (within 5 km of the mine boundary)	3
Regional (Greater Rustenburg area)	4
National	5

DURATION OF IMPACT	RATING
One day to one month	1
One month to one year	2
One year to ten years	3
Life of operation	4
Post closure / permanent	5

CONSEQUENCE

FREQUENCY OF ACTIVITY / DURATION OF ASPECT	RATING
Annually or less / low	1
6 monthly / temporary	2
Monthly / infrequent	3
Weekly / life of operation / regularly / likely	4
Daily / permanent / high	5

FREQUENCY OF IMPACT	RATING
Almost never / almost impossible	1
Very seldom / highly unlikely	2
Infrequent / unlikely / seldom	3
Often / regularly / likely / possible	4
Daily / highly likely / definitely	5

LIKELIHOOD

Table 9-2: Interpretation of Impact Rating

Likelihood \ Consequence	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
6	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
7	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
8	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
9	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
10	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

	High	76 to 150	Improve current management
	Medium High	40 to 75	Maintain current management
	Medium Low	26 to 39	
	Low	1 to 25	No management required

SIGNIFICANCE = CONSEQUENCE x LIKELIHOOD

10 Impact Assessment

This section describes and assesses the predicted impacts in fulfilment of Section 93(3)(b)(i)(ii) and (iii) of the MPRDA read in conjunction with Regulation 50(c) and (e). Activities envisaged to take place are described in Table 10-1.

Table 10-1: Activities relating to all phases of the propose project

Construction	Construction of ventilation shaft and new gravel access road
	Site clearance and fencing off the construction site
	Construction of the raise boring machine platform and temporary pollution control dam
Operation	The ventilation shaft will operate 24 hours, 7 days per week to ensure that fresh air is supplied into the underground workings to facilitate safe underground working conditions.
	Vehicles will travel on the newly constructed gravel access road in order to undertake monitoring and maintenance on an infrequent basis.
Rehabilitation	The surface infrastructure will be removed and the ventilation opening will be sealed, cemented and grassed.
Post-closure	Demolition of ventilation shaft.
	Removal of roads.
	Handling of potential contaminated soils.
	Monitoring of rehabilitation success

The following sections provide further details on the potential impacts, on environmental aspects in respect of each aforesaid activity and associated actions that will be undertaken during the implementation of the proposed project.

The potential identified impacts were rated, as discussed in Section 0, in terms of the Severity, Spatial Scope, Duration, Frequency of Activity of Frequency of Impact. The following abbreviations were used in the Impact Assessment Tables to indicate how the significance of the proposed impacts was calculated:

- Se ➡ Severity;
- Sp ➡ Spatial Scope;
- Du ➡ Duration;
- FoA ➡ Frequency of Activity; and
- FoI ➡ Frequency of Impact.

10.1 Construction Phase

The construction of the proposed North Shaft Phase 3 Ventilation Shaft will involve the following activities:

- Construction of the ventilation shaft and access road;
- Construction of the pollution control dam;
- Construction of the camp site and provision of sanitary infrastructure;
- It is anticipated that the construction phase will take approximately 6 – 8 months.

10.1.1 Construction of the Up Cast North Shaft Phase 3 Ventilation Shaft

Activity: Construction of the North Shaft Phase 3 Ventilation Shaft and access road

Actions:

- Pre-cementation of the ventilation shaft:
  - This process involves the clearance, and fencing-off, of approximately 3 500 m^2 footprint area in which the ventilation shaft head-works and concrete foundations is to be installed. Whilst providing the base for the location of the preliminary drilling rig, and subsequently the

ventilation shaft head-works. The concrete foundation is also established to seal off the area around the ventilation shaft position to prevent the potential ingress of surface water from the surrounding area into the shaft.

- Raise-boring
  - A 4.1 m vertical up cast ventilation shaft will be drilled to a depth of approximately 460 m for the North Shaft Phase 3 Ventilation Shaft. At first a 381 mm diameter hole will be drilled from the surface to the ventilation shaft position underground. The reamer head will then be attached to the drill steel at the bottom of the ventilation shaft underground. The raise bore machine slowly turns and pulls the reamer towards the surface. The drill chip (rock) will fall to the bottom of the shaft from where it will be removed by underground machines.
  - The internal surface of the ventilation shaft is sealed to minimize the ingress of groundwater into the shaft as it is established, and subsequently operated, whilst also minimising the potential for the shaft to impact on any abstraction boreholes located in close proximity in the area, if they had been identified, which they have not;
  - A pollution control dam will be constructed in close proximity to the raise boring machine in order to reuse the waste water from the raise boring machine and ensuring that no waste water will be discharged in to the immediate environment.
  - Material removed during the North Shaft Phase 3 Ventilation Shaft establishment will be managed within the existing BRPM mine residue management facilities. No additional drilling residue facilities will be required.
  - Electrical power to the underground services for the ventilation fans will be provided through a cable servitude drilled adjacent to the North Shaft Phase 3 Ventilation Shaft.
- Access Road
  - This process involves earthworks to remove the top clay layer of the access road in order to ensure that an all-weather road can be constructed. This access road will make use of existing tracks within the Robega community.

Table 10-2 describes and assesses the potential impacts associated with the construction activities of the proposed North Shaft Phase 3 Ventilation Shaft.

