ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED EVEREST NORTH PLATINUM MINE

VOLUME 1 OF 2 – EIA & EMP

AQUARIUS LTD (PTY)

DEPARTMENT OF MINERAL RESOURCES
REF: MP30/5/1/2/2/1034PR

DECEMBER 2012

Digby Wells & Associates (Pty) Ltd. Co. Reg. No. 1999/05985/07. Fern Isle, Section 10, 359 Pretoria Ave Randburg Private Bag X10046, Randburg, 2125, South Africa
Tel: +27 11 789 9495, Fax: +27 11 789 9498, info@digbywells.com, www.digbywells.com

This document has been prepared by **Digby Wells Environmental**.

Report Title: **Everest North Platinum Mine EIA & EMP - MPRDA**

Project Number: **SYL1256**

Name	Responsibility	Signature	Date
Hendrik Kruger	Report Writer		27 November 2012
Johan Hayes	Project Manager		30 November 2012
Bradly Thornton	MANCO Review		2 December 2012

EXECUTIVE SUMMARY

Aquarius (Pty) Ltd (Aquarius, previously known as Sylvania) is applying for a Mining Right on the farm Vygenhoek near Lydenburg in the Thaba Chweu Local Municipality. The Environmental Impact Assessment (EIA), Environmental Management Programme (EMP) and associated specialist studies have been conducted in support of the Mining Right Application (MRA) for the open cast and underground mining of platinum at the proposed Everest North Platinum Mine.

The UG2 Reef in the Bushveld Complex commonly comprises 'Leader' and an underlying 'Main' chromitite seams. The Leader seams are thin, measuring from 5cm to 15cm apart and the underlying Main seam by similar widths of pyroxenite. The Main seam normally is a more massive chromitite seam measuring 30cm to 80cm.

The Everest North deposit will be mined using an open pit as well as an underground mining method. The orebody is characterised by a semi-circular strike layout with a section of the orebody's dip greater than 10 degrees with a maximum dip of approximately 18 degrees. Initially, an open pit mining method will be used to mine the reef outcrop and up to a depth of 75m, thereafter, underground mining will take place. The grade of the ore is not influenced by the dip of the reef, but rather by the internal waste parting.

The open pit will utilize a conventional opencast truck and shovel mining philosophy. Two different mining methods were identified for different areas within the underground mining section. A bord and pillar mining method will be applied in areas where the reef dip is less than 10 degrees, and a hybrid method will be applied in steeper sections where the reef dip is above 10 degrees. All the development and mining will be done on reef, with the exception of the return airway ventilation holes. Ore produced by the mine will be processed at the existing Everest South UG2 concentrator plant. An upgrade of the front end of the plant may be required to blend the ore from Everest South with that of Everest North after accounting for the metal content in each. Co-processing of the ores will result in co-deposition of the mine residue on the existing Everest South mine residue disposal facilities.

A mining right for a period of 12 years is currently being applied for. Rehabilitation and final closure will be as specified in the final EMP to be submitted to the DMR indicated in section 13.

Digby Wells Environmental (Pty) Ltd have conducted necessary social and environmental studies in order assess the impacts on the physical, biological and social environments within the proposed mining area. The impacts that mining is expected to have on these different environments have been assessed using a detailed quantitative impact assessment methodology.

From the impact assessment, it was determined that the most significant effects will be from activities during site clearing, formation of the initial boxcut and the removal of overburden. The aspects that will be impacted the most if not carefully managed will be fauna and flora and heritage and archaeology, followed by visual and aquatic impacts.

Mitigation measures and monitoring programs were generated and are included to assist in minimising and avoiding the negative impacts and maximising the benefits of the proposed mining operation. Aquarius will need to implement the associated EMP as well as additional operating procedures to ensure that the potential impacts are controlled, monitored and prevented where possible.

Aquarius will need to implement the draft management plan included within this document as well as additional operating procedures and management plans in order to ensure that the potential impacts are controlled, monitored and prevented if possible. It needs to be ensured that the management plan is communicated to all levels of employees including contractors that will be working on the mine. The environmental management plan needs to be implemented throughout the life of mine. Annual performance assessments of the Everest North Mine to their environmental management plan must be undertaken to access compliance.

From the information gathered during the EIA process it can be concluded that the proposed mine's overall impact on the natural environment will be of a medium significance. If all the mitigation measures, management and monitoring procedures recommended in this report are adhered to, these impacts may be reduced.

This EIA and draft EMP was compiled in support of a mining right application for the proposed Everest North Platinum Mine. The aim of the EIA process and the related studies is to provide adequate information to the decision makers in order to make an informed decision on the way forward.

However due to the existing knowledge gaps and work currently being undertaken, as contained in Section 7, it is recommended that the current knowledge gaps be investigated and once the commitments are fulfilled, an amended report be submitted to the DMR for consideration.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PLANS

Content of Volume 2

A. Public Supporting Documents
B. Surface Water Study
C. Traffic Report
D. Archaeology & Heritage Study
E. Financial Provisions
F. Consultation between Aquarius and the Public

LIST OF ABBREVIATIONS

°C	Degrees Celsius
ADT	Average Daily Traffic
AMD	Acid Mine Drainage
AQIA	Air Quality Impact Assessment
ASAPA	Association for Southern African Professional Archaeologists
BIC	Bushveld Igneous Complex
BID	Background Information Document
DJF	During summer
DMR	Department of Mineral Resources
DO	Dissolved Oxygen
DWA	Department of Water Affairs
EC	Electric conductivity
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Programme
ETAP	Environmental Training and Awareness Plan
Fa	Fractured aquifer
FEPA	Freshwater Ecological Priority Areas
Fa-f	Fractured aquifer in the presence of fractures
FRAI	Fish Response Assessment Index
g/t	Grams per tonne
HGM	Hydro-geomorphic

I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IHAS	Index of Habitat Integrity
IHI	Invertebrate Habitat Assessment
IWULA	Integrated Water Use License Application
JJF	During winter
LHD's	Load-Haul-Dumpers
LoM	Life of Mine
m	Metres
MAM	During autumn
mamsl	Metres above mean sea level
MAP	Mean annual precipitation
m bgl	Metres below ground level
MDEDET	Mpumalanga Department of Economic Development, Environment and Tourism
MPRDA	Minerals and Petroleum Resources Development Act (Act 29 of 2002)
mbgl	Metres below ground level
Mg/L	Milligram per litre
MRA	Mining Right Application
m/s	Metres per second
MTPA	Mpumalanga Tourism and Parks Agency
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008)

NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
PCD	Pollution Control Dam
PES	Present Ecological State
PPP	Public Participation Process
RE	Remaining Extent
RHP	River Health Programme
RoM	Run of Mine
SAHRA	South African Heritage Resources Agency
SANS	South African National Standards
SASS5	South African Scoring System for invertebrates
SAWS	South African Weather Service
SLP	Social and Labour Plan
SON	During spring
t	Tonnes
t/m³	Tonnes per cubic metre
TDS	Total Dissolved Solids
VAC	Visual absorption capacity
Wa	Weathered aquifer

PART I: INTRODUCTION

1 BACKGROUND

Digby Wells Environmental (Digby Wells) has been appointed as the independent environmental consultant to conduct an Environmental Impact Assessment (EIA) and associated specialist studies in support of a Mining Right Application (MRA) for the open cast and underground mining of platinum at the proposed Everest North Platinum Mine. Aquarius is applying for a mining right on the farm Vygenhoek 10 JT near Lydenburg in the Thaba Chweu Local Municipality, Mpumalanga. The proposed life of mine (LoM) is 12 years.

In compliance with the Mineral and Petroleum Resource Development Act, Act 28 of 2002 (MPRDA), a scoping report was submitted to the Mpumalanga Department of Mineral Resources (DMR) on 24 July 2012. Following a public review period of 40 days, the draft EIA report was compiled including comments received during the scoping phase.

In addition to the MPRDA, the EIA and associated Environmental Management Programme (EMP) for the proposed Everest North Mine are compiled in accordance with the following legislation and licensing requirements:

- Listed activities as contained in the EIA Regulations GN543, 544 and 545 in accordance with the National Environmental Management Act (NEMA), Act 108 of 1998;
- National Water Act (NWA) Act 36 of 1998 in support of an integrated water use license application (IWULA); and
- National Environmental Management Waste Act (NEMWA), Act 59 of 2008 in support of an integrated environmental management waste license.

This report will address the EIA requirements as outlined by the MPRDA. The format of this report based on the requirements in the Regulations as well as report templates issued by the DMR. The objectives of this EIA report are to:

- Describe the EIA process;
- Provide information on the proposed project to authorities;
- Provide information on the consideration of alternatives;
- Indicate how authorities and interested and affected parties were afforded the opportunity to contribute to the project;
- Describe the baseline environment; and
- Describe potential impacts of the project and the mitigation measures to address these impacts.

1.1 Project location

Aquarius is planning to develop a new platinum mine on the farm Vygenhoek 10 JT near Lydenburg, Mpumalanga Province. The proposed project, called Everest North Mine, will be located within the Groot Dwars River valley, approximately 28 km north east Roossenekal and 30 km west of Lydenburg (Plan 1)

1.1.1 Local setting

The property under consideration is the following portions of the farm Vygenhoek 10 JT (Plan 2):

Table 1-1: Farm options applicable to the proposed project

Farm Name and Portion	Infrastructure
Vygenhoek Portion 3	Mining
Vygenhoek Portion 7	Mining
Vygenhoek Portion 2	Access Road
Vygenhoek Portion 4	Access Road
Vygenhoek Portion 5	Access Road
Vygenhoek Portion 8	Access Road

1.1.2 Surrounding mining activities

There is no presence of mining activities within the vicinity of the project area; however, mining is present 10 km to the north-west, and 11 km to the south.

1.2 Land tenure

Landowner information of the farm portions constituting the proposed project area is indicated in Table 1-2 and Plan 3.

Table 1-2: Land Ownership details

Farm Name and Portion	Land Owner
Vygenhoek Portion 3	Claimant Applicant is M.S. Choma [1]

[1] The details of the land claim will be confirmed through the receipt of the title deeds of the property. As a matter of importance, M.S. Choma was consulted throughout the process and will be provided the opportunity to register as Interested and Affected Party (I&AP) as part in the Public Participation Process (PPP) so that his rights are acknowledged and considered in line with the recognised processes.

Farm Name and Portion	Land Owner
Vygenhoek Portion 7	Republic of South Africa
Vygenhoek Portion 2	Republic of South Africa
Vygenhoek Portion 4	Republic of South Africa
Vygenhoek Portion 5	Republic of South Africa
Vygenhoek Portion 8	Mr Anton Charl le Roux

1.3 Applicant details

The full particulars of the applicant are as follows:

Full name: Aquarius Platinum SA (Pty) Ltd

Contact person: Mr Jac van Heerden

Telephone No.: +27 (0) 11 880 3924

Facsimile No.: +27 (0) 11 880 3788

Physical address: Farm 304JQ
Waterval Road
Off Kroondal Village
NWP

Postal address: PO Box 624
Kroondal
0350

Plan 1: Regional Setting

Plan 2: Local Setting

Plan 3: Land Tenure

1.4 Project description

1.4.1 UG2 Reef

The UG2 Reef in the Bushveld Complex commonly comprises ‘Leader’ and an underlying ‘Main’ chromitite seams. The Leader seams are thin, measuring from 5cm to 15cm apart and the underlying Main seam by similar widths of pyroxenite. The Main seam normally is a more massive chromitite seam measuring 30cm to 80cm.

The UG2 Reef as found in the Everest North Project area is mainly developed in two distinct reef types. The first type of occurrence is a composite chromitite band where the Leader seams and Main seam are not separated. In these areas, the distinction between the Leader seam and Main seam can only be distinguished based on grades and the Pt: Pd ratio in the individual samples. The second type of occurrence is where UG2 chromitite has been split by an internal waste parting which reaches thicknesses of up to 6.78m.

The development of the internal parting is not necessarily at the position of the “stratigraphic” boundary between the Leader and Main Seam, but can occur anywhere within the UG2 chromitite. For this reason it is chosen to refer to this reef as a split reef type with an Upper and Lower chromitite unit (Figure 1-1).

The Vygenhoek UG2 resource has the form of a half ellipse as the UG2 resource is bisected by the Vygenhoek-Mareesburg property boundary line. At its widest point, the UG2 resource on the Everest North project area has a width of 630m East-West and 1.7km North-South.

The maximum depth of the base of the UG2 reef was recorded with the depth of the base of the UG2 reef recorded at 141.29m. The depth below surface contours of the top of the UG2 reef reached a maximum depth at 140m approximately in the middle of the UG2 resource along the farm boundary. The average thickness of the UG2 reef (including internal waste parting) is 1.67m.

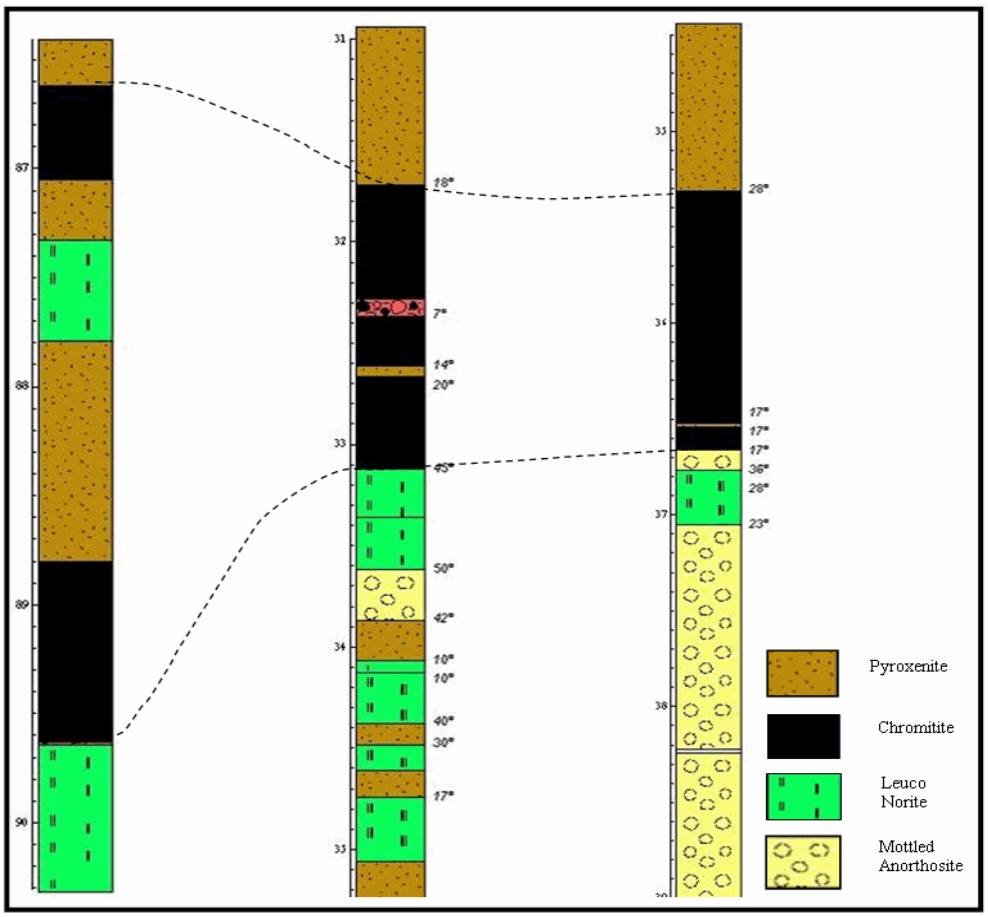

Figure 1-1: Different Reef Facies as Seen in the Exploration Boreholes

1.4.2 Mineral Resource Estimate

The updated mineral resource estimate is presented in Table 1-3 below. The Mineral Resource estimate is stated exclusive of dyke and pothole volumes and external dilution, and inclusive of internal waste dilution. The geostatistically estimated SG's are utilized for tonnage estimations.

Table 1-3: Mineral Resource Estimate

Resource Blocks	Width	SG	4E (g/t)	Mt	MOz
0m - 10m	1.60	3.73	5.16	0.464	0.077
10m - 30m	1.64	3.72	5.18	0.598	0.100
30m - 50m	1.74	3.73	5.13	0.664	0.109
Deeper than 50m	1.68	3.72	5.10	1.958	0.321
TOTAL	**1.67**	**3.72**	**5.13**	**3.684**	**0.607**

1.4.3 Mining Method

1.4.3.1 Overview

The Everest North deposit will be mined using an open pit mining method, as well as an underground mining method. The orebody is characterised by a semi-circular strike layout with a section of the orebody's dip greater than 10 degrees with a maximum dip of around 18 degrees. Initially, an open pit mining method will be used to mine the reef outcrop and up to a depth of 75m, thereafter underground mining will take place. The grade of the ore is not influenced by the dip of the reef, rather by the internal waste parting.