Table 10-2: Potential Impacts and mitigation measures associated with the construction activities of the North Shaft Phase 3 Ventilation Shaft

Potential Impact Description in terms of Environmental Aspects:		Potential Impact Rating						Mitigation/Management Measures	Mitigated Impact Rating					
		Se	Sp	Du	FoA	FoI	Signifi-cance		Se	Sp	Du	FoA	FoI	Signifi-cance
Socio-Economic	Temporary employment opportunities may arise during the construction period of the North Shaft Phase 3 Ventilation Shaft. No additional long-term employment opportunities will be created as a result of the construction of the ventilation shaft. However, in the absence of compliance with mining regulations, BRPM could be required to cease operations, with direct impact on the current, and potential future employees at BRPM. The BRPM mine will thus continue to operate as a result of the ventilation shaft.	3	3	4	4	4	**80 High (Positive impact)**	Implement BRPM's employment policies to ensure maximum benefits of employment opportunities and associated indirect economic benefits for the surrounding communities. Make use of local labour as far as possible.	3	3	4	4	4	**80 High (Positive Impact)**
	Accidents as a result of increased traffic in the area.	4	3	3	5	1	**60 Medium High**	Restriction of transport speed on surrounding roads without special covering to 20 km/h.	4	3	3	5	1	**60 Medium High**
Geology	No impacts anticipated on geology as a result of the establishment of the ventilation shaft.	1	1	2	1	5	**24 Low**	No management measures are recommended as the extent of this impact is localised and the impact has been rated to have a Low significance rating. During the drilling process various measures will also be implemented to stabilise the hole drilled.	1	1	2	1	5	**24 Low**
Topography	Temporary impact on topography due to operation of raise bore drill rig.	1	1	2	1	5	**24 Low**	Please refer to Visual Impact Mitigation measures listed below.	1	1	2	1	3	**16 Low**
Air Quality	Dust emissions associated with raise bore drilling. Dust emissions associated with vehicle movement with respect to site preparation and driving to and from drill sites.	1	1	2	2	4	**24 Low**	Regular irrigation by water of the site, access road and construction material and debris with just enough moisture to keep the dust down without creating runoff. The raisebore machine which will be used during construction, will make use of proper water management on the machine will assist to reduce the dust emission to a minimum Restriction of transport speed on surrounding roads without special covering to 20 km/h.	1	1	2	2	2	**16 Low**
	Methane gas explosion could potentially cause a fire	5	2	1	4	2	**48 Medium High**	When a methane pocket is intersected during drilling, the drilling operation is immediately stopped and the BRPM Ventilation Department is called out to conduct an assessment	5	1	1	3	2	**30 Medium Low**

Potential Impact Description in terms of Environmental Aspects:		Potential Impact Rating						Mitigation/Management Measures	Mitigated Impact Rating					
		Se	Sp	Du	FoA	Fol	Signifi-cance		Se	Sp	Du	FoA	Fol	Signifi-cance
								of the concentration of the methane. Drilling continues once the Ventilation Department declares the working area as safe.						
Soils, Land Use and Land Capability	Loss of soil resource due to land clearing and infrastructure establishment in areas.	1	1	2	1	5	**24 Low**	The area of impact will be kept to a minimum by keeping the footprint will as small as practically possible. Spill clean-up kits will be available on site to clean up spills. The stripping and stockpiling of topsoil and subsoil from the ventilation shaft footprint will be made available for use during the decommissioning and post closure phase of the project. Areas compacted as a result of construction activities will be ripped and scarified in order to allow for the re-vegetation of the disturbed surrounding areas.	1	1	1	1	4	**15 Low**
	Soil erosion at edge of drilling site and contamination due to spillages of oil, fuel and chemicals.	1	1	2	3	3	**24 Low**	Mitigation measures include the protection of the soils on the perimeter of infrastructure from mobilisation of contaminants. Sufficient spill kits will be made available at areas where possible hydrocarbon spills may occur.	1	1	2	1	1	**8 Low**
Biodiversity	Disturbance of vegetation and flora.	1	1	2	3	3	**24 Low**	Minimise the areas that are to be stripped of vegetation.	1	1	2	1	1	**8 Low**
Surface Water And Groundwater	The potential impact of increase soil erosion may occur as a result of surface water runoff.	1	1	2	3	3	**24 Low**	The footprint of the ventilation shaft construction areas will be minimised in order to reduce any possible impact. Ventilation shaft footprint areas will be free draining to ensure that the shaft do not affect the catchments yield. Ventilation shaft will be sealed to ensure minimal surface water entering the area. Clean water runoff will be separated from the run off within the catchment of the proposed ventilation shaft. Should erosion be evident, erosion control measure will be implemented. Sedimentation of nearby streams must be prevented.	1	1	2	1	1	**8 Low**
	Potential pollution of water resources resulting from contaminated runoff.	3	3	2	2	2	**32 Medium Low**	Dirty water runoff will be captured in order to prevent contaminated runoff reaching the Matlopyane stream. All hazardous substances will be stored in a bunded area with the capacity to store 110% of the contents volume.	1	3	2	2	2	**24 Low**
	Contamination of surface and ground water due to incorrect handling and disposal of waste materials, physical drilling process (sludge contains oils and greases) and oil leaks from drill rigs.	3	2	1	4	4	**48 Medium High**	Develop and implement controls to pick up oil/diesel leaks and spillages from hazardous waste. Bund chemical and hazardous waste storage areas.	2	1	1	4	1	**20 Low**