1.4.3.2 Open pit mining

Initially, the Everest North resource will be exploited using an open pit mining method. The open pit will utilize a conventional opencast truck and shovel mining philosophy. The opencast mining will include the following steps:

- Removal of topsoil and storing it at a designated position
- Stripping of overburden. Drilling and blasting will be required to break the hard overburden. The waste will be used to fill a previous void created in the mining process, or storing it at the waste dump, separate from the topsoil, for later use to backfill the pit.
- Drilling and blasting of the ore.
- Loading and hauling of the ore for stockpiling at the Run-of-Mine (ROM) pad or for transport to the plant

The proposed mining direction strategy is to mine from north to south past the portal position, and then south to north, backfilling the mined out area in the process. The ore will be stockpiled on a ROM pad and transported to the processing plant by surface trucks. The open pit mining activities shall be performed by an open it mining contractor. A 24 hours a day, 7 days a week operating cycle will be adopted. The open pit mining layout is illustrated in Plan 4.

1.4.3.3 Open Pit Design Criteria

The open pit was designed to have an overall slope angle of 52° (to be confirmed by geotechnical investigations). The open pit will produce 27 000 tonnes (t) per month of run of mine (RoM) ore. An average *in-situ* ore density of 3.72 t/m³ was used, as reported in the mineral resource estimate.

1.4.3.4 Open Pit Optimisation

An assumption was made that underground mining would not occur in any areas shallower than 75m from surface measured to vertical height.

1.4.4 Underground Mining

1.4.4.1 Mining Method Selection

Two different mining methods were identified as suitable for different areas within the underground mining section. The criterion used to select each mining method was based on the dip of the ore body. The mining methods to be applied are:

- Bord and Pillar, and
- Hybrid Mining

Bord and pillar mining method will be applied in areas where the reef dip is less than 10 degrees, and a hybrid method will be applied in steeper sections where the reef dip is above 10 degrees. All the development and mining will be done on reef, with the exception of the return airway ventilation holes.

1.4.4.2 Main Access Design and Layout

The following factors were considered when selecting the portal position:

- Quick access to areas with high grade ore in order to maximise early returns on investment;
- Ensuring access to the deepest point of the project area, found at 141.29m below surface; and
- Minimising the sterilisation of high grade ore through pillars.

The lowest access point of the ore body is on the northern side of the lease area, and is also aligned to the deepest part of the ore body underground. Therefore, the portal to the underground workings is designed on the northern end of the ore body in order to minimise highly diluted primary development.

The main access development consists of a 3 barrel decline cluster. A 35 m wide portal will be developed from the pit highwall. From the portal, the 3 barrel decline system will be developed on dip and will serve as access to the underground workings, consisting of the Conveyor Belt and Services decline, TME decline, and Men and Material decline. The main access development is illustrated in Figure 1-2.

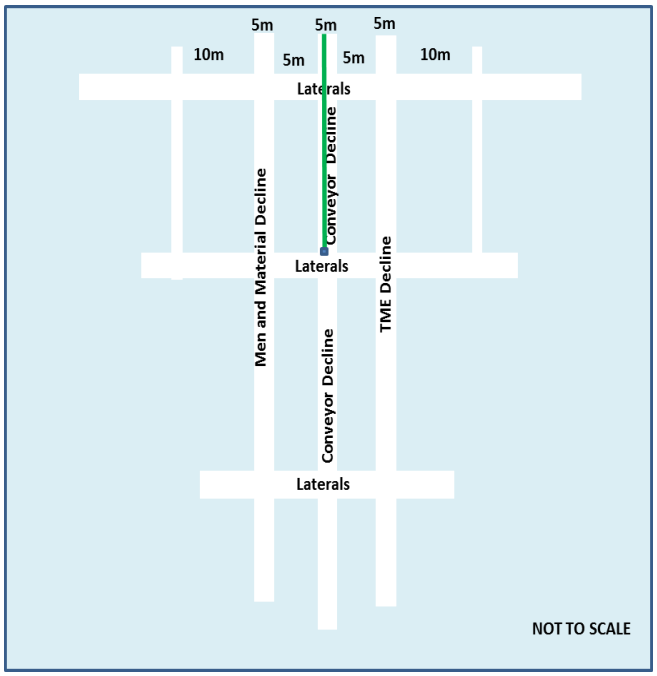

Figure 1-2: Main underground access layout

The three declines are provided to accommodate a dedicated trackless vehicle access; a dedicated walkway for personnel, and the main conveyor and services decline. The main conveyor and services decline will be equipped with the following:

- Main conveyor belt system;
- Main pumping column;
- Compressed air column;
- Service water and potable water column; and
- Electrical cables and communication lines.

The declines will be developed using handheld rock drills at a development rate of 40m per month per system advance. Laterals are developed at 45m interval in order to maximise ventilation flow and aid in development cleaning. Pillars of 5m width separate the declines, and 10m wide barrier pillars are left on either side of the declines to ensure stability. The current design is based on the use of a main conveyor belt to transport the ore from underground to surface.

1.4.4.3 Bord and pillar mining

The bord and pillar section is divided into the north and the south sections, on either side of the decline cluster. The reef dips between 0 - 10 degrees and has an average channel width of 1.7m. Access to the underground section will be through the main access development with a 3 barrel decline system. Both the north and south sections consist of 3 levels. The levels are spaced at approximately 105m on dip and shall consist of 6 bords of 10m wide. The bord and pillar design criteria is summarised in Table 1-4.

Table 1-4: Bord and pillar design criteria

Description	Width	Height
Declines	5m	2.5m
Strike Drives	5m	2.5m
	Units	**Size**
Bord and Pillar	m	15m (centre - to - centre)
Minimum Pillar Size	m	5m on strike and 5m on dip
Bord Width	m	10
Holing	m	8
No. of Panels per Section	number	6
Section Length on Dip	m	105
Bord and Pillar Stoping Width	m	IF (CW<1.8, SW=2) IF (CW>1.8, SW=CW+0.2)
Mining Rate	tpm/crew	6,750

In bord and pillar mining, cleaning will be done by means of Load-Haul-Dumpers (LHD's). The LHD's will clean the blasted face; haul the material for tipping onto a conveyor belt. The conveyor belt will transport the material to surface either for stockpiling on the ROM pad or for transport to the plant. The ore will be transported to the processing plant by means of trucks. Auto-rock drills will be used in drilling and installation of support. The bord and pillar layout is illustrated in the Figure 1-3.

1.4.4.4 Hybrid Mining

The hybrid mining method will be applied in areas where the reef dip is greater than 10°. The average channel width for these areas is 1.5m, with the reef dip not exceeding 18 degrees. Access to the hybrid sections is via the bord and pillar section through strike drives. Where major changes in the strike direction occurs, footwall connections to the bord and pillar sections were designed in order to gain access to the hybrid sections. The hybrid mining layout is illustrated in Figure 1-4.

Single strike drives will be developed and equipped with strike belts for the hybrid section. These belts will in turn connect to the bord and pillar strike belts, which connect to the main dip conveyor. From the strike drives, raise lines will be developed at a spacing of 150m on strike, with back lengths of approximately 120m on average. Each stope will have 8 panels on average. The mine design criteria for the hybrid section is summarised in Table 1-5.

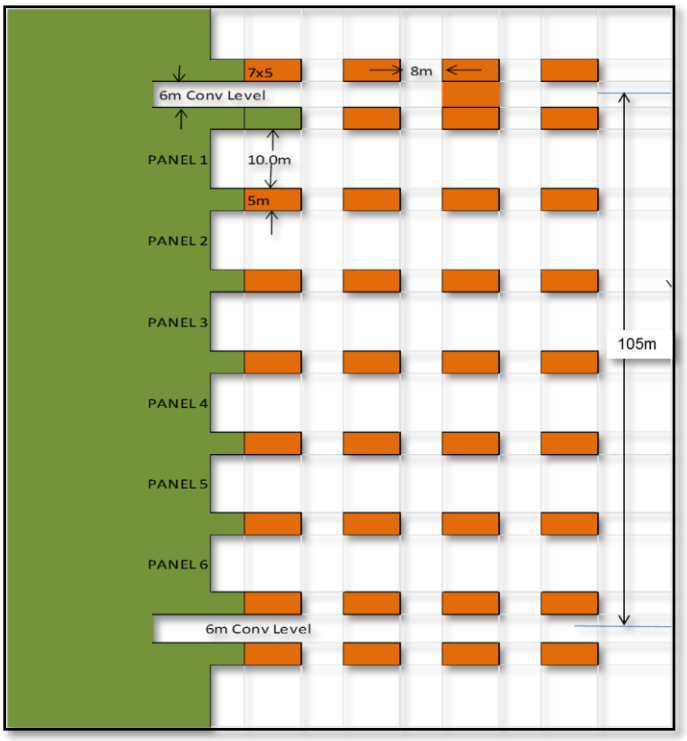

Figure 1-3: Bord and pillar layout

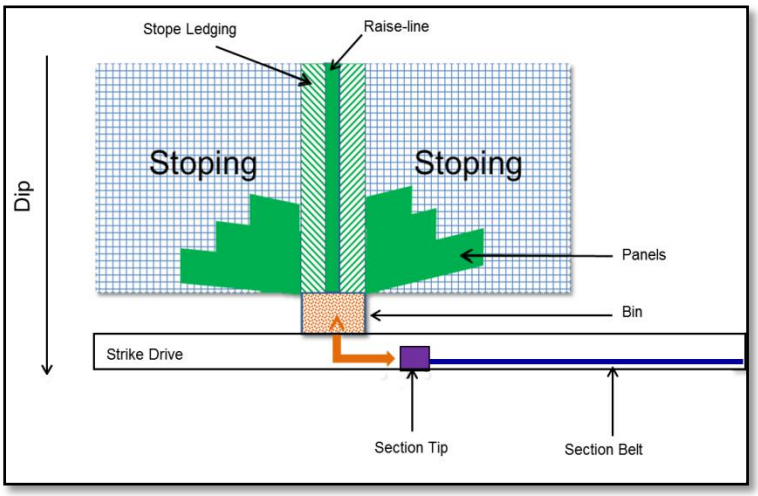

Figure 1-4: Hybrid mining layout

Table 1-5: Hybrid mining design criteria

Description	Width(m)	Height(m)
Strike Drives	5	2.5
Raise/Winze	1.5	2.4

Description	Width(m)	Height(m)
ASG	1.5	2.4
Description	**Units**	**Qty**
Raise lines spacing	m	150
Back length	m	120 average
Hybrid stoping width	m	IF (CW<1.8, SW=CW+0.2)
Hybrid Stope panel length	m	26
Ventilation holes	m	8

Drilling will be done by means of hand held rock drills and Auto-rock support rock drills will be used to install support. Scraper winches will be used to clean the blasted rock from the face into the gully, and from the gully into the raise. A raise winch will in turn clean the material from the raise down into a mucking bay, situated at the bottom of the raise.

From the mucking bay, the material will be loaded using a LHD, and tipped onto a strike conveyor belt. The material will then be transferred to surface via the main conveyor belt (on dip), either for stockpiling on the ROM pad or for direct transport to the plant via surface trucks.

The equipment lists consists of the following: rock drills, pumps, LHD's, scraper winches, and fans. Access development and stoping in the section will be mined using hand held rock drills. Cleaning will be done by means of LHD's or a combination of scrapers and LHD's. A main dip conveyor belt was selected as means to transport the ore from underground to surface. A trade off study comparing trucks with a conveyor system will be conducted during the next study phase of the project in order to determine the optimal means of ore transport.

1.4.5 LoM Production Scheduling

Various key parameters were used as constraints to achieve the life of mine schedule and are:

- A constant supply of 27 00 tpm ore feed to the plant;
- A stockpile capacity equivalent to four months of production; and
- The underground mine access development is scheduled to commence 12 months prior to the depletion of the open pit ore reserves.

1.4.5.1 Open pit scheduling

Open pit mining was scheduled to commence in July 2013. A pre-strip period of 3 months was allowed for topsoil and overburden removal in order to open up sufficient ore reserves to ensure a constant supply of ore to the plant. Any ore that is mined during the pre-strip period will be stockpiled. The open pit scheduling results are summarised in the Table 1-7.

1.4.5.2 Underground scheduling

Underground mining was scheduled such that it commences a year prior to the completion of the open pit. This is done in order to allow for the development of the underground sections to ensure a constant supply to the plant once the open pit reserves have been depleted. The underground scheduling results are summarised in the Table 1-7.

1.4.5.3 Life of mine schedule

A summary of the scheduling results and the mill feed over the life of mine is provided in Table 1-9.

1.4.6 Reserve Estimation

The Everest North deposit has a high quality in-situ resource of 3.68Mt at an average 4E grade of 5.13g/t. The resource to a potential mineable reserve conversion was calculated by applying the following modifying factors to the measured resource to produce a potential mineable reserve as outlined in Table 1-6.

Open Pit Mining

- Overall slope angle: 52°; and
- Average stripping ratio.

Underground Mining

- Bord and Pillar: minimum stoping width of 2.0m;
- Hybrid: minimum stoping width of 1.5m;
- Geological losses: 15%;
- Pillar losses: 25%;
- Dilution: 10%;
- Mine call factor: 95%; and
- Mining cut: IF CW<1.8, then SW = 1.8 OR IF CW>1.8, then SW = CW +0.2.

Table 1-6: Mineable reserves

Mining Area	Width (m)	SG (t/m³)	4E (g/t)	Tonnes	Ounces
Open pit	1.72	3.72	4.32	2,699,963	349,100
Underground	1.71	3.72	3.54	1,578,471	179,811
Total	**1.71**	**3.72**	**4.04**	**4,278,434**	**555,038**

Table 1-7: Open pit scheduling

Data Field Name	Units	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Ore Tonnes	kTon	162	324	324	324	324	324	324	324	270	**2,699**
4E Grade	g/t	4.41	4.48	4.44	4.41	4.05	4.13	4.73	4.55	3.64	**4.32**
Waste Tonnes	kTon	296	860	1,910	14,964	2,901	2,642	11,351	3,035	674	**38,633**
Stripping Ratio	t/t	1.83	2.66	5.90	46.19	8.95	8.15	35.03	9.37	2.50	**14.3**
TOTAL TONS	**kTons**	458	1,184	2,234	15,288	3,225	2,966	11,675	3,359	944	**41,333**

Table 1-8: Underground scheduling

Data Field Name	Units	2020	2021	2022	2023	2024	2025	Total
Development Tonnes	kTon	35	21	29	27	8.8		**121,911**
Development Meters	M	1,350	958	1,144	1,326	564		**5,342**
Stoping Tonnes: Bord and Pillar	kTon	97	291	184	11			**583,986**
Stoping Width: Bord and Pillar	M	2.3	2.6	2.1	2.0			**2.4**
Stoping Tonnes: Hybrid	kTon			140	140	325	267	**872**
Stoping Width: Hybrid	M			1.7	1.7	1.7	1.7	**1.7**
Centares	m^2	15,318	33,561	47,882	26,264	52,582	41,454	**217,061**
Ave. Channel Width	M	2.0	2.2	1.5	1.5	1.5	1.5	**1.7**

Data Field Name	Units	2020	2021	2022	2023	2024	2025	Total
Tramming Width	M	2.6	2.9	2.2	2.1	1.9	1.9	**2.3**
Total ROM Tonnes		133	313	352	179	333	267	**1,578**
4E Grade	g/t	2.95	2.61	3.27	4.00	4.36	3.96	**3.54**

Table 1-9: Life of mine schedule

Data Field Name	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	LOM Total
Open Pit Ore Tons (kTon)	162	324	324	324	324	324	324	324	270					**2,699**
Underground Ore Tons (kTon)								133	313	352	179	333	267	**1,578**
Total Ore Tonnes (kTon)	162	324	324	324	324	324	324	457	583	352	179	333	267	**4,278**
4E Grade (g/t)	4.41	4.48	4.44	4.41	4.05	4.13	4.73	4.08	3.08	3.27	4.00	4.36	3.96	4.04
Waste Tonnes (Mt)	0.296	0.860	1.9	15	2.9	2.6	11.3	3	0.674					**38.6**
TOTAL TONS (Mt)	0.458	1.2	2.2	15.3	3.2	2.9	11.7	3.5	1.3	0.353	0.178	0.333	0.268	**42.9**
Stripping Ratio (t/t)	1.8	2.7	5.9	46.2	9.0	8.2	35.0	9.4	2.5					**14.3**

1.4.7 Processing

Ore produced by the mine will be processed at the existing Everest South UG2 concentrator plant. An upgrade of the front end of the plant may be required to blend the ore from Everest South with that of Everest North after accounting for the metal content in each. Co-processing of the ores will result in co-deposition of the mine residue on the existing Everest South mine residue disposal facilities.

The project will investigate the feasibility of expanding these facilities for the combined future requirements of Everest North and Everest South, while confirming an alternative site for final deposition. The project will describe the supporting services and facilities for the Everest North mine only, as it is assumed that existing facilities and infrastructure at the Everest South concentrator plant will remain largely unaffected.

1.4.8 Infrastructure

Other associated support facilities identified to date include:

- temporary construction facilities and infrastructure;
- waste management: temporary handling and storage of general and hazardous waste, on-site change houses/ablution facilities with sewage treatment plant, possible incinerator for treating sewage screenings;
- surface water management: water supply dams, mine residue facility return water dams, pollution control dams, clean and dirty storm water controls, river crossings;
- storage and handling of hazardous substances: fuel, lubricants, various process input chemicals, raw material stockpiles/bunkers, gas, burning oils, explosives;
- services: power lines, pipelines, conveyors, roads, telephone lines, communication and lighting masts, helipad;
- security and access control;
- lay down and storage yard areas;
- compressor house;
- stores, lamp rooms, workshops and wash bays;
- offices, control rooms;
- contractor camps; and
- medical station.

The exact placement of infrastructure has not been identified however, a preliminary mine plan indicating the proposed mining areas and access road are indicated in Plan 4.

Plan 4: Mine Plan

1.4.9 Waste Disposal

Waste rock from the open pit will be used for backfilling and rehabilitating the open pit. The remaining waste rock from the open pit and that from the development of the underground mine will be stockpiled on site and used for construction and/or the rehabilitation of areas such as screening berms, roads and the tailings dam. The option of a dedicated waste rock dump is also being considered.

It is proposed that there will be a sewage treatment facility located on site to cater for the proposed project. This plant will emit an inert and safe waste product in small quantities which can be stockpiled or returned to the environment. There could also be an incinerator located at the sewage treatment plant for treating sewage screenings. The location, design and capacity of this facility will be determined during the planning and design phase of the project.

The types of waste that will be generated by the project include: hazardous industrial waste (such as packaging for hazardous materials, used oil, grease), general industrial waste (such as scrap metal and building rubble) and domestic waste (such as packaging and office waste). These wastes will be temporarily handled and stored on site before being removed for recycling by suppliers, reuse by scrap dealers or final disposal at permitted waste disposal facilities. No on-site landfill (waste disposal) facilities are planned. A waste management procedure will be developed for these wastes.

1.4.10 Open cast mining

A strip mining approach will be followed. Topsoil, overburden and excess rock will be removed and stockpiled adjacent to the pit. Ore will be blasted, stockpiled and loaded onto trucks. Mined ore will be transported to the concentrator plant and stockpiled on site. On an ongoing basis the open pit will be backfilled and rehabilitated by replacing the rock followed by the subsoil followed by topsoil.

The open pit operation will extend along the outskirts of the ore body on the farm Vygenhoek (approximately 5 km of the strike). The current plan is to start the open pit mine in the south and advance to the north over a one year period. The approximate depth of the proposed pit will be 70 m.

1.4.11 Underground mining

There will be two declines to access the underground workings. The declines will be placed in the initial open pit boxcut. The underground mine will extend in a northerly direction to the boundary of the Vygenhoek farm. Ore and waste will be separated underground. Ore will be transported to the run-of-mine stockpile via trucks.

1.4.12 Road Infrastructure

From a regional perspective there are two main access roads. These are the R557 between Roosenekal and Steelpoort and the R577 between Roosenekal and Lydenburg. The following roads feed the proposed project area: the Oshoek gravel road off the R577, and a

second gravel road that leads from the Oshoek gravel road onto the farm Vygenhoek and onto the project site. This second gravel road will need to be upgraded to cater for the proposed project.

Aquarius also proposes to construct an access road that will traverse portions 2, 4, 5 and 8 of the farm Vygenhoek.

1.4.13 Electricity Requirements and Supply

Additional power supply is required for the proposed Everest North Mining Project. It is proposed that power will be supplied from the Everest South mine via a new overhead line to the project site. The new overhead line will form part of a separate EIA process.

1.4.14 Water Supply

It is proposed that water for the project will be sourced either from local/regional boreholes, groundwater inflows into the workings, rainfall inputs to the pits, De Hoop dam, Lebalelo Pipeline, or a combination of the above. Both potable and process water will be needed for the operations throughout the Life of Mine.

Water management facilities for the control of storm water and for pollution prevention such as water supply dams, mine residue facility, return water dams, pollution control dams, clean and dirty storm water controls and river crossings will be designed to meet the requirements of relevant legislation. Recycling dirty/process water is a priority.

One or more stream diversions (of non-perennial streams) may be required depending on the final infrastructure layout and the layout of the proposed opencast mining section.

1.4.15 Employment Opportunities

It should be noted that Everest North's workforce will be composed primarily of independent contract workers. These employees will be permanently employed with the contracting company. Cumulatively, the project will employ approximately 620 contractor staff during the development and construction phase. The contractors have not been formally appointed and will be responsible for the development of their Human Resources. It is therefore necessary that these contractors adhere to the activities set out in the Everest North SLP and that contract agreements be entered into to reflect these undertakings.

1.5 Legal Framework

1.5.1 Mineral and Petroleum Resources Development Act, 2002 (Act No.28 of 2002) (MPRDA)

A Mining Right Application (MRA) has been submitted to the DMR, Mpumalanga Province in terms of the MPRDA. The scoping report was submitted to the DMR in April 2012. This Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP) has been compiled and a draft is to be submitted to the DMR on 6 December 2012. This report however has significant gaps, as indicated in section 7. It is recommended that these gaps are addressed prior to authorisation of the mining right.

1.5.2 National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Associated EIA Regulations (GNR. 543 of 18 June 2010)

In terms of the NEMA, authorisation is required for listed activities in terms of Section 24 (2) and 24 (D) Listing Notice 2 (R544 and R545). The application was submitted to the MDEDET after which it was assigned with the reference number Ref No 17/2/3/E-100. Table 1-10 is the listed activities applied for in the application.

Table 1-10: List of NEMA activities applied for

Regulation Number	Activity Number	Description of activity
R 544; 18/06/2010	9	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or stormwater – (i) with an internal diameter of 0.36 metres or more, or (ii) with a peak throughput of 120 litres per second or more
R 544; 18/06/2010	10	The construction of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.
R 544; 18/06/2010	12	The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more
R 544; 18/06/2010	13	The construction of facilities or infrastructure for the storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres
R 544; 18/06/2010	20	Any activity requiring a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002, or the renewal thereof
R 544; 18/06/2010	22	The construction of a road outside urban areas (i) with a reserve wider than 13.5 metres; (ii) (ii) where no reserve exists where the road is wider than 8 metres;
R 545; 18/06/2010	3	The construction of facilities or infrastructure for the storage or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres
R 545; 18/06/2010	5	The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of the national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No 544 or included in the list of waste management activities in terms of section 19 of the NEMWA
R 545; 18/06/2010	6	The construction of facilities or infrastructure for the bulk transportation of dangerous goods (iii) in solid form, outside an industrial complex, using funiculars or conveyors with a throughput capacity of more than 50 tons per day

Regulation Number	Activity Number	Description of activity
R 545; 18/06/2010	15	Physical alternation of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more.

1.5.3 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA)

A Waste Management License Application in terms of the NEMWA will be submitted to the MDEDET.

1.5.4 National Water Act, 1998 (Act No. 36 of 1998) (NWA)

An IWULA will be submitted to the DWA for applicable activities in terms of Section 40 of the NWA. The water uses will be identified following site investigations. An Integrated Waste and Water Use Licence Management Plan (IWWMP) will be prepared in accordance with the NWA, which will describe the waste and water uses for which the mine is applying, and the impacts on the surrounding environment. All registered interested and affected parties (I&APs) will be notified of the IWULA process once the Application has been submitted to the relevant authorities and the necessary documentation will be made available to the public for comment.

PART II: ENVIRONMENTAL IMPACT ASSESSMENT

IN COMPLIANCE WITH SECTION 39 OF THE MINERALS AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA).

2 REGULATION 50(A)

(a) An assessment of the environment likely to be affected by the proposed mining operation, including cumulative environmental impacts

2.1 Baseline environment

2.1.1 Climate

The Everest North project area is located on the eastern escarpment on the border of the Highveld and Northern Transvaal climatic zones (Schulze, 1974). Shadow effects are likely to affect microclimate, especially in winter, by reducing temperature and increasing moisture holding capacity on southern slopes. In summer, elevated areas are frequently exposed to mist that accompanies the inflow of moist air from the Indian Ocean. Rain falls in the area in the form of showers and thunderstorms and mostly between October and March. Temperatures are mostly moderate, with a mean temperature of about 15°C. However, summer temperatures have been known to exceed 30°C on occasion.

2.1.1.1 Precipitation

Historical monthly rainfall statistics in the vicinity of proposed mining development were obtained from three weather stations that had records and are situated near the project area: the De Kafferskraal Weather Station (WD 0554280), located 9 km South of the project area at 25˚10’ South and 30˚10’ East; the Maarteenshoop Weather Station (WD 0593419), located 7 km North East of the project area at 24˚59’ South and 30˚14’ East; and the Lydenburg Weather Station (WD 0554816), located 31 km East of the project area at 25˚00’ South and 30˚28’ East. It was found that the rainfall in the vicinity of the proposed mine is similar to that in Maarteenshoop, which has the longest rainfall record of the three weather stations (71 complete years). A summary of the mean monthly and mean annual rainfall at the stations is given in Table 2-1, Table 2-2 and Table 2-3.

Table 2-1: Average monthly rainfall in the region of the Project at the nearest SAWS stations.

	STATIONS		
Station name	**De Kafferskraal**	**Lydenburg**	**Maarteenshoop**
SAWS Station No.	0554280 W	0554816 W	0593419 W
Latitude	25°10’ S	25°06’ S	24°59’ S
Longitude	30°10’ E	30°28’ E	30°14’ E
Altitude (m)	1814	1412	1408
Length of record	1982 - 1994	1960 – 2000	1909 - 2000

	RAINFALL (mm)		
January	123.3	137.8	113.8
February	91.8	78.1	89.1
March	80.0	75.0	81.8
April	35.0	47.5	45.8
May	12.9	16.0	15.0
June	9.8	5.9	6.0
July	4.1	5.5	5.9
August	12.8	10.1	7.6
September	18.5	24.6	21.8
October	59.9	66.1	60.3
November	103.4	126.3	116.3
December	141.0	118.4	122.2
Annual	**692.6**	**711.3**	**685.4**

Table 2-2: Rainfall in the region of the Project – De Kafferskraal SAWS weather station (1982 to 1994).

	Mean days of rain	Maximum 24-hour rainfall (mm)		Maximum and minimum total per month / Year (mm)			
		mm	Date	Maximum	Year	Minimum	Year
January	9.8	64	1987/01/19	196	1984	41	1994
February	9.3	75	1985/02/08	189	1985	41	1984
March	7.6	53	1991/03/15	182	1991	14	1992
April	5.2	38	1990/04/24	97	1990	3	1986
May	1.9	21	1983/05/27	68	1983	0	1991
June	1.5	19	1991/06/20	39	1991	0	1992
July	0.9	15	1984/07/22	38	1984	0	1993
August	1.5	32	1987/08/25	47	1987	0	1991
September	2.6	35	1984/09/13	72	1987	0	1990
October	8.2	37	1992/10/01	103	1984	0	1988
November	10.4	49	1985/11/24	185	1983	32	1992
December	12.7	49	1990/12/15	198	1991	31	1984
Annual	**74**	**75**	**1985/02/08**	**861**	**1989**	**565**	**1992**

Table 2-3: Rainfall in the region of the Project – Maarteenshoop SAWS weather station (1909 to 1998).

	Mean days of rain	Maximum 24-hour rainfall (mm)		Maximum and minimum total per month / Year (mm)			
		mm	Date	Maximum	Year	Minimum	Year
January	8.0	111	1934/01/14	447	1923	0	1962
February	6.0	255	1939/02/04	366	1939	0	1933
March	5.9	76	1931/03/01	220	1914	0	1966
April	3.8	93	1938/04/02	169	1938	0	1997
May	1.7	53	1914/05/22	109	1196	0	1998
June	0.7	44	1942/06/01	0	1998	0	1998
July	0.7	58	1927/07/27	75	1927	0	1998
August	0.8	45	1999/08/10	50	1987	0	1998
September	2.0	50	1909/09/23	122	1973	0	1995
October	4.9	130	1999/10/24	246	1929	0	1961
November	8.8	80	1980/11/23	319	1980	0	1993
December	8.6	98	1946/12/17	307	1938	26	1995
Annual	**52**	**255**	**1939/02/04**	**447**	**1923**	**0**	**1998**

2.1.1.2 Temperature

As Maarteenshoop is only a rainfall monitoring station, temperature data from the De Kafferskraal and Lydenburg Weather Stations were used (Table 2-4 and Table 2-5 respectively). Data provided shows that summers are warm, temperatures rarely exceed 30^{o}C, and winters are mild.

Table 2-4: Temperatures recorded in the region of the Project - De Kafferskraal SAWS Weather Station (1982 to 1990).

Month	Mean daily (^{o}C)			Extremes (^{o}C)	
	Maximum	Minimum	Average	Highest	Lowest
January	23.8	12.6	18.2	32.0 (1983/11)	16.5 (1990/11)
February	23.4	12.1	17.7	32.1 (1983/27)	16.0 (1989/10)
March	23.3	12.3	17.8	34.5 (1984/02)	16.0 (1990/29)
April	21.0	9.0	15.0	28.0 (1987/04)	12.0 (1989/27)
May	18.9	5.3	12.1	25.2 (1987/14)	8.5 (1984/30)
June	16.1	2.1	9.1	22.5 (1988/05)	4.5 (1984/14)
July	16.6	2.2	9.4	22.0 (1989/31)	7.0 (1984/22)
August	18.8	3.6	11.2	25.8 (1988/30)	9.2 (1983/09)
September	21.2	6.7	14.1	30.1 (1983/29)	8.3 (1988/02)
October	21.7	9.1	15.5	30.0 (1985/05)	9.6 (1989/10)
November	22.0	10.6	16.3	29.6 (1982/19)	11.0 (1990/06)
December	23.2	12.0	17.6	28.8 (1982/13)	15.4 (1989/11)
Annual	**20.8**	**8.1**	**14.5**	**34.5 (1984/02)**	**4.5 (1984/14)**

Table 2-5: Temperatures recorded in the region of the Project - Lydenburg SAWS weather station (1961 to 1990).

Month	Mean daily (°C)			Extremes (°C)	
	Maximum	Minimum	Average	Highest	Lowest
January	25.9	14.7	20.3	33.5 (1983/11)	15.8 (1972/23)
February	25.5	14.2	19.8	34.5 (1983/27)	14.9 (1967/19)
March	24.8	12.9	18.8	34.0 (1984/02)	13.6 (1975/18)
April	22.6	10.0	16.3	31.3 (1987/04)	12.8 (1974/03)
May	20.8	6.0	13.4	28.0 (1979/08)	9.0 (1972/13)
June	18.3	2.8	10.6	25.3 (1962/28)	5.9 (1968/03)
July	18.8	2.7	10.7	26.4 (1983/15)	8.0 (1967/15)
August	20.9	4.8	12.8	28.5 (1979/08)	6.2 (1977/24)
September	23.6	8.1	15.9	33.5 (1983/29)	6.4 (1974/04)
October	24.0	10.8	17.4	33.5 (1961/24)	9.3 (1965/19)
November	24.2	12.7	18.4	33.3 (1981/06)	9.0 (1968/11)
December	25.2	14.1	19.6	31.8 (1972/30)	15.2 (1966/17)
Annual	**22.9**	**9.5**	**16.2**	**34.5 (1983/27)**	**5.9 (1968/03)**

2.1.1.3 Evaporation

Mean monthly S-pan evaporation data shows that the evaporation exceeds precipitation. Owing to the similar altitudes of Lydenburg and the project area (1,412 mamsl and 1,450 mamsl, respectively) it is believed that the evaporation figures for the proposed mining development should be similar to those of the SAWS Lydenburg Weather Station.

2.1.1.4 Windfield

There is no meteorological station located close to the proposed site for it to be considered as site representative. Site specific MM5 modelled meteorological data set for full three calendar years (2008 – 2010) was therefore obtained from the Lakes Environmental Consultants in Canada to determine local prevailing weather conditions. Modelled meteorological data for the period January 2008 to December 2010 was obtained for a point close to the Everest North site (25° 3'2.03"S, 30° 9'49.63"E). Data availability was 100%.

The spatial and annual variability in the wind field for Everest North modelled data is clearly evident in Figure 2-1. In the figure the radial arms of the windrose represent the directions from which the wind is blowing. The prevailing annual wind direction is following the southeast – northwest direction. Over the three year period, the average frequency of occurrence was 21.4% from the south-easterly sector, and 13% from the east south-easterly sector. Calm conditions (wind speeds < 0.5 m/s) occurred for 1.6% of the time. Overall average wind speed for the period was 4.04 m/s.