Potential Impact Description in terms of Environmental Aspects:		Potential Impact Rating						Mitigation/Management Measures	Mitigated Impact Rating					
		Se	Sp	Du	FoA	Fol	Signifi-cance		Se	Sp	Du	FoA	Fol	Signifi-cance
Noise	Noise impacts during site establishment and decommissioning activities. Noise impacts during drilling operations associated with the use of power tools, transformers and drill rigs.	1	1	2	2	4	**24 Low**	The fans associated with the ventilation shaft will be placed underground to further alleviate noise levels. Machinery with low noise levels to be used. Construction activities to take place during daytime period only (7H00-17H00). All employees working within the 10 m radius will wear noise protection. A 10 m radius from the raise boring drill rig will be fenced off, preventing any unauthorized access to the shaft. A register will be kept on site, whereby all issues and concerns raised by the community will be recorded. .	1	1	2	2	2	**16 Low**
Heritage	Disturbance of areas of Archaeological Importance	2	2	3	4	3	**49 Medium High**	If any human remains (or any other concentrations of archaeological heritage material) are exposed during construction, all work must cease and it must be reported immediately to the nearest museum/archaeologist or to the South African Heritage Resources Agency (SAHRA), so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from such an investigation.	1	1	2	2	2	**16 Low**
Visual	Visual impact associated with operation of raise bore drill rig in close proximity of Robega residents.	2	1	2	1	2	**15 Low**	Keep site neat and organised. Natural vegetation, wherever possible, must be retained within the mining area. The ventilation shaft cowl will be painted in a natural colour to blend in with the surrounding area. Area will be fenced off. Litter and dust management measures should be in place at all times.	1	1	1	1	1	**6 Low**
Vibration	No impacts associated with vibration are expected as no blasting activities will take place. Raise bore drilling methods will be used.	1	1	1	1	1	**6 Low**	No further mitigation required.	1	1	1	1	1	**6 Low**

10.2 Operation Phase

- Operation of the ventilation shaft and associated access road.

10.2.1 Operation of the ventilation shaft and access road

Activity: The ventilation shaft will operate 24 hours, 7 days a week to ensure fresh air is supplied to the underground workings. During the operational phase, maintenance activities at the ventilation shaft will be required.

Actions:

- Maintenance an monitoring of the ventilation shaft; and
- Utilization and maintenance of the access road to the ventilation shaft.

Table 10-3 illustrates and assesses the potential impacts resulting from the operational phase of the proposed North Shaft Phase 3 Ventilation Shaft.

Table 10-3: Potential impacts and mitigation measures associated with the operation of the ventilation shaft and use of the access road.

Potential Impact Description in terms of Environmental Aspects:		Potential Impact Rating						Mitigation/Management Measures	Mitigated Impact Rating					
		Se	Sp	Du	FoA	FoI	Signi-cance		Se	Sp	Du	FoA	FoI	Signi-cance
Socio-Economic	No additional long-term employment opportunities will be created as a result of the construction of the ventilation shaft. However, in the absence of compliance with mining regulations, BRPM could be required to cease operations, with direct impact on the current, and potential future employees at BRPM. The BRPM mine will thus continue to operate as a result of the ventilation shaft.	3	3	4	4	4	**80 High (Positive impact)**	No additional mitigation measures.	3	3	4	4	4	**80 High (Positive Impact)**
Geology	No impacts anticipated on geology as a result of the establishment of the ventilation shaft.	1	1	2	1	5	**24 Low**	No management measures are recommended as the extent of this impact is localised and the impact has been rated to have a Low significance rating.	1	1	2	1	5	**24 Low**
Topography	Temporary impact on topography due to operation of raise bore drill rig.	1	1	2	1	5	**24 Low**	Please refer to Visual Impact Mitigation measures listed below.	1	1	2	1	3	**16 Low**
Air Quality	No air quality impacts are anticipated as this is a downcast ventilation shaft, which allows the passage of air from surface to flow into the mine.	1	1	1	1	1	**6 Low**	No additional mitigation measures required.	1	1	1	1	1	**6 Low**
Soils, Land Use and Land Capability	Loss of soil resource due to land clearing and infrastructure establishment in areas.	1	1	2	1	5	**24 Low**	The area of impact will be kept to a minimum by keeping the footprint will as small as practically possible. The stripping and stockpiling of topsoil and subsoil from the ventilation shaft footprint will be made available for use during the decommissioning and post closure phase of the project. Areas compacted as a result of construction activities will be ripped and scarified in order to allow for the re-vegetation of the disturbed surrounding areas.	1	1	1	1	4	**15 Low**
		1	1	2	3	3	**24 Low**	Mitigation measures include the protection of the soils on the perimeter of infrastructure from mobilisation of contaminants. Sufficient spill kits will be made available at areas where possible hydrocarbon spills may occur.	1	1	2	1	1	**8 Low**
Biodiversity	Disturbance of vegetation and flora.	1	1	2	3	3	**24 Low**	Minimise the areas that are to be stripped of vegetation.	1	1	2	1	1	**8 Low**

Potential Impact Description in terms of Environmental Aspects:		Potential Impact Rating						Mitigation/Management Measures	Mitigated Impact Rating					
		Se	Sp	Du	FoA	Fol	Signifi-cance		Se	Sp	Du	FoA	Fol	Signifi-cance
Surface Water And Groundwater	The potential impact of increase soil erosion may occur as a result of surface water runoff.	1	1	2	3	3	**24 Low**	The footprint of the ventilation shaft construction areas will be minimised in order to reduce any possible impact. Ventilation shaft footprint areas will be free draining to ensure that the shaft do not affect the catchments yield. Ventilation shaft will be sealed to ensure minimal surface water entering the area. Should erosion be evident, erosion control measure will be implemented.	1	1	2	1	1	**8 Low**
Noise	Noise impacts during operation of the ventilation shaft.	1	1	2	2	2	**16 Low**	The fans associated with the ventilation shaft will be placed underground to further alleviate noise levels. A 10 m radius from the raise boring drill rig will be fenced off, preventing any unauthorized access to the shaft. A register will be kept on site, whereby all issues and concerns raised by the community will be recorded. .	1	1	1	1	1	**6 Low**
Heritage	Disturbance of areas of Archaeological Importance	1	1	2	2	2	**16 Low**	No additional mitigation measures required.	1	1	2	2	2	**16 Low**
Visual	Visual impact associated with operation of raise bore drill rig in close proximity of Robega residents.	2	1	2	1	2	**15 Low**	Natural vegetation, wherever possible, must be retained within the mining area. The ventilation shaft cowl will be painted in a natural colour to blend in with the surrounding area. Area will be fenced off.	1	1	1	1	1	**6 Low**
Vibration	No impacts associated with vibration expected.	1	1	1	1	1	**6 Low**	No further mitigation required.	1	1	1	1	1	**6 Low**