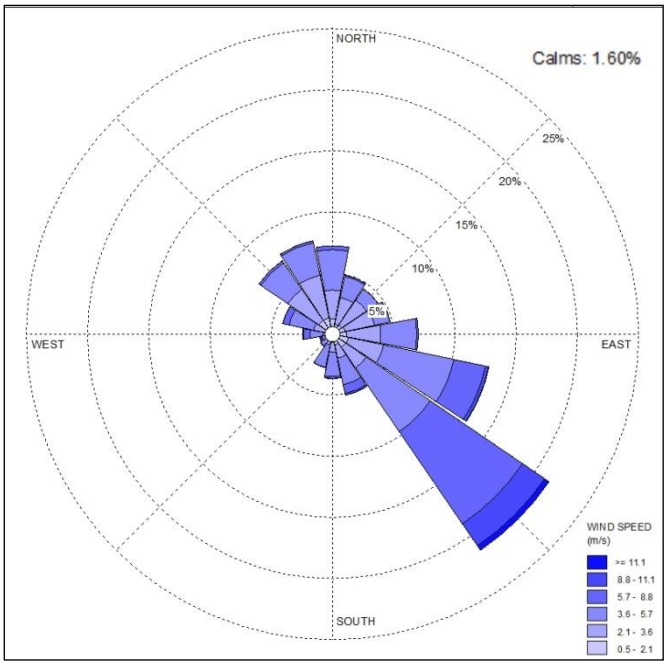

Figure 2-1: Surface wind rose for Everest North modelled data, 01 January 2008 – 31 December 2010.

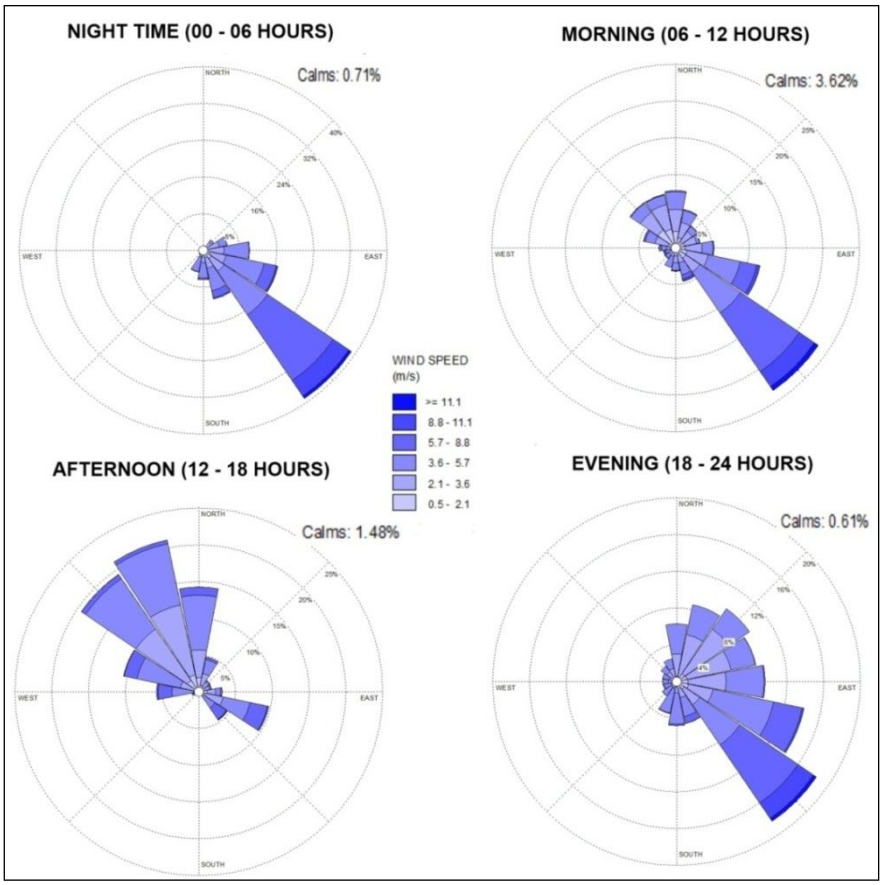

Figure 2-2: Diurnal variation of winds between Night time 00:00 – 06:00 (top left), Morning 06:00 – 12:00 (top right), Afternoon 12:00 – 18:00 (bottom left) and Evening 18:00 – 24:00 (bottom right) (Everest North modelled data 01 January 2008 – 31 December 2010).

2.1.2 Topography

The proposed development is located within the Steelpoort River basin which lies on the north-eastern escarpment, between 750 and 2,400 mamsl. The regional topography is mountainous in nature, with incised valleys and associated spurs. The topography of the site is consistent with the general landscape which is typical of the entire region.

The project site is located in the upper catchment of the Groot Dwars River valley, and there is a significant change in altitude within this valley. The highest point is the De Berg peak in the Steenkampsberge which rises to 2,331 mamsl, and lies approximately 19.5 km north of the project site. The lowest point is the confluence of the Dwars River with the Steelpoort River at 770 mamsl, which is situated approximately 24 km south of the proposed site. The topography west of the project site consists of a valley running from the south to the north. This valley holds a tributary of the Dwars River, which flows in a northerly direction. The eastern section of the project site is dominated by a spur with an elevation of approximately 1,490 mamsl. Elevation ranges from the highest point of 1,490 mamsl on top of the spur, to 1,275 mamsl within the valley located at the north-western edge of the project site. General topographical drainage appears to be in a north north-westerly direction from the project site.

2.1.3 Soils

Dominant soils occupying the area in the middle of the proposed mine (**Error! Reference ource not found.**) are brown to reddish-brown, structure-less to weakly structured, sandy clay loam topsoil on reddish-brown subsoil on rock. Surface rock and/or stones occur throughout. These soils are mainly soils of the Hutton and Mispah soil forms.

Dark brown to black, moderately structured crumbly clay topsoil on strongly structured clay subsoil occur within the area closer and within the opencast mine site, especially where soil depths are deeper. The soils found are mainly soils of the Bonheim soil form including black, strongly structured clay topsoil on hard rock (shallow) which are soils of the Milkwood soil form. Interspersed with these soils black, strongly structured clay topsoil on unspecified strongly structured clay subsoils such as Arcadia, Inhoek and Mayo soil forms were found.

The samples were analysed for particle size (sand, silt and clay), cation exchange capacity (CEC) and exchangeable cations (Ca, Mg, K, Na), pH (H_2O), C content and P (Bray 1). The analytical results are given in **Error! Reference source not found.** below.

Table 2-6: Soil results and data

Sample Point	Soil Form	Org C %	CEC cmol(+) kg^{-1}	K mg kg^{-1}	Ca mg kg^{-1}	Mg mg kg^{-1}	Na mg kg^{-1}	P (Bray1) mg kg^{-1}	pH (H_2O)	Sand %	Silt %	Clay %
1 Top	Hu	0.65	10.78	153	403	138	17.5	1.2	6.18	76	8	16

2 Sub				70	334	280	18.2	0.15	6.06	70	6	24
3 Top	Mw	1.07	10.5	253	445	173	13.5	0.96	5.9	72	6	22
4 Sub				186	711	370	29.2	0.31	6.53	56	8	36
5 Top	Hu	0.53	5.87	54	120	30	17.4	4.6	5.77	92	2	6

Organic carbon (C) ranges from 0.53 – 1.07%. Any soil C content less than 1% is considered to be low. The dominant black soils tend to exhibit higher C content than the lesser common sandy soil.

Topsoil Phosphorus (P) values are generally very low (0.96 – 4.6 mg kg^{-1}. Potassium (K) values are also low (54 – 253 mg kg^{-1}).

The soil pH is in the order of 5.8 – 6.2. This pH range is indicative of slightly acidic soil conditions not only in the topsoil but also in the subsoil.

The soils in this area are considered to have a low cation exchange capacity (CEC). A low CEC reflects low soil clay and organic matter content, because CEC is a property of both clay and organic material. The cation exchange capacity (CEC) ranges from 5.9 to 10.7 cmol (+) kg^{-1} for the topsoil. Low CEC implies low nutrient content while the opposite is true for high CEC.

The size limits for sand, silt and clay used in the determination of soil texture classes are sand: 2.0 – 0.05 mm, silt: 0.05 – 0.002 mm and clay: < 0.002 mm. The clay content range is from 6 – 22% in the topsoil while the subsoil has a clay content ranging from 24 to 36 %. Sand content ranges from 72 – 92 % in the topsoil.

The fertility analysis indicates that in general low soil fertility occurs in all the soil of the Project site.

2.1.4 Land Capability

Land capability is defined using a combination of soil, terrain and climate features. Land capability classes reflect the most intensive long term sustainable use of land under rain-fed conditions. An indication is also provided about the permanent limitations associated with the different land use class definitions (Schoeman, et. al., 2000).

The entire infrastructure study area is dominated by veld and classified as Class VII grazing land for purposes of its “pre-project” land capability. Either conservation or some form of grazing agriculture is the most significant natural capability of the land.

Plan 5: Soil types:

2.1.4.1 Land Capability and Land Use

Land capability is defined using a combination of soil, terrain and climate features. Land capability classes reflect the most intensive long term sustainable use of land under rain-fed conditions. An indication is also provided about the permanent limitations associated with the different land use class definitions (Schoeman, et. al., 2000).

The entire infrastructure study area is dominated by veld and classified as Class VII grazing land for purposes of its “pre-project” land capability. Either conservation or some form of grazing agriculture is the most significant natural capability of the land.

The agricultural potential was found to be low due to the presence of dominating shallow rocky soils found in the study area.

Presently the areas earmarked for mining infrastructure are used for agriculture namely arable and grazing. The farm is unfenced in many places and grazed using a communal system. Presently the unfenced farm is overgrazed. Mining will have an additional influence on land capability during mining operations because smaller areas are available for grazing thereby putting more strain on vegetation production for grazing in areas in close proximity of the mining land.

The topography, climate and parent material within the infrastructure area is typical of mountainous areas. It is undulating but some flatter areas historically were frequently cleared and the soil cultivated for the planting of permanent crops such as peach orchards. These are now abandoned. Vegetables and maize are probably cultivated but on the east side of the stream because some deeper soil occurs on the stream bank. This does not necessarily qualify the land capability as being arable as the crops are planted for local use and this could not be done on an economically sustainable basis. This is because the majority of soils are too shallow for cultivation. These soils are thus seldom farmed on a large scale, mainly due to the rocks present thereby preventing cultivation.

2.1.4.2 Disturbance of Existing Land Uses

In some sections of the proposed project area (and surrounding area) there is residential land use, livestock farming, agricultural activities (crop fields and fruit farms), conservation/wilderness areas and game farming. The development of the project is likely to impact on some or all of these land uses. Once the project alternatives have been finalised, the findings, impact assessment and associated management measures will be included in the EIA/EMP report.

2.1.5 Traffic

The increase in traffic entering and leaving the project area will place pressure on the existing road network. Currently these roads are used by local residents and farmers. Without assessing the implications of the increased traffic it is not possible to meaningfully assess the associated road use, capacity and safety issues.

2.1.5.1 Adjacent Road Network

The proposed development is located in close proximity of the following Class 2 roads:

- Road R577 - a provincial road connecting Lydenburg and the surrounding areas such as Mashishing. The road is designed to carry an Average Daily Traffic (ADT) of 10,000 vehicles. The road is a two lane road with gravel shoulders on both sides of the road. The road is currently carries low vehicular trips with peak hour trips of less than 400 vehicles during the AM and PM periods; and
- Sekhukhune Road – runs north south on the eastern side of the proposed mining development site. The road is also a two lane road with gravel shoulders on both sides of the road. The road was also designed to carry an Average Daily Traffic (ADT) of 10,000 vehicles. The road currently carries low vehicular trips with peak hour trips of less 420 vehicular trips during the AM and PM periods

2.1.5.2 Development Access

In the long term, the site will be bounded by two major provincial routes Road R577 south of the proposed development site and Sekhukhune Road to the east. This will be followed by construction of Road C, an existing gravel road in good condition and Road D which is not constructed.

In order to achieve a practical intersection layout no more than two left turn lanes and two right turn lanes per approach can be allowed. Dual right turn and left turn lanes can only be provided when the cross road has at least two lanes per direction of travel.

2.1.5.3 Access Management Considerations

The status of Road R577 and Sekhukhune Road dictates the access positions at which can be provided on these routes. Provision for access to adjacent land uses from K-routes is necessary and must comply with relevant access management standards. The “Guidelines for Human Settlement Planning and Design, Department of Housing” provides guidelines in this regard.

A preferable minimum intersection spacing of 600m is required in order to achieve acceptable two way progression in a network that is controlled by traffic signals. The design speed of both the R577 and Sekhukhune Road is estimated at 100km/h, with the following design parameters:

- Site distance: 155m;
- Shoulder/barrier sight distance: 300m;
- Passing sight distance: 680m;
- Stopping sight distance: 155m;and
- Decision sight distance: 300m to 395m.

2.1.5.4 Access Proposal

The site will be accessible using Road R577, Sekhukhune Road, Road C and Road D. The current intersection is a three leg intersection thus the proposal to establish the development

access at this point will convert the current intersection to a four leg intersection with introduction of the south approach as the main access to the development. The propose access road will have a road reserve (Road D) of 32m to 40m.

2.1.6 Air Quality

Due to the remote setting of the proposed project area there are no major sources of air pollution apart from dust generated by vehicles travelling along un-surfaced roads. Potential receptor sites in the proposed project area include the community living on the farm Vygenhoek and the fauna and flora of the area.

2.1.6.1 Baseline Assessment

The ambient air quality guideline values indicate safe daily exposure levels for the majority of the population, including the very young and the elderly, throughout an individual's lifetime. Air quality guidelines and standards are normally given for specific averaging periods. These averaging periods refer to the time-span over which the air concentration of the pollutant was monitored at a location. Generally, five averaging periods are applicable, namely an instantaneous peak, 1-hour average, 24-hour average, 1-month average, and annual average. The application of these standards varies, with some countries allowing a certain number of exceedances of each of the standards per year.

With the shift of the new Air Quality Act from source control to the impacts on the receiving environment, the responsibility to achieve and manage sustainable development has reached a new dimension. The National Framework states that aside from the various spheres of government responsibility towards good air quality, industry too has a responsibility not to impinge on everyone's right to air that is not harmful to health and well-being. Industries therefore should take reasonable measures to prevent such pollution order degradation form occurring, continuing or recurring.

2.1.7 Noise

Current ambient noise levels at the proposed project area are very low and representative of a rural environment due to the area's remote setting, sparse population and low level of agricultural mechanization. Limited significant noise sources exist. These include community activities and natural sounds. Potential receptor sites in the proposed project area include the community living on the farm Vygenhoek and the fauna of the area.

A list of the noise measurement locations is presented in Table 2-7 and illustrated on **Error! Reference source not found.** below.

Table 2-7: Noise measurement locations

Site ID	Farm/location	Owner	Type of receptor	GPS coordinates
SN1	Vygenhoek 10 JT (portion 7)	Republic of South Africa	Farmstead	25° 3'32.61"S & 30°10'2.72"E

SN2	Vygenhoek 10 JT (portion 2)	Republic of South Africa	Farmstead	25° 3'30.66"S & 30° 9'42.38"E
SN3	Mareesburg 8 JT (portion R)	Rustenburg Platinum Mine	Farmstead	25° 1'21.67"S & 30° 8'30.18"E

The results from the noise meter recordings for all the sampled points as well as the rating limits according to the SANS 10103:2008 guidelines are presented in Table 2-8.

Based on the daytime results from the baseline environmental noise measurements it is noted that the ambient noise levels are below the SANS guidelines for the maximum allowable outdoor daytime limit for ambient noise in rural districts.

The night time ambient Leq levels measured slightly above the SANS guidelines for the maximum allowable outdoor limit for night time ambient noise in rural districts.

Plan 6: Noise measurement locations

Table 2-8: Results of the baseline measurements

Sample ID	SANS rating limit			Measurement details		
	Type of district	Period	Acceptable rating level dBA	$L_{Areq,T}$ dBA	Maximum/Minimum dBA	Date
SN1	Rural	Daytime	45	45	67 / 22	29/02/2012
		Night time	35	47	79 / 27	29/02/2012
SN2	Rural	Daytime	45	43	73 / 24	01/03/2012
		Night time	35	41	66 / 32	01/03/2012
SN3	Rural	Daytime	45	44	75 / 28	01/03/2012
		Night time	35	43	62 / 29	01/03/2012
	Indicates $L_{Aeq,T}$ levels above either the daytime rating limit or the night time rating limit					

2.1.8 Visual environment

2.1.8.1 Land cover and land use

The region is characterised by mountainous topography which is predominantly used for game farming, cattle farming, crop agriculture and mining activities. The project area is located between two vegetation types; from the project site to the west, the vegetation consists of mixed bushveld, while the central and eastern areas of the project area consist of north-eastern mountain grassland (Acocks, 1988). More specifically, the vegetation of the project site can be described as being fairly shrubby and woody in places, particularly towards the west, north-west and north-east, while areas towards the east and south-west consist of open grassland. Commercial crop agriculture is evident in the south-eastern corner of the project area. There is no presence of mining activities within the vicinity of the project area; however, mining is present 10 km to the north-west, and 11 km to the south.

2.1.8.2 Sense of place, scenic quality and visual intrusion

The general sense of place can be described as being a remote and “off the beaten track” mountainous area. The area possesses high scenic quality due to the endless mountains, minimal development and fairly intact vegetation. Visual intrusion which is the compatibility or congruence of the proposed project with the particular qualities of the area or sense of place (Oberholzer, 2005), is expected to be high, as there are no mining activities in the vicinity.

2.1.8.3 Visual adsorption capacity (VAC) and visibility

The VAC is the potential of the landscape to conceal the proposed project as a result of topography, vegetation or synthetic features (Oberholzer, 2005). The VAC of the project site and surrounding area will be high, as the project site is surrounded by mountainous terrain which will conceal the proposed project from sensitive visual receptors. The visibility of the project, as depicted by the viewshed analysis in Figure 2-3, will be confined to a few high lying areas within a 15 km radius of the project boundary.

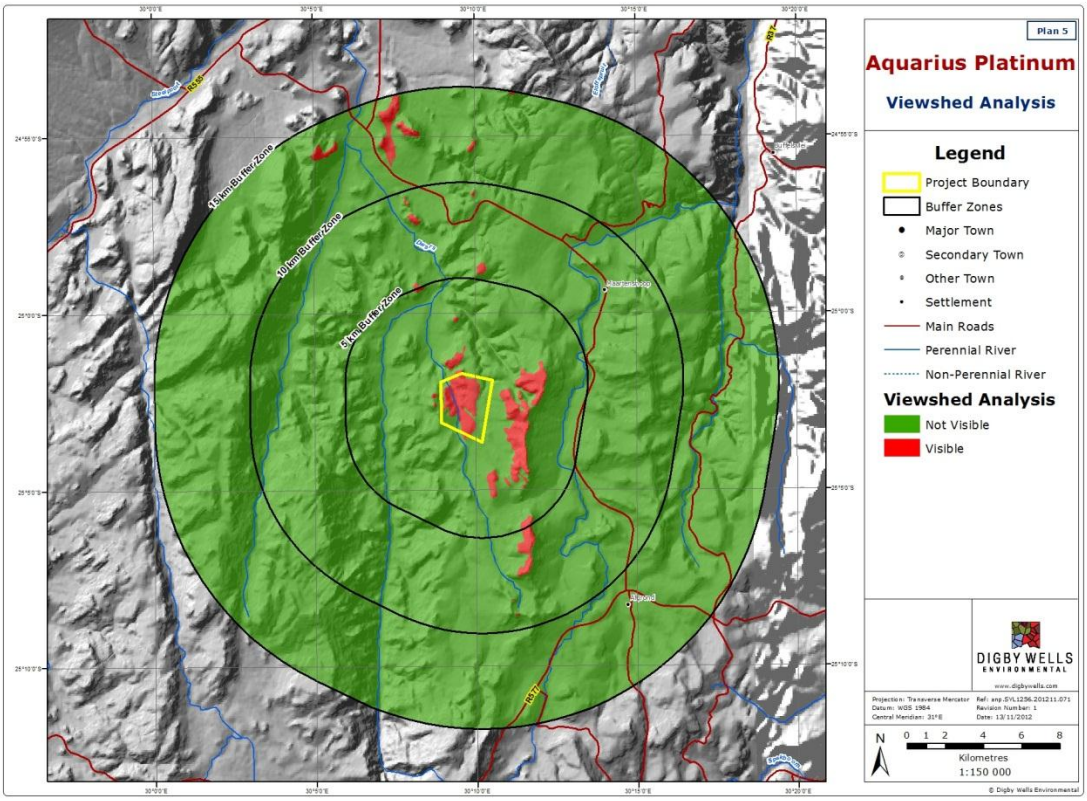

Figure 2-3: Visibility of the proposed project

2.1.9 Sensitive visual receptors

Sensitive receptors identified from aerial photography within a 15 km radius of the project site included:

- Rural farm houses;
- Lodges; and
- Main / secondary roads in the area.

According to the viewshed analysis, farm houses located on the southern boundary of the project site will be impacted upon. Besides this, the project will not be visible to the other identified receptors within the landscape.

2.1.10 Fauna and Flora

2.1.10.1 Local Natural Environment

As discussed previously, the area of concern falls within the grassland biome of South Africa, according to Acocks (1988) differentiation occurs within this biome and is expressed as different vegetation types. The area of interest falls within the North-eastern Mountain Sourveld (A8), North-eastern Sandy Highveld (A57), Piet Retief Sourveld (A63); *Loudetia simplex-Diheteropogon filifolius* Grassland, *Monocymbium ceresiiforme-Tristachya leucothrix*

Grassland. According to Mucina and Rutherford (2005) the study area falls within the Sekhukhune Montain Grassland (Gm 19).

This type comprises the grasslands of the northern parts of the great escarpment mountains in Mpumalanga. It stretches northwards along these mountains into Northern Province, and southwards through KwaZulu-Natal, reaching the northern parts of Eastern Cape. Altitude ranges from 1 400 to 1 900 m.

2.1.10.2 Habitat and Vegetation types

A total of four main habitat units were delineated for the project area, topographic features and current land use were the primary distinguishing factors in the delineation of the various units (**Error! Reference source not found.**). These features included the location of the abitat type in the landscape (top, middle or bottom slopes), influence of available soil type (clay content, rockiness), influence of available moisture (proximity to water sources, water holding capacity of soil), gradient (steepness of slope) and aspect (direction of slope) and current land use practices (agricultural, natural). The above mentioned factors have an effect on the habitat type in isolation and in conjunction with each other.

The effects of the anthropogenic activities that were considered in assisting with the delineation of vegetative and/or habitat types included current and previous land use. Owing to the presence of limited maize farming activities within the few flat areas of the study area coupled with exotic tree areas and homesteads the natural landscape has been altered very little. The buildings encountered in the study area were a small percentage (1%) and was not discussed as a separate vegetation unit. The pastures and grassland vegetation units are mapped together as the management of these areas is similar. The river and riparian vegetation type delineated utilising existing vegetation and topography, and not soil characteristics.

2.1.10.3 Vegetation

The vegetation types described after field work were all found to be undisturbed, except the disturbed vegetation unit which occurred as a result of the historical land use specifically farming. The undulating and rocky, sometimes mountainous nature of the study area has made it unsuitable for agriculture and only the valley bottoms and flat hill-slopes were used for agricultural development.

Plan 7: Vegetation types identified

2.1.10.4 Mammals

No Large and medium sized herbivores were encountered during the single wet season field survey, this could be as a result of previous land use or informal hunting practiced on the study site. The very low numbers of actual wild animal sightings (small antelope species) confirmed this. Leopard was however found on the study site. The riparian areas present on site provide watering points for the existing wildlife, however only bird species were found to congregate in these areas. The mammals present on the project site are a direct result of the number and severity of threats present. These threats include shrinking available habitat, hunting, lack of shelter and lack of space to accommodate viable populations. Due to the size and threats present in the area no large herbivores will be able to return to the area, realistic expectations should be to conserve natural habitat.

2.1.10.5 Birds

Birds have been viewed as good ecological indicators, since their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological condition are linked to land cover. As the land cover of an area changes, so do the types of birds in that area (The Bird Community Index, 2007). Land cover is directly linked to habitats within the study area. The diversity of these habitats should give rise to many different species. During the wet season field excursions 38 bird species were observed, the majority of which were observed during early mornings and late afternoons in the vicinity of water sources.

Ecosystem services offered to bird species include shelter for bird species in the form of nesting sites within the trees of the alien tree vegetation type. Furthermore the grassland areas could offer space and materials for ground nesting birds to nest.

2.1.10.6 Herpetofauna

Nine herpetofauna species were identified during the field visit. *Platysaurus orientalis* (Sekukhune Flat Lizard) is endemic to the SCPE and therefore is a species of concern. Impacts on endemic species have limited management or mitigation opportunities, due to the fact that there distribution is restricted. Furthermore *Python sebae natalensis* (South African Rock Python) is protected by the Limpopo Environmental Management Act. This species is also listed by NEMBA (2004) as a protected species and as vulnerable by the South African red data book (Branch, 1988). More than one individual was found to occur within the project area which is expected due to the fact that the mountainous project area is suitable habitat. Herpetofauna species that might occur on site are not limited to this list. Rocky ridges/mountainous areas present itself as definite habitat for reptile species and many reptile species may be lost by removing this habitat type. In summer rainfall areas breeding usually takes place after the first thunder storms. It therefore stands to reason that amphibian field surveys are most successful during the rainy season. With the available habitat present on the area of interest, it was expected to encounter amphibian species. However, after the dry season field visit it was evident that the threats present in the study area were having a serious effect on the population of amphibians. The biggest threat

observed was habitat degradation through uncontrolled burning, this practice not only destroys the habitat (plants for shelter and food) but also directly kills the amphibians that cannot avoid the flames.

2.1.10.7 Arthropoda

The discovery of Pycna *sylva* on the study area, and in particular the large colonies found on the area identified as the opencast pit, has potentially serious repercussions. As current knowledge of *Pycna* is very limited, the colony present will have to be studied further in order for the most appropriate and ecologically sound mitigation measures to be implemented. The specific host plant is known, *Vitex obovata* subsp. w*ilmsii,* which was also found in abundance on the property. If relocation of the *Pycna* is to be considered then the first step will be the relocation or propagation of the host plant. Suitable habitat will have to found in order for the host plant to successful, only then can relocation of the Pycna be considered.

2.1.10.8 Site-specific conservation value

The biodiversity conservation value of each vegetation unit in the study area was determined considering all the information collated during this study (Table 2-9). The following criteria were broadly taken into account in evaluating the importance of biodiversity of each vegetation unit:

- Ecological status of the vegetation unit (i.e. untransformed (primary) or transformed (secondary));
- Conservation status of vegetation type represented by each vegetation unit (after Mucina and Rutherford, 2007);
- Relative indigenous fauna and flora species richness of the vegetation units;
- Presence or habitat-derived probability of occurrence of Red Data or Protected fauna and flora species present in each vegetation unit;
- Presence of special (unique or restricted) habitats (such as ridge or hill);
- Presence of invasive alien species;
- Any other significant biodiversity features of the vegetation unit that may contribute to its conservation value.

Based on the above considerations, each vegetation unit was given a sensitivity/importance value of high, medium, low or negligible:

- The vegetation unit that have been more or less irreversibly transformed from their natural state have negligible value in terms of biodiversity conservation.
- The vegetation unit with a low sensitivity / importance are generally disturbed or transformed biotopes with little conservation value. The diversity of indigenous species is relatively low (compared to the natural untransformed habitats of the site) and the units are unlikely to support threatened/protected species. Future developments should, where possible, be planned within these areas, rather than in the medium or high conservation areas.

- Vegetation unit with a moderate sensitivity / importance are generally areas with some disturbance, but not as severe as for areas with a low sensitivity / importance. These are generally transformed habitats with good habitat potential or deteriorated untransformed habitats. The relative species richness of these units may also be lower than in those with high conservation value. No Red Data species have been identified/ observed in this vegetation unit but there is still a moderate possibility that threatened/protected species may utilise the vegetation unit. Future alterations of these vegetation units should be limited, but development in these areas is preferred above the areas with high conservation value.
- A vegetation unit with high sensitivity / importance is generally one that comprises untransformed biotopes where Red Data and protected species have been observed or where there is a high probability of such a species occurring. These vegetation units often consist of primary vegetation, rivers, streams and wetlands and are considered important even if they are disturbed. Mining and development should be limited and prevented as far as possible in these areas.

Threats to plant species and ecosystems create areas where alien and exotic plant species start to dominate the landscape. The below Table 2-9, displays the results obtained from all six habitat units. The results therefore identify and delineate the various vegetation and/or habitat types present within the study area, characterise the sensitivity of the vegetation and/or habitat types and describe the ecological state of the mammals, birds, amphibians and reptiles present.

Table 2-9: Fauna and Flora summary table

Vegetation type	Flora	Mammals	Birds	Amphibians	Reptiles	Sensitivity
Open Savannah	73	3	28	-	5	High
Rivers/Riparian	22	4	16	2	-	High
Rocky Ledges	20	-	8	-	1	Medium
Wooded slopes	54	3	18	-	3	High
Disturbed areas	17	1	12	-	-	Low

2.1.10.9 Red Data Species

Different Red Data, protected and endemic species were found within the project area, therefore it is considered to be of a high floristic sensitivity. Red data species (fauna and flora) found to occur within the project area are indicated on Plan 8 and Plan 9. There are no proclaimed nature reserves within the Mpumalanga portion of the SCPE. It is estimated that approximately 29% of the SCPE has already been transformed. Decline of plant populations could lead to local, or even global, extinction, resulting in irreversible loss of important grazing species, medicinally utilized species and other economically important plants.

Some of the species such as *Lydenburgia cassinoides* were well represented on the project site. This Red Data species is protected by law and cannot be relocated.

Furthermore Red Data Leopard and the endemic and previously declared extinct *Pycna sylvia* occur on site. This project will remove a large portion of the *Pycna* habitat, the host plant *Vitex obovata subsp.wilmsii*. Also due to the fact that the duration of the larvae stage is unknown, but estimated to be above three years, the removal of soil will eliminate future generations of *Pycna sylvia* as well. For this reason the net loss of *Pycna* individuals will be substantial.

A summary of mitigation include:

- To establish a nursery from topsoil, seeds and young plants collected;
- To annually remove exotics/invasive during the wet season;
- If soil and *Vitex* removal in *Pycna* colonies (*Pycna* habitat) take place, it must take place during November – December;
- To search for *Pycna* larvae in soil after soil removal;
- To conduct *Pycna* monitoring annually;
- To avoid sensitive areas that don't fall within the open cast area;
- To conduct an ecological audit and fauna relocation program before and during construction;
- To establish an appropriate offset area with formal conservation status that could be used for eco-tourism opportunities; and
- To rehabilitate area with indigenous and nursery species.

The key issue remains the cumulative impacts of mining on Sekhukhune land that will need to be addressed as the continual loss of SCPE can lead to the extinction of endemic species.

Plan 8: Red Data Flora Species

Plan 9: Red data Fauna Species

2.1.11 Aquatics

The project area is situated within quaternary catchment B41G of the Olifants Water Management Area (WMA 4). According to Kleynhans (2000) the quaternary catchment is considered to be of high ecological importance and characterised by sensitive systems. The catchment area is generally considered to be in a largely natural state and it has been recommended by Kleynhans (2000) that the quaternary catchment be managed to a natural state.

According to the Mpumalanga Conservation Plan (C-Plan) (Ferrar and Lotter, 2007), the project area is located within a catchment area categorised as Highly Significant. According to the C-Plan this refers to the need for protection of the catchment as there is very limited choice for meeting selected targets.

The Freshwater Ecological Priority Areas (FEPA) programme indicates different sub-catchment priority areas for management. The project area is situated in the sub-quaternary catchment “723” which is described as a FEPA. River FEPAs aim to achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species, and have been identified in rivers that are currently in a largely natural state. FEPAs should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources.

The Dwars River traverses the project area flowing in a northerly direction. The Dwars River is a tributary of the Steelpoort River which eventually flows into the Olifants River. The system is a perennial system which is considered to be critically endangered. Threats to the system are largely attributed to the surrounding agricultural land uses which have impacted on the local aquatic ecosystems, as well as the increase in mining operations within the larger area.

The location of the project area in relation to the Mpumalanga provincial location, the Olifants WMA as well as the selected sampling sites for the Dwars River system is presented in Figure 2-4 .

In order to determine the current state (health) of the local aquatic ecosystems associated with the project area, the methodologies described the River Health Programme (RHP) of South Africa were implemented. The RHP methodologies conduct an ecological classification of the assessed system in order to determine and categorise the current health or integrity of individual biophysical attributes of the system, compared to the natural or close to natural reference condition. These biophysical attributes refer to the drivers and biological responses of an aquatic ecosystem. The following study components were addressed:

- **Drivers**
  - *Water quality (supplemented from the surface water study component)*
  - *Habitat*
- **Responses**
  - *Fish*
  - *Macroinvertebrates*

2.1.11.1 Water quality

Water samples were collected from the project area in February 2012 (Digby Wells Environmental, Surface Water Study). Hydrochemical analysis was completed for five water samples. The water quality results were considered in light of the South African National Standards for drinking water (SANS 241). The water quality results for each of the sample locations in light of the SANS guidelines are presented in Table 2-10.