10.3 Closure and Rehabilitation Phase

The main activity that will take place during this phase of the project is the demolition and removal of the ventilation shaft infrastructure. The potential impacts associated with closure activities are similar to the anticipated impacts to occur during the construction. The impacts and mitigation measures have been dealt with during the discussions of the construction activities and will not be recaptured in this section, only references will be made where applicable.

10.3.1 Demolition of ventilation shaft

The following activities will be associated with the demolition of the ventilation shaft:

- Demolish and remove all infrastructure not required post-closure, this will include the cement base of the ventilation shaft as well as the surface infrastructure;
- Seal ventilation hole with concrete plug;
- Establish vegetation on the disturbed area;
- Compacted clay in the base of the facility will be ripped to loosen compaction and to promote re-vegetation.

Potential Impacts and Mitigation Measures: It is anticipated that the potential impacts of this activity in the rehabilitation phase will be the same as the anticipated impacts listed in the construction phase. Therefore it is recommended that the mitigation/management measures applicable to the construction of the ventilation shaft, are implemented.

10.3.2 Demolition of general mining and project related infrastructure

The following activities will be associated with the demolition project related infrastructure:

Roads

- Roads not needed for closure and post-closure uses at the site will be closed by ripping compacted surfaces, re-grading as needed to promote proper surface drainage, covered with growth media where needed and re-vegetated.

Other Infrastructure

- All power and water services to be disconnected and certified as safe prior to commencement of any demolition works;
- Salvageable equipment will be removed and transported offsite prior to the commencement of demolition;
- All above ground electrical, water and other service infrastructure and equipment to be removed and stored at designated salvage yards;
- Electrical, water and other services that are more than 500 mm below ground surface will remain;
- All pipes and structures deeper than 500 mm need to be sealed to prevent possible ingress and ponding of water.
- Concrete slabs and footings will be removed to a depth of 500 mm below ground surface. This concrete (and metal) will be broken up and disposed of in the designated landfill.
- All concrete below 500 mm depth will remain underground with the invert of all structures broken/sealed to prevent possible ingress and ponding of water.
- Topsoil to be replaced at the following thicknesses, depending on final planned land capability:
    - Arable – 750 mm;
    - Grazing – 250 mm;
    - Wilderness – 100-250 mm.

- Establish appropriate vegetation.

Potential Impacts and Mitigation Measures: It is anticipated that the potential impacts of this activity in the rehabilitation phase will be the same as the anticipated impacts listed in the construction phase. Therefore it is recommended that the mitigation/management measures applicable to the construction phase are implemented.

10.3.3 Contaminated soils

During Post Closure, any contaminated soils found on site will be dealt with as follow:

- Undertake soil investigations to characterise the nature of possible contaminants and design a site specific soil remediation strategy. Identify appropriate risk based guideline levels against which to assess contamination. As a point of departure the guidelines given in the National Framework for the Management of Contaminated Land (DEA, 2010) will be used
- If contamination is primarily hydrocarbon, with soil concentrations exceeding an appropriate risk based guideline, the following will be undertaken:
    - Volumes less than 100 m^3 – On site bioremediation will be undertaken by collecting the affected soils and transporting them to a dedicated bioremediation.
    - Volumes greater than 100 m^3 – Disposal at hazardous landfill site
- If contamination primarily inorganic a risk based approach will be adopted in determining final soil remediation technology adopted. Options available include:
    - Isolation by installation of physical barrier;
    - Immobilisation by either pH or redox adjustment;
    - Extraction through enhancing solubility and then extracting contaminated solution; and
    - Removal and disposal at a suitable alternative site, such as placement on Tailings Storage Facility.
- Where risk based assessment indicates that residual contamination is unlikely to present an unacceptable human or ecological risk, contaminated soils to be covered with a soils suitable as a plant growth media and vegetation established. These areas to be clearly demarcated as areas not for use by local communities.

10.3.4 Post Closure Phase

This is a period of maintenance and monitoring of the various structures and infrastructure closed in the phase described above. It is not anticipated that any significant impacts will arise during this period.

11 Environmental Management Programme

This section describes the management programme of the propose development in accordance with Section 39(4)(a)(iii) and (3)(d) of the MPRDA, read in conjunction with Regulation 50 (e)(f) and (i) and Regulation 51(b)(i) and (ii)