All of the constituents analysed for with the exception of Fe were within the recommended drinking water classification (Class I). Fe was measured to be within drinkable water quality standards but for limited allowed time of exposure, approximately seven years (Class II). The water quality associated with the study area would not be a limiting factor for aquatic biota.

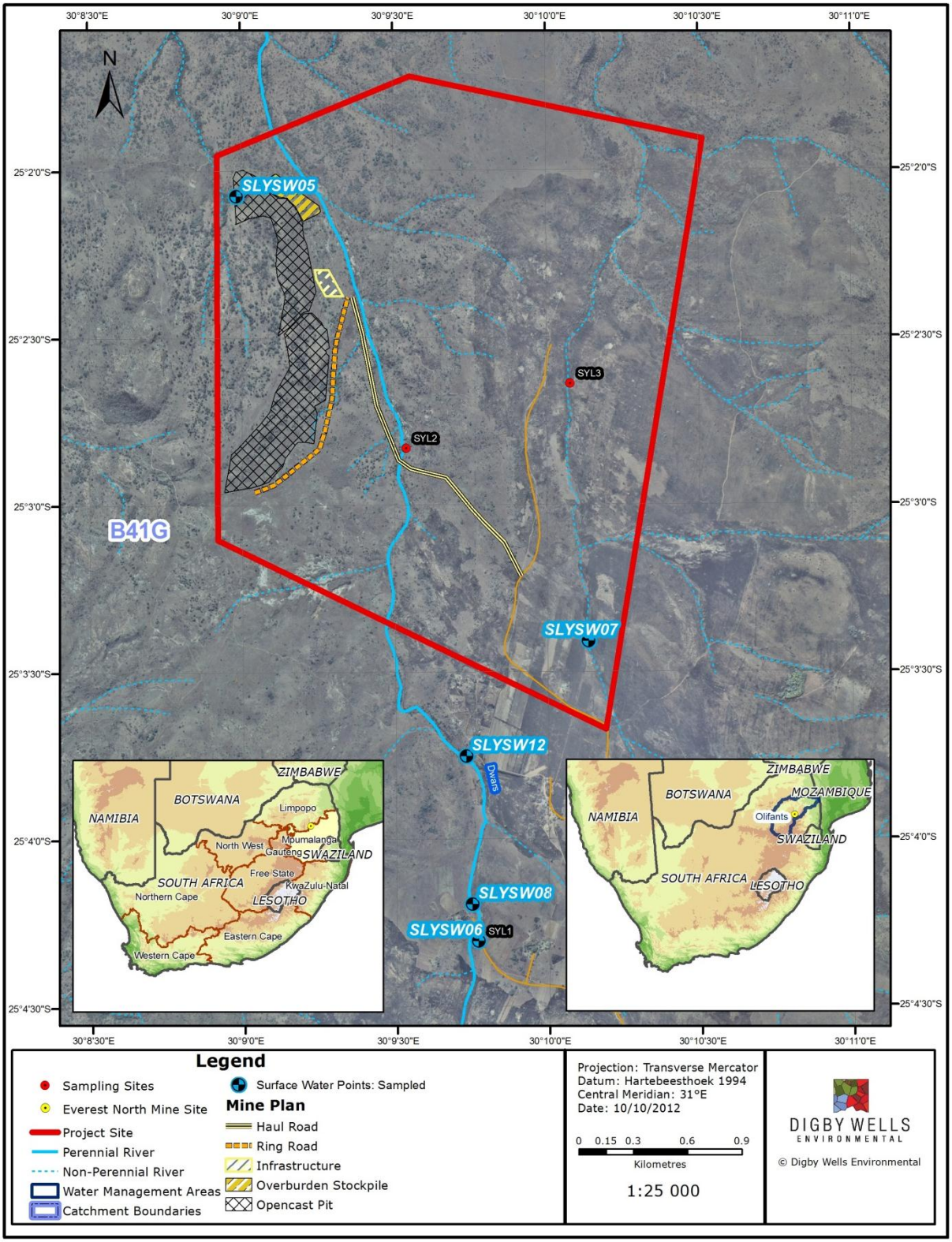

Figure 2-4: The location or the sampling sites and project area in relation to the Olifants WMA and Mpumalanga

Table 2-10: Water quality results for the five sample locations compared to the SANS guidelines

Sample ID	Total Dissolved Solids	Nitrate NO_3 as N	Chlorides as Cl	Total Alkalinity as $CaCO_3$	Sulphate as SO_4	Calcium as Ca	Magnesium as Mg	Sodium as Na	Potassium as K	Iron as Fe	Manganese as Mn	Conductivity at 25° C in mS/m	pH-Value at 25° C	Aluminium as Al	Free and Saline Ammonia as N	Fluoride as F
Class I	<1000	<10	<200	N/S	<400	<150	<70	<200	<50	<0.2	<0.1	<150	5-9.5	<0.3	<1	<1
Class II	1000-2400	10-20	200-600	N/S	400-600	150-300	70-100	200-400	50-100	0.2-2	0.1-1	150-370	4-5 or 9.5-10	0.3-0.5	1-2	1-1.5
	7 years			N/S	7 years								None	1 year	None	1 year
SLY SW05	346.00	-0.06	5.80	353.80	9.09	62.80	44.76	10.54	1.08	-0.01	0.00	66.30	7.85	-0.01	0.08	-0.18
SLY SW06	59.00	-0.06	3.90	52.70	4.50	9.06	8.83	0.99	-0.04	0.78	0.00	10.38	8.05	-0.01	0.04	-0.18
SLY SW07	34.00	-0.06	2.00	29.30	2.94	5.17	5.87	-0.03	-0.04	-0.01	0.00	7.71	7.69	-0.01	0.03	-0.18
SLY SW08	59.00	-0.06	3.60	47.80	7.72	9.03	8.82	1.53	-0.04	0.81	0.00	9.95	7.88	-0.01	0.02	-0.18
SLY SW12	50.00	-0.06	2.60	46.60	2.00	9.75	7.18	0.71	-0.04	0.75	0.00	11.58	8.02	-0.01	0.04	-0.18

2.1.11.2 Habitat quality

The habitat structures and features associated with the Dwars River were in a largely natural state. The quality and diversity of the available habitat was assessed by means of the Index of Habitat Integrity (IHI) (Kleynhans *et al*, 1999) and the Invertebrate Habitat Assessment System (McMillan, 1999). Photographs of habitat structures and features associated with the Dwars River system is presented in Figure 2-5.

Figure 2-5: Habitat structures and features associated with the Dwars River system

The IHI was applied to all the sample sites collectively during the high flow survey. The habitat assessment took into consideration the larger catchment area. The IHI scores for the project area are presented in Table 2-11.

The instream habitat is in a largely natural state (Class B). The habitat structures and features include a variety of flow-depth scenarios such as shallow-deep and fast-shallow reaches of the rivers as well as different substrate types such stones, cobbles, gravel, sand and mud. The hydrology of the system is in a largely natural state. Minor impacts have incurred to the system due to the limited development of the catchment, a result of informal stream crossings (roads) being constructed which have impacted on flow regimes. The riparian areas associated with the project area are in a largely natural state (Class B). Pressure imposed by the local agricultural practices on the riparian areas have been negligible, and thus these systems are not largely impacted. The riparian areas are able to provide important services such as bank stabilisation as well as habitat cover for aquatic biota.

Table 2-11: Summary of the application of the IHI index to the study area

Component	Rating	Description
Instream IHI %	87.6	Largely natural
Instream Category	B	
Riparian IHI %	82.1	Largely natural
Riparian Category	B	

According to Kleynhans *et al* (2009) the modifications to the system area limited to very few localities and the impact on habitat quality, diversity, size and variability are very small. A

small change in natural habitats may have taken place, however, the ecosystem functions are essentially unchanged.

2.1.11.3 Fish community

Information pertinent to this component is used in an index known as the Fish Response Assessment index (FRAI) (Kleynhans, 2007). Fish were collected by means of electro-fishing. All fish were identified in the field and released at the point of capture. Fish species were identified using the guide Freshwater Fishes of Southern Africa (Skelton, 2001).

A total of 9 fish species are expected to occur within quaternary catchment B41G (Kleynhans, 2011). The expected fish species list was developed from a literature survey and included sources such as (Kleynhans *et al.,* 2007) and Skelton (2001). The expected species list compiled for the region is presented in Table 2-12.

Table 2-12: A list of expected fish species to be found in quaternary catchment B41G (Kleynhans et al, 2007)

Abbreviation	Scientific name	Common name
AURA	*AMPHILIUS URANOSCOPUS*	STARGAZER
BANO	*BARBUS ANOPLUS*	CHUBBYHEAD BARB
BMAR	*BARBUS MAREQUENSIS*	LARGESCALE YELLOWFISH
BTOP	*BARBUS TOPPINI*	
BTRI	*BARBUS TRIMACULATUS*	THREESPOT BARB
LMOL	*LABEO MOLYBDINUS*	LEADEN LABEO
OMOS	*OREOCHROMIS MOSSAMBICUS*	MOZAMBIQUE TILAPIA
PPHI	*PSEUDOCRENILABRUS PHILANDER*	SOUTHERN MOUTHBROODER
TSPA	*TILAPIA SPARRMANII*	BANDED TILAPIA

The sampled fish species indicate that the Dwars River is able to support both tolerant and sensitive fish species with varying requirements. This may be an indication that the Dwars River is in a largely natural state. Owing to the fact that *A. uranoscopus* is considered to be sensitive to water quality impairment, this may indicate that the water quality of the Dwars River is in a suitable state, supporting the findings from the water quality assessment. In addition to this, the surrounding activities have not impacted on the quality of the available habitat as the system is able to support fish species considered to be sensitive to specific habitat types. This may be a further indication that the system is in a largely natural state.

2.1.11.4 Macroinvertebrate structures

Macroinvertebrates with varying tolerances to impacted water quality were sampled during the system. Taxa with both a low and moderate tolerance to poor water quality were

sampled from the Dwars River. This may be an indication that the water quality of the system is in a good state, however, the dominant taxa sampled for the Dwars River were characterized by a moderate tolerance to poor water quality.

Findings from the macroinvertebrate suggest that the Dwars River is in a largely natural state, providing good water quality and suitable habitat types to support a diversity of taxa. The ability of the system to support taxa considered to be sensitive to poor water quality is an indication that the water quality of the Dwars River is not a limiting factor for aquatic biota.

2.1.12 Groundwater

2.1.12.1 Catchment Description

The mining area is largely contained within the farm Vygenhoek 10JT and falls within the valley of the north flowing Mareesburg stream that forms part of the B41G quaternary catchment in the Olifants Water Management Area.

The Mareesburg stream flows into the Groot Dwars River 1,200 m downstream from the northern boundary of Vygenhoek and Mareesburg farms. The size of the Mareesburg stream catchment to the confluence with the Dwars River is approximately 32 km^2. Ultimately the Dwars River flows into the Steelpoort River, a further 25 km downstream.

The catchment lies within the summer rainfall area with rainfall predominantly occurring between October and March with a maximum in January. The mean annual rainfall (MAR) is approximately 545 mm.

2.1.12.2 Hydro-census

Digby Wells completed a site visit to identify water sources (locate and access all known boreholes and surface water sites) and water users on the farm portions of Moabsvelden 248-IR and Rietkuil 249-IR.

Ten boreholes were identified within the project area. A summary of the hydro-census data is presented in Table 2-13 and the borehole localities are presented on **Error! Reference source not found.**.

The sites selected for sampling were chosen in an attempt to best represent the area within the proposed mine site, as well as to account for water used for human and livestock purposes.

Table 2-13: Hydro census data

Site ID	Coordinates		Type	Equipment	Collar height (m)	Static water level (m bgl[2])	Borehole depth (m)	Use	Sampled
	X	Y							
H35-0107	-85335.4	-2771455	Borehole	None	0.255	28.245	60	None	Yes
H35-0108	-85418.1	-2771617	Borehole	None	0.525	10.415	60	None	Yes
H35-0109	-85472.5	-2771956	Borehole	None	0.235	9.025	60	None	Yes
Vh11	-85454.1	-2771032	Borehole	None				None	No
Vh12	-85464.4	-2770668	Borehole	None	0.301	8.88	10.55	None	No
Vh14	-85525	-2770511	Borehole	None	0.230	Blocked		None	No
Vh15	-85532.9	-2770378	Borehole	None	0.121	13.592	16.95	None	Yes
Vh16	-85591.4	-2770223	Borehole	None	0.210	9.250	28.30	None	No
Vh17	-85807.8	-2770155	Borehole	None	0.195	Blocked		None	No
Vh19	-85578.3	-2771501	Borehole	None	0.382	13.018	15.80	None	Yes
VHKSW01	-84535.9	-2773249	Stream	None	Surface water			Domestic and livestock	Yes

[2] Meters below ground level

Plan 10: Location of hydro census boreholes

2.1.12.3 Geology

Stratigraphy

The Everest North area is underlain by gently north and north-west dipping layers of the Bushveld Igneous Complex (BIC), which intruded into the Transvaal Super group on the Kaapvaal Craton at about 2060 Ma. The Bushveld Complex consists of two lithological distinct units that are mainly intrusive into the Transvaal Super group:

- A lower sequence of layered mafic and ultramafic rocks, known as the Rustenburg Layered Suite (RLS); and
- An overlying unit of granite, known as the Lebowa Granite Suite.

The chromitite and platinum mineralization is located in the RLS. The Rustenburg Layered Sequence comprises five stratigraphic zones:

- The Marginal Zone (with no economic potential);
- The Lower Zone (containing thin, high-grade chromitite seams);
- The Critical Zone (hosts all the significant PGM and chromite deposits);
- The Main Zone (locally exploited as dimension stone); and
- The Upper Zone (which host magnetite seams, some of which are exploited for Vanadium and iron ore).

The project area is underlain by the upper portion of the Critical Zone which in this area consists dominantly of anorthosite and mottled anorthosite with rare pyroxenite and chromitite layers (SAS, 2009).

Structure

The ore body is an isolated basin-like structure. No major fault zones are expected to occur on the project site. Secondary discontinuities such as joints, shear joints and fault surfaces occur in the area and are likely to be an important control on the direction of groundwater flow (SAS, 2009).

NE-SW trending dykes is indicated on the 1:250 000 geological map series for this area and is overlain by Quaternary deposits in the middle of the property. The UG2 outcrops are seen from N-S and NW-SE in the western part of the property.

Folding

The stereographic projection of poles to planes of layering illustrates that the Bushveld Complex has been subjected to gentle folding on a NNW-trending fold axis. Field data suggests that the Everest North area is underlain by an open syncline structure. It is possible that such orientated folds are within the stress field of the generally dextral Steelpoort Fault (WGC, 2009).

Quartzite inlier

During the field investigations between July and September 2008 an inlier of quartzite was found in the Bushveld rocks between the proposed mining area and the Mareesburg River, with a sub-circular outcrop approximately 40 m in diameter forming a local topographic high

point. The quartzite is presumed to be Pretoria Group, and is fractured in outcrop. Such fractures can be associated with the quartzite itself, or with chilling in the margin of the Bushveld rocks (WGC, 2009).

Weathering

Feldspars in anorthosite and mottled anorthosite layers are especially prone to chemical weathering, which was found to be particularly intense where surface water courses flow over the bedrock. It is estimated that the weathered zone may be several metres thick (more than 3 m) in these areas. Weathered areas are characterised by the development of core stones and very soft weathered rock, which is readily eroded into deep (more than 2 m) gullies by flowing surface water. Away from streams, the rocks remain relatively fresh even at surface (WGC, 2009).

Source Areas

It is anticipated that the major sources of pollution on the surrounding environment, associated with the Everest North project, include:

- Contaminated storm water runoff;
- Mine water contained within the dirty water containment facilities such as:
  - Sewage treatment plant;
  - Silt traps;
  - Storm water dam;
  - Return water dam;
  - Pollution control dam;
- Recharge of contaminated water by means of seepage through:
  - The waste rock dump;
  - Stockpile areas;
  - Waste storage facilities;
  - Open cast pit; and
  - Underground mining areas.

2.1.12.4 Groundwater pathways

Information taken from the regional groundwater assessment for the Everest north area, Mpumalanga Province, done by Water Geosciences Consulting (January 2009) was used to help define this section.

Aquifer characteristics

Based on the literature survey and previous groundwater investigations, it is apparent that three aquifers types are present in the study area. These are:

- Shallow alluvial aquifers;
- Weathered or inter-granular type aquifers;
- Fractured rock aquifers; and
- Shallow alluvial aquifers.