Table 11-1: Project Specific mitigation and management commitments

Ref no	Measure, criteria or principles	Phase
	Socio-Economic	
1.	Implement BRPM's employment policies to ensure maximum benefits of employment opportunities and associated indirect economic benefits for the surrounding communities.	C/D
2.	Make use of local labour as far as possible.	C/D
	Geology	
3.	No management measures are recommended as the extent of this impact is localised and the impact has been rated to have a Low significance rating. During the drilling process various measures will also be implemented to stabilise the hole drilled.	N/A
	Topography	
4.	No mitigation measures are required as no impact is anticipated (please refer to visual impact mitigation measures).	N/A
	Air Quality	
5.	Air Quality affected by the establishment of North Shaft Phase 3 Ventilation Shaft will be mitigated and managed according to established construction activity management controls applied by BRPM for their existing ventilation shafts.	C/O/D
6.	Should excessive dust occur as a result of construction activities, water carts will be used to wet the area.	C/D
7.	Speed limits will be enforced at 20 km/h on the access road to the ventilation shaft.	C/O/D
8.	Construction material and debris will be kept wet with just enough moisture to keep the dust down without creating undue runoff.	C/D
9.	Vehicle and machinery will be maintained regularly to ensure that emissions are minimised.	C/O/D
	Soils, Land Use and Land Capability	
10.	Soils, land Use and land capability affected by the establishment of North Shaft Phase 3 Ventilation Shaft will be mitigated and managed according to established construction activity management controls applied by BRPM for their existing ventilation shafts.	C/D
11.	The project footprint area will be fenced and secured prior to construction commencing. No disturbance will take place beyond the footprint area of the North Shaft Phase 3 Ventilation Shaft project footprint area. Appropriate drainage infrastructure will be established to drain clean run-off away from the project area, and minimise and contain dirty run-off arising within the project footprint area.	C/O/D
12.	Soil will be stripped only from all areas to be disturbed. Topsoil should be stripped appropriate to the depth to facilitate the laying of the foundations	C/D

Ref no	Measure, criteria or principles	Phase
	and civil works for the drilling rig and subsequent ventilation shaft super-structure. Topsoil and subsoil will be stockpiled for use during rehabilitation	
13.	Stockpiling areas will be identified and marked on a plan.	C
14.	Equipment movement on the soil stockpiles will be limited to avoid topsoil compaction.	C/O/D
15.	Stockpiles will be established within the bounds of storm water management infrastructure and outside potential drainage paths.	C
16.	No waste material (domestic or industrial) will be placed on the soil stockpiles.	C/O/D
17.	Clean and dirty water separation and compliance with Regulation 704 of the NWA will be upheld as necessary.	C
18.	Spillages of oil, grease and hydraulic fluids will be cleaned up by removing the affected soil and disposing it at an appropriate facility.	C/D
19.	The stripping and stockpiling of topsoil and subsoil from the ventilation shaft footprint will be made available for use during the decommissioning and post closure phase of the project.	C/D
20.	Areas compacted as a result of construction activities will be ripped and scarified in order to allow for the re-vegetation of the disturbed surrounding areas.	C/O/D
21.	Demolish and remove all infrastructure not required post-closure, this will include the cement base of the ventilation shaft as well as the surface infrastructure	D
22.	Compacted clay in the base of the facility will be ripped to loosen compaction and to promote re-vegetation.	D
	Biodiversity	
23.	Minimise the areas that are to be stripped of vegetation.	C/O/D
24.	No hunting activities will be practised by the construction workers. Any animal purposefully killed by an employee will result in disciplinary action.	C/D
25.	Seal ventilation hole with concrete plug to ensure no animals become trapped.	D
26.	Establish vegetation on the disturbed area.	D
	Surface Water	
27.	Surface water affected by the establishment of North Shaft Phase 3 Ventilation Shaft will be mitigated and managed according to established construction activity management controls applied by BRPM for their existing ventilation shafts.	C
28.	Clean and dirty water separation and compliance with Regulation 704 of the National Water Act will be upheld as necessary.	C/O/D
29.	During the construction phase appropriate temporary stormwater infrastructure will be implemented	C/D
30.	During earthworks, a bund will be placed at the lowest portion of the site. This will allow any runoff to settle and the clean water will discharge to the environment.	C/D
31.	All surface water management infrastructure constructed from soil will be inspected on a monthly basis, with more frequent inspections during periods of high rainfall and after major rain events. If any of the inspections identify eroded areas, these will be repaired before the next inspection.	C/O/D

Ref no	Measure, criteria or principles	Phase
32.	Oil and diesel spills will be reported and cleaned up timeously.	C/D
33.	Oil and diesel will be stored in areas that are bunded to collect 1.25 times the volume of the storage facility or 110% the volume of the largest tank where more than one tank is included in a bunded area.	C/D
34.	Sufficient toilets will be provided for the construction staff (one toilet for 15 staff members). These will be located within the disturbed (i.e. footprint) area. Contract conditions will include the provision of adequate chemical toilets for the contract staff.	C/D
35.	Incidents relating to the contamination of surface water will be communicated to BRPM Management and then reported to DWA, depending on significance and risk rating.	C/D
	Groundwater	
36.	Groundwater affected by the establishment of North Shaft Phase 3 Ventilation Shaft will be mitigated and managed according to established construction activity management controls applied by BRPM for their existing ventilation shafts.	C/D
37.	The surface concrete works to locate the drilling rig, and subsequently house the canopy of the ventilation shaft will be appropriately engineered and sealed to prevent the ingress of rainwater into the shaft as it is developed and subsequently operated, according to established construction activity management controls applied by BRPM for their existing ventilation shafts.	C
38.	The interior of the ventilation shaft will be sealed to minimize ingress of ground water	C
	Noise	
39.	Noise affected by the establishment of North Shaft Phase 3 Ventilation Shaft will be mitigated and managed according to established construction activity management controls applied by BRPM for their existing ventilation shafts.	C/O/D
40.	All noise emitting equipment will be well maintained in good working order.	C/D
41.	Regular maintenance schedules will include the checking and replacement if necessary of intake and exhaust silencers.	C/D
42.	Any significant changes in the noise emission levels of equipment will serve as a trigger to withdraw that equipment for maintenance checking.	C/D
43.	The access road leading to the shaft to be maintained in a good order.	C/O/D
44.	Mufflers on engine exhausts and compressor components will be installed.	C/D
45.	Ventilation fans will be placed underground, only the exit canopy will be on surface.	C
46.	Construction will preferably take place from 06:00 to 20:00 with specialist construction such as continuous concrete pouring possibly taking place during the hours of darkness.	C/D
47.	All employees working within the 10 m radius will wear noise protection.	C/O/D
48.	A 10 m radius from the raise boring drill rig will be fenced off, preventing any unauthorized access to the shaft.	C/D
	Heritage	
49.	If any human remains (or any other concentrations of archaeological heritage material) are exposed during construction, all work must cease and it	C