Alluvial aquifers

Alluvial aquifers are present in locally distributed unconsolidated sand, silt and clay sediments deposited along the lower reaches of the Klein Dwars, Groot Dwars and Mareesburg Rivers. This aquifer is characterized by low to moderate permeability with boreholes typically yielding around 1 L/s or less. Recharge is primarily downward leakage from the overlying stream and in direct response to rainfall events. Alluvial sediment in the Mareesburg drainage valley may be several metres thick and lateral distribution of the alluvial sediment in both the Groot Dwars and Mareesburg Rivers is likely to be restricted to the immediate banks of the current active channel. These aquifers provide groundwater storage and recharge to the underlying secondary weathered bedrock aquifers with which they are in hydraulic interaction, as well as interacting and contributing to the baseflow of the main rivers. Due to their limited size and/or probable low transmissivity and connectivity to the river baseflow, the alluvial aquifers are not considered suitable groundwater production targets.

Weathered aquifers

Norite, anorthosite and pyroxenite rocks of the Bushveld Complex are characterized by a zone of weathering, which provides suitable porosity and permeability conditions to host an unconfined to locally semi-confined aquifer. This aquifer has a widespread distribution occurring between 4 and 35 m below surface and is best developed underlying the alluvial aquifer and where overburden is generally greater than 2 m thick. The groundwater potential in weathered bedrock aquifers is generally poor to moderate with yields from 0.2 L/s up to 3 L/s. Recharge is mainly direct in response to seasonal rainfall and downward leakage from the alluvial aquifer. Initial investigations in the region suggested that this aquifer may have had potential for significant groundwater supply. However, later investigations have revealed this not to be the case. Transmissivity values range between 0.001-5 m^2/d with S-values of 0.001-0.0001.

Deep fractured bedrock aquifers

The deeper regional confined fractured bedrock aquifer covers the greater part of the catchment and represents fresh and fractured bedrock below the weathered zone. The presence of unweathered Bushveld mafic rocks with very low permeability, poorly connected joint/fractures and dolerite/diabase dykes acting as barriers to groundwater flow ensures that the aquifer system is confined and poorly connected with shallower bedrock and perched aquifers. The permeability of the deep fractured bedrock aquifer, in the absence of open fracture systems is characteristically low, and estimated to be in the order of 0.0003-0.004 m/d (T of 0.00003-0.0004 m^2/d). The storativity for this aquifer varies between 0.001-0.0001. Slightly higher permeability (0.0047 m/d) and transmissivity values up to 0.000432 m^2/d are associated with dolerite dyke contacts.

2.1.12.4.1 Groundwater levels and flow

The groundwater levels recorded during previous investigations within the proposed mining area and immediate adjacent properties ranged between 1.1 and 82.6 m bgl[3].

It is likely that shallow groundwater in the weathered zone flows from local topographic high to low areas. In the immediate area of the proposed Everest North mine site this would mean towards the Mareesburg River. Groundwater originating in the area proposed for mining would therefore flow north and north-east.

Groundwater associated with the Mareesburg alluvium is likely to flow in the same direction as the surface water, with the topography; more or less towards the north in the vicinity of the mine.

Deeper groundwater in the fractured and jointed Bushveld rocks is likely to flow towards the north in general, with the regional topography. Deeper groundwater flow is likely to be modified locally by dykes, faults, deeper zones of weathering and other features.

Aquifer yields

The sustainable borehole yields recorded during the GWC, 2009 investigation were all less than 0.5 L/s. A summary of the aquifer parameters are given in Table 2-14 below.

[3] m bgl – meters below ground level

Table 2-14: Aquifer parameters[4]

Area / Borehole ID	Investigation	Water Levels (m bgl)	Conductivity (m/d)	Transmissivity (m^2/d)	Storativity	Method	Recharge	Level of confidence
Der Brochen Farms	EMPR, Groundwater section, 2002	20.8 – 82.6		0.36 – 0.47 (wa[5])	$1.1e^{-3}$ – $2e^{3}$	Pump test	5% (Groot Dwars catchment)	High/Regional
Dwars River Catchment	Y,Xu Numerical model, 2002		0.00001 – 0.3	9 – 46	$1.1e^{-3}$	Model		High
St George/Helena farms	Tailings Dam No 3&4, 2003	1.48 – 9.8 (wa) 14 – 42 (fa[6])	0.06 – 0.3 (wa) 0.01 – 0.02 (fa) 0.09 (fa-f)	0.005 – 0.024 (wa) 0.001 – 0.002 (fa) 0.008 (fa-f)	0.0001	Slug test	5% (sub-catchment)	Moderate / Site specific
Richmond	EIA – Groundwater, 2003	4.3 - >21	0.15 - 0.16 (wa) 0.0003 - 0.004 (fa) 10 - 47 (fa-f[7])	0.013 - 0.014 (wa) 0.00003 - 0.0004 (fa) 0.9 – 4.1 (fa-f)	0.001 – 0.0001	Slug & Pump test	5% (sub-catchment)	High
Mareesburg	Detailed Hydrogeological study, 2004	7 – 13	$3.44e^{-5}$ – 0.443 (wa) $4.82e^{-5}$ – $1.49e^{-3}$ (fa)	0.0042 – 0.3776 (wa) 0.0017 – 0.0591 (fa)	0.001 – 0.0001	Slug & Pump test	5% (sub-catchment)	High / Site specific

[4] Information sourced from the WGC, 2009 report

[5] Wa – weathered aquifer

[6] Fa – fractured aquifer

[7] Fa-f –fractured aquifer in the presence of fractures

Area / Borehole ID	Investigation	Water Levels (m bgl)	Conductivity (m/d)	Transmissivity (m^2/d)	Storativity	Method	Recharge	Level of confidence
Helena/Mareesburg farms	Wellfield extension, 2005	1.1 – 30.2		20 (wa) 2.3 – 132.5 (fa)	0.03 – 0.0001	Pump test		Site specific
Helena	Tailings Dam No 1, 2005		0.031 – 0.037 (wa) 0.004 – 0.063 (fa)		0.001 – 0.0001	Slug test	3.2 %	Site specific
Everest North – BH35-0107	Groundwater investigation, 2009	29.1		8.6 -14.8		Pump test		High / Site specific
Everest North – BH 35-0108	Groundwater investigation, 2009	10.9		4.2 – 4.3		Pump test		High / Site specific
Everest North – BH 35-0109	Groundwater investigation, 2009	6.8		1.6 – 1.7		Pump test		High / Site specific

2.1.12.1 Receptors

Private boreholes

Groundwater in the Olifants Water Management Area (WMA) (B41G quaternary catchment) area is mainly used for mine water supply, domestic supply and for livestock watering.

The aquifer classification in this catchment is classed as minor aquifers with low to moderate vulnerability and susceptibility to contamination and human impacts.

Base flow to streams – ecological receptors

Baseflow is that part of stream flow that derives from groundwater and shallow subsurface storage. During the dry season, the stream flow is typically composed entirely of baseflow.

The groundwater contribution to baseflow within the project property boundary is from the shallow weathered and alluvial aquifers to the Mareesburg River.

2.1.12.2 Water quality assessment

The baseline groundwater quality assessment is based on the October 2011 hydro-census sampling results (Table 2-15). Water quality is benchmarked against the SANS241:2005 drinking water quality standards and classified by means of a Piper diagram. The position of the sampling points is indicated on **Error! Reference source not found.**.

Compliance with water quality standards

The results of the water quality analysis indicate that baseline water quality in the area exceeds the SANS Class 1 drinking water standards for:

- Manganese (0.12 mg/L) in borehole H35-0107; and
- Iron (0.3 mg/L) in VHKSW01, which is a surface sampling point taken from a stream that runs through the project area from the south to the north.

The reason for the slightly elevated manganese in borehole H35-0107 is most likely dissolution of the natural occurrence of manganese in the host rock, where the borehole was drilled. The slightly elevated iron concentration in the surface stream could be the result of pollution upstream of the site, but this is not confirmed and other unknown reasons might also be the cause.

Table 2-15: Water quality analysis

Sample ID		Total Dissolved Solids	Nitrate NO_3 as N	Chlorides as Cl	Total Alkalinity as $CaCO_3$	Sulphate as SO_4	Calcium as Ca	Magnesium as Mg	Sodium as Na	Potassium as K	Iron as Fe	Manganese as Mn	Conductivity at 25° C in mS/m	pH-Value at 25° C	Aluminium as Al	Free and Saline Ammonia as N	Fluoride as F
Class I	(Recommended)	<1000	<10	<200	N/S	<400	<150	<70	<200	<50	<0.2	<0.1	<150	5-9.5	<0.3	<1	<1
Class II	(Max. Allowable)	1000-2400	10-20	200-600	N/S	400-600	150-300	70-100	200-400	50-100	0.2-2	0.1-1	150-370	4-5 or 9.5-10	0.3-0.5	1-2	1-1.5
	Duration (years)	7	7	7	N/S	7	7	7	7	7	7	7	7	No Limit	1	None	1
H35-0107		193.00	0.43	37.80	113.80	16.08	22.72	17.41	29.49	0.97	>0.006	**0.12**	21.73	6.87	>0.006	>0.015	0.34
H35-0108		255.00	0.30	83.60	85.70	22.21	23.73	15.19	56.95	1.80	>0.006	0.08	15.31	8.52	>0.006	0.04	0.31
H35-0109		227.00	4.49	3.40	198.80	16.43	48.37	22.47	10.63	2.17	>0.006	0.00	36.50	7.61	>0.006	>0.015	0.38
VH15		467.00	2.98	110.50	216.60	55.22	35.42	54.18	76.13	2.53	>0.006	0.02	45.40	7.35	>0.006	>0.015	0.31
VH19		393.00	0.42	64.80	261.00	21.16	64.79	32.82	49.04	3.58	>0.006	0.02	49.90	7.81	>0.006	>0.015	0.46
VHKSW01		93.00	0.23	5.10	86.80	4.42	14.61	10.53	6.11	0.12	**0.30**	0.02	15.60	8.28	>0.006	>0.015	0.33

Plan 11: Position of groundwater sampling points

2.1.12.1 Groundwater classification

A Piper diagram (Figure 2-6) was created using the Windows Interpretation System for Hydrogeologists (WISH). A Piper diagram is utilised to characterise water type in a graphical manner and to distinguish any specific water types in the area. The Piper diagram was quartered to simplify this process. The water samples can be grouped into the left, bottom, right and upper quarters. The position of the water sample on the plot is based on the ratio of the various constituents measured in equivalence and is not an indication of the absolute water quality or the suitability thereof for domestic consumption.

The left quarter is characterised by freshly recharged water and is dominated by calcium-magnesium-bicarbonate. The right quarter is associated with stagnant or slow moving water and is dominated by sodium chloride. The bottom quarter is typical of dynamic groundwater flow and is dominated by sodium bicarbonate and the top quarter typically shows contamination by mining activities (gold and coal) and is dominated by sulphate.

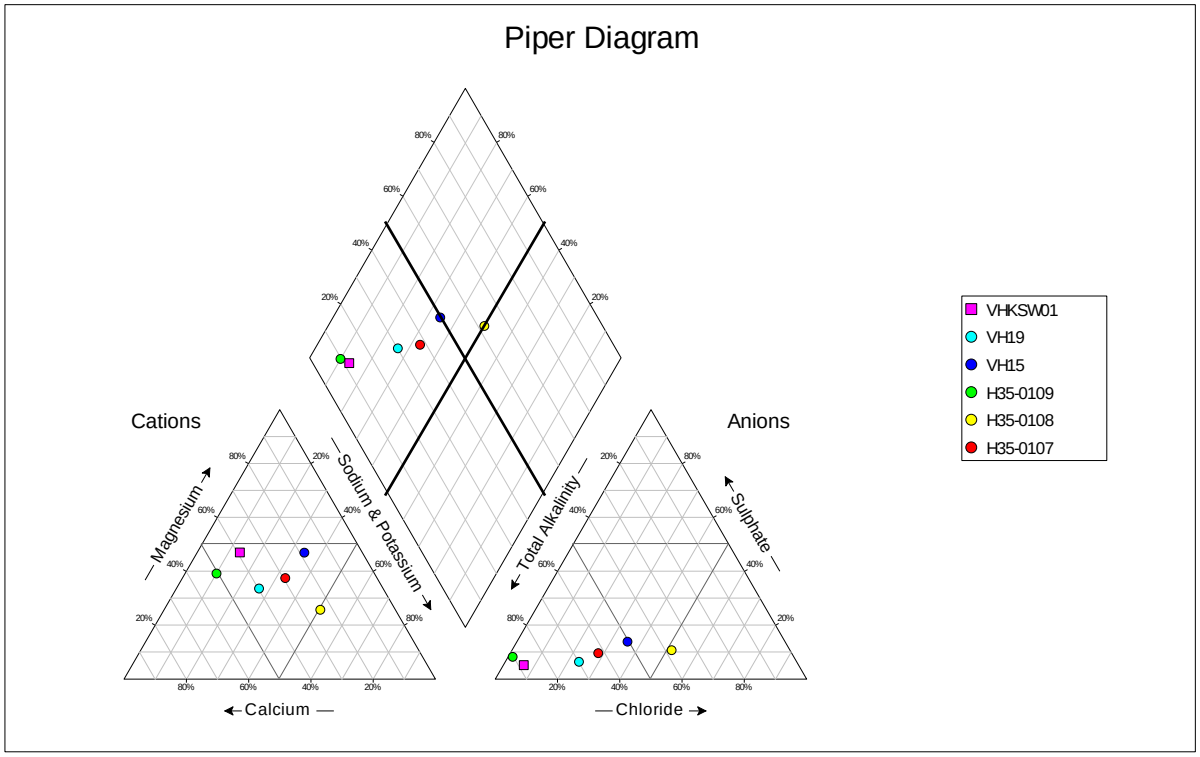

Figure 2-6: Piper diagram

Five of the six samples taken during the hydro-census can be classed as calcium-magnesium-bicarbonate water; which indicate freshly recharged groundwater.

One sample (H35-0108) falls on the border between the top and right hand quarters of the Piper diagram and can be classified as groundwater dominated by chloride, sodium and potassium.

2.1.13 Surface water

The surface water assessment methodology entailed a desktop assessment, site assessment and report compilation.

2.1.13.1 Catchment Characteristics

The catchment characteristics are summarised in Table 2-16 indicating a 10% conversion of MAP to MAR (WRC, 1994).

Table 2-16: Quaternary Catchment Characteristics

Catchment	Catchment Area (km^2)	Project Area (km^2)	% Project Area Catchment	MAP (mm)	MAR (mm)	MAE (mm)	% MAR/ MAP
B41G	442	7.15	1.6	650	66	1500	10

2.1.14 24- Hour Rainfall Depths

Two weather stations close to the study area were considered for the assessment of a 24 hour storm. These are the Lydenburg Weather Station (WD 0554816) located 31 km east of the project area at 25˚ 00' South and 30 28' East and Beetgeskraal Weather Station (0554516), located about 9 km east of the project Area at 25 ˚ 5' South and 30 ˚16' East. To be able to determine the design 24 hour rainfall depths for the 1: 50 and 1: 100 year return periods, the Design Rainfall Estimation in South Africa software (Smithers and Schulze, 2003) was utilised. The summarised data is presented in Table 2-17. The maximum rainfall depth that can be recorded over a 24 hour storm in the area could be on average 159 and 182 mm for a 1: 50 and 1: 100 year event respectively.

Table 2-17: Estimated 24 Hour Rainfall depths

Return Period (years)	1: 50	1: 100
Station Name (Number)	**24 Hour Rainfall Depth (mm)**	
Lydenburg (0554816)	162	186
Beetgeskraal (0554516)	156	177

2.1.14.1 Catchment Delineation

To be able to calculate flood peaks, the quaternary catchment B41G was delineated into 6 sub-catchments around the project site (**Error! Reference source not found.**).

The two unnamed tributaries were named tributary 1 and 2, where tributary 1 is the stream that flows on the west valley and tributary 2 drains the project site on the east. These two drain to a confluence with the Groot Dwars River. Table 2-18 indicates the catchment

characteristics useful for the flood peak modelling. A summary of the delineated sub-catchment characteristics is presented in Table 2-18.

Table 2-18: Sub-catchment delineation summary for B41G quaternary catchment

Sub-catchment	Description
sub1	Upstream project area tributary 1
sub2	Project Area on tributary 1
sub3	Upstream project area on tributary2
sub4	Project Area on tributary 2
sub5	Downstream of Project Area on tributary 2
sub6	Downstream project area on tributary 1

Table 2-19: Sub-Catchment characteristics

Catchment	Area (km2)	Longest Stream Length (km)	Elevation difference at 85% and 10% river length (m)	Distance from outlet to centroid (km)
sub1	7.5	5	130	2.7
sub2	7.2	4	210	1.8
sub3	4	3	52	1.4
sub4	10.5	4	69	1.8
sub5	9.8	3	237	2
sub6	6.2	2	40	1.1

The catchment area that encloses the project area (the watershed for Dwars River tributaries draining the project area) is approximately 45 km^2, which covers 11% of the quaternary catchment B41G.