Ref no	Measure, criteria or principles	Phase
	must be reported immediately to the nearest museum/archaeologist or to the South African Heritage Resources Agency (SAHRA), so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from such an investigation.	
	Visual	
50.	Visual aspects affected by the establishment of North Shaft Phase 3 Ventilation Shaft will be mitigated and managed according to established construction activity management controls applied by BRPM for their existing ventilation shafts.	C/D
51.	The surface ventilation cone will be painted a natural green, stone or sky blue colour depending on the background.	C
52.	Litter and dust management measures will be in place at all times.	C/D
53.	Natural vegetation, wherever possible, must be retained within the mining area.	C/O/D
	Waste Management	
54.	Waste Management required for the establishment of North Shaft Phase 3 Ventilation Shaft will be mitigated and managed according to established construction activity management controls applied by BRPM for their existing ventilation shafts.	C/D
55.	Domestic waste generated on the proposed site will be collected by the BRPM Mine waste contractor and disposed at the BRPM landfill site.	C/D
56.	Industrial waste will be taken by the BRPM Mine waste contractor to the BRPM Mine salvage yard for sorting and disposal or sale/reuse.	C/D
57.	Litter bins are to be provided and should be emptied when full for removal to a general waste facility.	C/D
58.	Contaminated construction waste and clean construction waste will be dealt with separately, to be removed to a registered waste disposal site.	C/D
59.	Oils, greases etc will be collected and segregated in temporary storage facilities prior to disposal at a suitable facility.	C/D
60.	General waste will be sorted into domestic waste, wood and steel.	C/D
61.	Care will be taken to ensure that scrap metal does not become polluted or mixed with any other waste.	C/D
	Interested and Affected Parties	
62.	I&AP affected by the establishment of North Shaft Phase 3 Ventilation Shaft will be consulted according to established communication procedures applied by BRPM for their existing stakeholder engagement.	C/O/D
63.	A complaints register will be made available on site during the construction phase of the project. Complaints will be dealt with swiftly and appropriately.	C/O/D
64.	Contractors will receive basic training in environmental awareness.	C/O/D
65.	Contractors will ensure proper supervision of employees at all times and undertake regular inspections of the workplace, enforce the wearing of safety equipment/clothing and ensure compliance with all relevant rules and procedures.	C/D

Ref no	Measure, criteria or principles	Phase
	Performance Assessment	
66.	Performance Assessments will be undertaken according to established auditing and monitoring protocols applied by BRPM for their existing construction and operational activities.	C/D
67.	BRPM will undertake an assessment of this EMP on a weekly basis.	C/D
68.	All management commitments will be implemented by a competent and qualified person.	C/O/D
69.	The land owner will be kept appraised of the progress of the project, and any reportable incidents or accidents.	C/D

12 Monitoring and EMP Performance Assessment

This section describes the monitoring and EMP performance assessment process in fulfilment of Regulation 50(h) and 51(b)(iv) of the MPRDA.

Air quality, noise monitoring and surface/ground water monitoring will be undertaken through the existing monitoring programme in place for BRPM. Additional information is available from the adjacent BRPM Styldrift Merensky Phase 1 project and will be sought as deemed necessary.

A formal audit of the performance assessment of the EMP will take place every two years as stipulated in Regulation 55 (2)(b) of the MPRDA, or at any period as required by the Minister.

13 Environmental Objectives and Goals

The Section describes the environmental objectives and goals in fulfilment of Regulation 51(a) of the MPRDA.

The BRPM will strive to achieve the following environmental objectives and goals

- Contribute to ecological sustainable development as embodies I the Industrial Environmental Forums Code of Conduct and its own Environmental Policy;
- The project manager during the construction phase of the mine and subsequent new mine management will also be committed to these objectives;
- The mine will further adhere to, and implement the “Best Practicable Environmental Option (BPEO)” principle in all decisions concerning the environment;
    - The BPEO principle requires that environmental objectives are to be achieved using the procedure or means that is most beneficial or least damaging to the environment, at acceptable cost, as a whole in the long term as well as the short term.
- It is an expressed objective of the BRPM to return the land capability at the end of mine life to, as far as practicable, its original state. It is also an expressed objective to as far as practicable minimise any negative environmental impact during construction, the operational phase and at closure.
- Promote environmental awareness amongst all employees, contractors and partners through appropriate training and on-going awareness programmes so as to achieve the agreed objectives and targets;
- Design, construct and operate our facilities in such a manner as to mitigate and manage environmental impacts. This will incorporate the development and implementation of appropriate environmental management programmes;
- Minimise and manage the generation of waste and recycle waste products wherever technically and economically feasible;
- Optimise water utilisation;
- Make this policy available to the public and consult with all interested and affected parties where needed;
- Comply with all applicable legislation and other requirements;
- Conduct periodic audits and reviews to ensure continuous improvement in performance.

An EMP has been compiled for the North Shaft Phase 3 Ventilation Shaft specifically and is present in Section 11 with specific objectives, in line with meeting the aims above of:

- Ensuring compliance with environmental legislation;
- Managing identified impacts;
- Providing a reference by which future audits can be assessed.

13.1 Environmental Impact Management

For the North Shaft Phase 3 Ventilation Shaft specifically, negative environmental impacts will be managed and mitigated and positive impacts will be enhanced through the implementation of the EMP.

BRPM is responsible for ensuring that all environmental obligations relevant to the North Shaft Phase 3 Ventilation Shaftare met. The implementation of the Environmental Management Programmes and the meeting of environmental objectives and targets is also a responsibility of the BRPM.

The implementation of the environmental management measures will also be monitored through internal annual EMP assessments and external EMP Performance Assessment once every two years.

13.2 Mine Closure

13.2.1 Closure Vision

A closure vision has not been developed for the BRPM mine. This will be conducted once closure planning has is undertaken. IT would be premature to formulate a vision for the current project. After an assessment of other EMP's compiled for the BRPM, the vision is likely to consider the following elements:

- Sustainability
- Consideration for both internal and external health and safety;
- Consideration of potential post closure infrastructural uses by 3rd parties;
- Optimisation of potential to utilise closed areas commensurate with pre-mining land use and land capability;
- Residual risks are minimised.

13.2.2 Closure Objectives

As with the closure vision, the closure objective for the mine has not been developed. The following closure objectives have been sourced from existing EMP's for BPRM. The general objectives for closure that are reported in these EMP are that:

- The objective of the management of the mine will be to, as far as practicable, rehabilitate concurrently with the operation of the project to prevent excessive cost at the cessation of operations.
- The environmental impacts at the completion of mining should be minimised inter alia through applying the Best Practicable Environment Option principle. All rehabilitation and residual environmental impacts after mining has ceased must be reasonably acceptable to all parties concerned;
- Rehabilitation will be conducted in accordance with the appropriate sections of the BRPM's EMPR and in Accordance with the MPRDA, and rehabilitation being undertaken to the satisfaction of the Director: DMR;
- Areas occupied by infrastructure will be restored to pre-mining land capabilities, where possible;
- Rehabilitation standards will be such that runoff from rehabilitated areas can be regarded as uncontaminated and that infiltration through disturbed strata to groundwater will be minimised;
- No open voids or depressions facilitating the pooling of water will remain following closure;
- No allowance (discount) will be made for material that may be sold as scrap, working plant or facilities that may be transferred to a third party (e.g. offices buildings etc.).

13.2.3 Financial Provision for Closure

The Closure Cost Assessment for the North Shaft Phase 3 Ventilation Shaftspecifically is attached in Appendix E. These liabilities have been determined using the methodology of the Department of Minerals and Energy (DME – now the Department of Mineral Resources) 2005 Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine". Rates that have been used are those published in the guideline, but inflated at the Consumer Price Index (CPI) published by Stats SA.

The closure liabilities for the North Shaft Phase 3 Ventilation Shaft specifically will amount to R102,272.49 (excluding VAT).

This closure liability will be reviewed and appropriately updated during the annual review of mine closure costs for BRPM as a whole.

14 Environmental Emergencies and Remediation Procedures

This section describes the environmental emergency and remediation procedures applicable to the proposed project in fulfilment of Regulation 51(b)(iii) of the MPRDA.

14.1 Emergencies

The existing environmental emergency procedures as drafted for BRPM operations will be adhered to where applicable to the North Shaft Phase 3 Ventilation Shaft. These procedures are updated on a continual basis in alignment with the BRPM Environmental Management System (EMS).

14.2 Remediation

The management commitments as stipulated in Section 11 of this report will address the potential environmental impacts during all the different project phases.

15 Environmental Awareness Plan

This section describes the environmental awareness plan applicable to the proposed project in fulfilment of Section 39(3)(c) of the MPRDA and read in conjunction with Regulation 51(vi and (vii).

The North Shaft Phase 3 Ventilation Shaft will utilize the existing BRPM Environmental Awareness Plan.

16 Undertaking to Comply with the Provisions of the Act

I _____, the undersigned and duly authorised by Royal Bafokeng Platinum (Pty) Ltd, herby undertake to give effect to every undertaking contained in Section 48 and 11 of this document, and accept full responsibility therefore.

Signed at _____on this _____day of _____20__.

_____

Witnesses:

1._____ 2._____

_____ _____

APPROVAL

Approval in terms of the provisions of the Mineral and Petroleum Resources Development Act (Act No 28 of 2002) (MPRDA)

Signed at _____on this _____day of _____20__.

_____

Director

Region: _____

17 Conclusions and Recommendations

SRK Consulting has undertaken an EIA and EMP for the North Shaft Phase 3 Ventilation Shaft in accordance with the requirements of the MPRDA. This has included a public participation process.

The significant positive impact of the proposed project in ensuring a safe working environment for the underground miners and the sustainability of the BRPM mine is identified. There are no serious negative impacts that have been identified for the proposed North Shaft Phase 3 Ventilation Shaft.

An EMP has been developed as part of this EIA to ensure the mitigation of identified impacts. It is anticipated that it will be possible to successfully mitigate all the potential negative impacts to acceptable levels and the implementation will be monitored and audited to determine its effectiveness.

It is recommended that the North Shaft Phase 3 Ventilation Shaft is authorised to proceed, given the significant positive Occupational Health and Safety compliance, socio-economic benefits and the small potential contribution of the project to cumulative impacts (given appropriate environmental management).

Prepared by

Andrew Caddick/Dr. Laetitia Coetser

Environmental Scientist

Reviewed by

Dr. Andrew Wood

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

18 References

ACOCKS, J.P.H. 1988. Veld types of South Africa (3rd edn.). Memoirs of the Botanical Survey of South Africa No 28. Government printer, Pretoria.

BRYSZEWSKI, W. AND J. VISSER. 2004. Air quality management in the North West Province of South Africa – A successful partnership with industry, INFACON X: Transformation through Technology, ISBN: 0- 9584663-5-1, Cape Town

CAWTHORN, R.G., H.V. EALES, F. WALRAVEN, R. UKEN AND M.K. WATKEYS, 2006, Chapter 11: The Bushveld Complex in Johnson, M.R., C.R. Anhaeusser and R.J. Thomas (eds.), 2006, The Geology of South Africa, GSSA, Council for Geoscience

CPOETZEE, F.P. 2012. Cultural Heritage Survey of the Proposed New Ventilation Shaft Phase 3 Project, Bafokeng Rasimone Platinum Mine, North West Province. Department of Anthropology & Archaeology University of South Africa.

DEAT. 2002. Integrated Environmental Information Management, Information Series 2 :Scoping. DEAT, Pretoria

DEAT. 2002. Integrated Environmental Information Management, Information Series 3 :Stakeholder engagement. DEAT, Pretoria

DEAT. 2002. Integrated Environmental Information Management, Information Series 3 :Stakeholder engagement. DEAT, Pretoria

DEA (2010), Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 5, Department of Environmental Affairs.

DEA (2010), Public Participation, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs.

DRA MINING. (2011). Process Plant Upgrade Feasibility Study: Hazop study briefing note. Royal Bafokeng Platinum.

EVANS, R., & MNISI, N. 2006. Semane Consulting Engineers (Pty) Ltd. Environmental Impact Assessment / Environmental Management Programme Report for the Styldrift Project. Volume 1 and 2.Ref No. 117-GEN-005-0001/11-10-06.

HEYMANN, E.F., 1997, Environmental Management Programme for the proposed new Bafokeng-Rasimone Platinum Mine on the farm Boschkoppie 104JQ required in terms of Section 39 of the Minerals Act, Act 50 of 1991, Amplats

LOW, A.B. & REBELO, A.G. (1998) Vegetation of South Africa, Lesotho and Swaziland. Department of Environmental Affairs and Tourism, Pretoria.

NORTH WEST PROVINCIAL GOVERNMENT (NWPG), 2002, North West Province State of the Environment Report.

NORTH WEST PROVINCIAL GOVERNMENT (NWPG), 2003, Rustenburg Strategic Environmental Assessment.

NORTH WEST PROVINCIAL GOVERNMENT (NWPG), 2011, North West Mining and quarrying report, accessed on 03/07/2012. [Web]: http://www.nwpg.gov.za/transport/nwftd/nw/industries/mining_quarrying/index_xml.html

RUTHERFORD, M.C., MUCINA, L., LÖTTER, M.C., BREDENKAMP, G.J., SMIT, J.H.L., SCOTT-SHAW, C.R., HOARE, D.B., GOODMAN,P.S., BEZUIDENHOUT, H., SCOTT, L. & ELLIS, F. Savanna Biome. In: MUCINA, L. AND RUTHERFORD, M.C. (editors) in press. Vegetation map of

South Africa, Lesotho and Swaziland: an illustrated guide. Strelitzia xx, South African National Biodiversity Institute, Pretoria

ROYAL BAFOKENG PLATINUM (RBP), 2010, RBP Geology, accessed on 03/07/2012. [Web] http://www.bafokengplatinum.co.za/b/geology

SOUTH AFRICA.1998. National Environmental Management Act (Act No. 107, 1998).Pretoria: Governmental Printer.

SOUTH AFRICA.1998. Environmental Conservation Act (Act No.73 of 1989). Pretoria: Governmental Printer.

SOUTH AFRICA 1996. The constitution of the Republic of South Africa (Act no 108 of 1996) Pretoria: Governmental Printer.

SOUTH AFRICA.1998. National Environmental Management: Waste Act (Act No. 59 of 2008).Pretoria: Governmental Printer.

SOUTH AFRICA.1998. South African Heritage Resources Act (Act No. 107, 1998).Pretoria: Governmental Printer.

STATISTICS SOUTH AFRICA. 2011. Key municipal data. Accessed on 03/07/2012. [Web]: http://www.statssa.gov.za/community_new/content.asp?link=interactivedata.asp

VAN DER MERWE, B. 2012. Environmental Authorisation for Royal Bafokeng Management Services (Pty) Ltd Noise Impact Assessment North Shaft Phase 3. dBAcoustics.

VAN DER MEULEN, F. 1979. Plant sociology of the western Transvaal Bushveld, South Africa. A syntaxanomic and synecological study. Dissertationes Botanicae 49: 1–234.

WESTHOFF, V. & VAN DER MAAREL, E. 1978. The Braun-Blanquet approach. In: Whittaker, R.H. (ed.) Classification of plant communities. W. Junk, The Hague.

WINDFINDER, 2011, Wind & weather statistic Rustenburg, accessed on 02/07/2012. [Web]: http://www.windfinder.com/windstats/windstatistic_rustenburg.htm

WIKIPEDIA, 2011, BushveldIgneous Complex. Access on 03/07/2012. [Web]: http://en.wikipedia.org/wiki/Bushveld_Igneous_Complex.

WORLDWEATHERONLINE, 2011, Rustenburg Weather, South Africa Weather Averages, accessed on 02/07/2012. [Web]: http://www.worldweatheronline.com/weather-averages/South-Africa/2610093/Rustenburg/2620149/info.aspx

ZEEMAN, D.J. 2012. Report: Ground Vibration levels from Raise Boringf or Royal Bafokeng Platinum Mine NorthShaft, Phase III Project Replacement Project. Blast Management and Consulting. Ref. No.: SRK~RBPM Phase 3 Vent~120120.

Appendices

Appendix A: Project Experience

Appendix B: CV's of the Project Team

Appendix C: Specialist Statements

Appendix D: Comments and Response Report

Appendix E: Financial Provisions

Appendix F: BRPM SHE Policy

SRK Report Distribution Record

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