Plan 12: Sub-catchments

2.1.14.2 Hydrograph Analysis

Separation of the base flow was performed to be able to further understand the hydrology of the area. From the baseflow determined the low flow was determined as the average annual equivalent low baseflow that is equalled or exceeded during 75% of the time during the 4 driest months (May to August) of the year.

The method used is the Digital Filter method in Web-based Hydrograph Analysis Tool (WHAT). This method uses a filter parameter to separate quick flow (inter flow and storm runoff) from baseflow as discussed in several studies for South African conditions. The difference between quick flow and total stream flow is assumed to be baseflow. A hydrograph analysis of the estimated baseflow is illustrated in Figure 2-7.

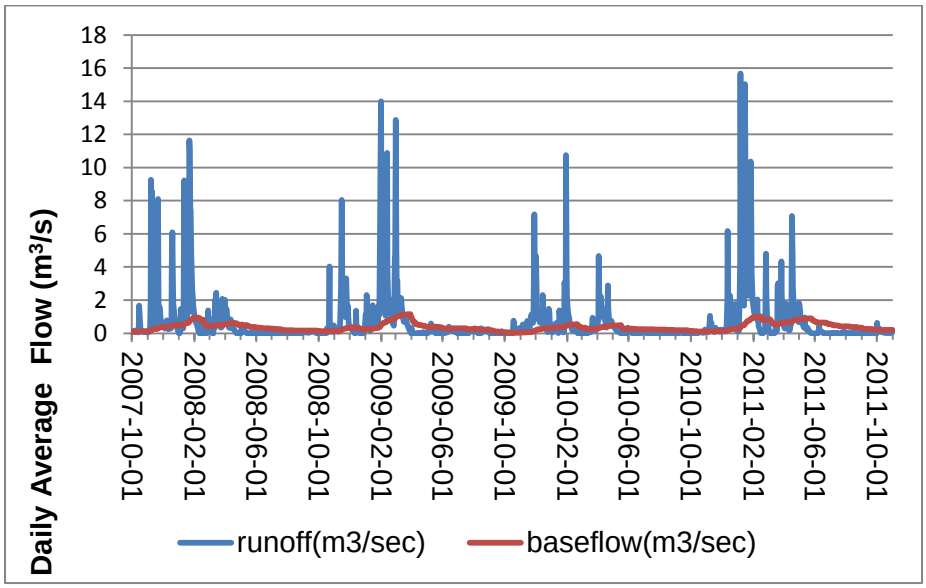

Figure 2-7: Hydrograph separation of the streamflow (DWA, 2012) into daily mean baseflow and runoff (m^3/sec) for the period 2006 to 2011

The baseflow for the catchment was determine to by considering the daily stream flow time series data from DWA Gauge B4H009 situated 14.4 km from the project site. The low flow was determined to be a daily average of between zero and 0.02 m^3/s. Although these are low flow rates, best management practices need to be appropriately applied to reduce and intercept pollutant leaching if base flow contributes significant amounts of pollutants to the stream. A Base flow Index (BFI) of 0.38 was determined. The Baseflow Index (BFI) is the ratio between baseflow and total flow. Therefore a BFI of 0.38 indicates that 38 % of total stream flow can be attributed to baseflow for the respective time period on average from 2006 – 2011.

2.1.14.3 Flood Peak Volume Estimation

The delineated sub-catchments were utilized to calculate the flood volumes. The peak flood volumes were determined using the Utilities Programmes for Drainage (UPD) software (SANRAL, 2007). The flood volumes calculated are presented in Table 2-20.

Table 2-20: Estimated Flood Peaks (m^3/s) for the delineated sub-catchments

Catchment	1:50			1:100		
	Rational	Alternative rational	Standard Design Flood (SDF)	Rational	Alternative rational	Standard Design Flood (SDF)
sub1	81	71.4	82	104	86	104
sub2	110	116	108	142	141	137
sub3	52	53	52	67	64	65
sub4	124	126	115	159	153	146
sub5	178	184	162	228	223	207
sub6	87	92	103	112	112	132

The flood peaks determined from the 3 methods were highly comparative for each of the sub-catchments. The ranges were close to each other for each of the return period. It can then be meaningful to determine the flood peak volumes for the 1: 50 and 1: 100 year return periods as the average value of the 3 methods (Table 2-21).

Table 2-21: Average Flood Peaks (m^3/s) based on the 3 methods

Catchment	1:50	1:100
sub1	78	98
sub2	111	140
sub3	52	65
sub4	122	153
sub5	175	219
sub6	94	119

The determined runoff volumes are high for the small catchment sizes and this was attributed to the hilly nature of the area and the presence of steep slopes. The catchments with relatively steep slopes had large elevation difference between the 10% and 85% stream length.

In line with the legislative requirements, the constructed infrastructure for containing dirty water should be able to contain the 1:50 year 24 hour flood peak flow of 189 m^3/s flow (total volume of 16 000 000 m^3) for sub-catchment 1 and 2 in which the proposed project area falls.

2.1.14.4 Sample Collection

The project area is characterised by hilly terrain with steep slopes and valleys. As a result of the terrain, most of the proposed sampling sites from the scoping phase were inaccessible. However during the baseline assessment on the 16th February 2012, only five samples (out of and the identified 12) were collected (**Error! Reference source not found.**). The ollected samples were labelled SLY (Aquarius) SW (Surface Water) 01 (number) as indicated in Table 2-22 (indicating location and site description).

Table 2-22: Summary of the sampled points and location description

Site ID	Latitude	Longitude	Site Description
SLY SW05	-25.034583	30.149778	Downstream of project area on Dwars River tributary 1 at the edge of the proposed overburden stockpile footprint
SLY SW06	-25.071738	30.162814	Upstream of project area on Dwars River tributary 1 downstream of

Site ID	Latitude	Longitude	Site Description
SLY SW07	-25.056802	30.168937	Upstream into the project area footprint on the Dwars River tributary 2
SLY SW08	-25.069893	30.162499	Upstream of project Area on the downstream of SYL06 on Dwars River tributary 1
SLY SW12	-25.062521	30.162204	Upstream of project Area on Dwars River tributary 1.

2.1.15 Variables Analysed

The following hydrochemical elements were analysed in the collected samples:

- Total Dissolved Solids (TDS);
- Sulphate as SO_4;
- Sodium as Na;
- Magnesium as Mg;
- Nitrate NO_3 as N;
- Fluoride as F;
- Calcium as Ca;
- Potassium as K;
- Chlorides as Cl;
- Iron as Fe;
- Manganese as Mn;
- Electrical Conductivity (EC);
- Total Alkalinity as $CaCO_3$;
- pH-Value at 25° C;
- Aluminium as Al; and
- Free and Saline Ammonia as N.

Plan 13: Surface water sampling points

2.1.16 Surface Water Quality

The chemical analysis results of water samples collected in February 2012 were evaluated against the SANS 241 (2011) drinking water quality standards as summarised in Table 2-23 and against the WHO (2011) guidelines for drinking water as summarised in Table 2-24. The presentation of the results is colour coded to present the Class I and Class II water quality respectively (SANS 241). Where Class I is recommended for drinking water purposes and Class II is drinkable water quality but for limited allowed time of exposure. Values that exceeded Class II are colour coded in red shading. The graphical presentation of the data in WISH graphs is appended.

Water quality data indicated depicted that based on the SANS water guidelines, all variables except Fe, were within class I. The Fe was in Class II for these samples taken at SYL SW 06, 08 and 12.

In terms of the WHO 2011 guidelines for drinking water, the variables analysed were within the drinking water limits with the exception of Fe.

The elevated Fe concentration as shown in both tables could be attributed to the natural geological formations in the area. It is important to note that metals in water supply may occur naturally or may be the result of contamination. Naturally occurring metals are dissolved in water when it comes into contact with rock or soil material. Metals should be removed from drinking water if they are present at high levels that could present a health risk. In this particular case, the iron levels are in the allowable levels although above the ideal. The water for these sampling points still falls in the Class I because Iron in water is not an immediate health hazard by itself. However it may increase the hazard of pathogenic organisms, since many of these organisms require iron to grow.

On comparing the various sampling sites, the sampling point SYL SW05 had relatively higher concentration of Ca, EC, Mg, Na and TDS as compared to the other sampling points although the levels were still within Class I. This sampling site requires closer monitoring and control to prevent the water quality from deteriorating further as a result of the mining activities.

Table 2-23: Chemical Results benchmarked against the SANS 241: 2011 standards

Sample ID		Total Dissolved Solids	Nitrate NO_3 as N	Chlorides as Cl	Total Alkalinity as $CaCO_3$	Sulphate as SO_4	Calcium as Ca	Magnesium as Mg	Sodium as Na	Potassium as K	Iron as Fe	Manganese as Mn	Conductivity at 25° C in mS/m	pH-Value at 25° C	Aluminium as Al	Free and Saline Ammonia as N	Fluoride as F
Class I	(Recommended)	<1000	<10	<200	N/S	<400	<150	<70	<200	<50	<0.2	<0.1	<150	5-9.5	<0.3	<1	<1
Class II	(Max. Allowable)	2400	20	600	N/S	600	300	100	400	100	2	1	370	4-5 or 9.5-10	0.3-0.5	2	1.5
	Duration (years)	7	7	7	N/S	7	7	7	7	7	7	7	7	No Limit	1	None	1
SLY SW05		346	-0.06	5.80	353	9.09	62.8	44.7	10.5	1.08	-0.01	0.00	66.3	7.85	-0.01	0.08	-0.18
SLY SW06		59.0	-0.06	3.90	52.7	4.50	9.06	8.83	0.99	-0.04	0.78	0.00	10.4	8.05	-0.01	0.04	-0.18
SLY SW07		34.0	-0.06	2.00	29.3	2.94	5.17	5.87	-0.03	-0.04	-0.01	0.00	7.71	7.69	-0.01	0.03	-0.18
SLY SW08		59.0	-0.06	3.60	47.8	7.72	9.03	8.82	1.53	-0.04	0.81	0.00	9.95	7.88	-0.01	0.02	-0.18
SLY SW12		50.0	-0.06	2.60	46.6	2.00	9.75	7.18	0.71	-0.04	0.75	0.00	11.6	8.02	-0.01	0.04	-0.18

Table 2-24: Chemical Results benchmarked against the World Bank WHO Standards

Sample ID	Total Dissolved Solids	Nitrate NO_3 as N	Chlorides as Cl	Total Alkalinity as $CaCO_3$	Sulphate as SO_4	Calcium as Ca	Magnesium as Mg	Sodium as Na	Potassium as K	Iron as Fe	Manganese as Mn	Conductivity at 25° C in mS/m	pH-Value at 25° C	Aluminium as Al	Free and Saline Ammonia as N	Fluoride as F
(Recommended) WHO, 2011	1000	50	250	N/S	250	N/S	N/S	200	N/S	0.3	0.1	NS	6.5-8.5	0.2	NS	1.5
SLY SW05	346.00	-0.06	5.80	353.80	9.09	62.80	44.76	10.54	1.08	-0.01	0.00	66.30	7.85	-0.01	0.08	-0.18
SLY SW06	59.00	-0.06	3.90	52.70	4.50	9.06	8.83	0.99	-0.04	0.78	0.00	10.38	8.05	-0.01	0.04	-0.18
SLY SW07	34.00	-0.06	2.00	29.30	2.94	5.17	5.87	-0.03	-0.04	-0.01	0.00	7.71	7.69	-0.01	0.03	-0.18
SLY SW08	59.00	-0.06	3.60	47.80	7.72	9.03	8.82	1.53	-0.04	0.81	0.00	9.95	7.88	-0.01	0.02	-0.18
SLY SW12	50.00	-0.06	2.60	46.60	2.00	9.75	7.18	0.71	-0.04	0.75	0.00	11.58	8.02	-0.01	0.04	-0.18

2.2 Conclusions

The following conclusions can be drawn from the baseline assessment:

- The proposed project could impact on a the delineated sub-catchments covering 11% of the quaternary catchment B41G;
- The surface water quality baseline indicates that the surface water resources on the tributaries to the Groot Dwars River draining through the proposed project area are in Class I and II of SANS drinking water standards which indicates a relatively pristine rural environment; and
- The variable that could potentially cause concern due to it falling in Class II in the present baseline state of the surface water is Fe.

2.3 POTENTIAL IMPACTS

Below is a brief discussion of the **significant** potential impacts on the individual aspects of the site. The individual activities are rated in an impact matrix according to their significance on activities occurring through the different phases of the project.

2.3.1 Air Quality

The phase will comprise a series of different operations including land clearing, topsoil removal, material loading, hauling, stockpiling, grading, bulldozing and compaction. The initial operation is removal of topsoil and subsoil with large scrapers. The topsoil will be stockpiled for rehabilitation. Each of these operations has its own duration and potential for dust generation. Fugitive dust (containing TSP (total suspended particulate, will give rise to nuisance impacts as fallout dust), as well as PM_{10} and $PM_{2.5}$ (dust with a size less than 10 micron, and dust with a size less than 2.5 micron giving rise to health impacts)) It is anticipated therefore that the extent of dust emissions would vary substantially from day to day depending on the level of activity, the specific operations, and the prevailing meteorological conditions. The abovementioned activities will be short-term, localised, and will have low impact that will seize once the construction activities are finalised.

2.3.2 Soil and Land Use

- The potential site specific impacts of opencast coal mining activities are high due to the removal and stockpiling of the natural occurring soil layers. Stockpiling of soil leads to decreasing soil quality due to the chemical and physical degradation. Examples of chemical degradation are loss of soil fertility and loss of soil carbon while physical degradation takes place in the form of soil compaction.
- The impact on regional land capability and land use is moderate due to the estimated impacted area. No agricultural activity will be possible during the construction, operational and decommissioning phases.
- Land capability and land use can only be rehabilitated after the decommissioning phase. Returning to pre mining land capability depends on the rehabilitation efforts

during soil profile reconstruction in the rehabilitation phase. The reverse order of stripping should be used using specified horizon thicknesses and acceptable soil materials. Soil fertility and acidity can be reclaimed after rehabilitation through representative soil sampling and testing, rectified if needed followed by re-vegetation.

2.3.3 Visual

The removal of topsoil and vegetation will have a negative visual impact on the receiving environment. The project area will become noticeable to the nearby visual receptors as it will contrast the surrounding areas. If not managed appropriately, soil erosion may result, which may have further visual impacts. The removal of topsoil and vegetation by heavy machinery will generate large amounts of dust which will draw attention to the project area.

The development of haul roads, pipes and storm water diversion berms will have a negative visual impact on the receiving environment. The visual impact of surface infrastructure will in most cases occur for the life of the project. The transport of construction material and stockpiling will have a negative visual impact on the receiving environment. Vehicular activity and the resulting dust will draw attention to the project area. Infrastructure lighting will be visible at night and will have a negative visual impact on the receiving environment. These visual impacts will occur for the life of the project.

Drilling and blasting will have a negative visual impact on the receiving environment. The boxcut will dramatically contrast the surrounding bushveld and grassland vegetation and will leave a permanent scar on the landscape. Dust resulting from the blasting will have a negative visual impact on the receiving environment. Topsoil and overburden stockpiling will have a negative visual impact on the receiving environment. Dust from stockpiles will have a negative visual impact on the receiving environment.

The removal of overburden by drilling and blasting (with explosives) will have a continual negative visual impact on the receiving environment. Overburden stockpiling will have a negative visual impact on the receiving environment. These visual impacts will occur for the life of the project. Dust from vehicle movement will add to the visual impacts.

2.3.4 Fauna and Flora

All vegetation communities, identified during field that are present within the proposed area of development and will be impacted on. Of concern is the natural areas as the existing vegetation (savannah bushveld, wooded slopes, rocky areas and riparian areas) will be disturbed to facilitate the construction of mine and related infrastructure. The wooded slopes and bushveld savannah will be impacted on the most as the open cast pit and road leading to this will cross both these vegetation types. This will include the continuous and complete removal of vegetation on the footprint of the actual pit. This activity is considered to be short term and will occur during the construction phase. The fact that the area of interest falls within the Sekhukhuneland Centre of Plant Endemism (SCPE) indicates that sensitive landscapes and protected plant and animal species do occur here, therefore the impact will be regional in extent with impacts likely to occur on site. The presence of sensitive habitats

and species, specifically the *Pycna sylva*, Leopard, *Zantedeschia pentlandii* (Yellow Arum) and *Lydenburgia cassinoides* (Sekhukhune bushman's tea) does however mean that destruction will be a regional loss of the habitat type. The severity of the impact was determined to be high.

The partial degradation of natural vegetation and habitat for animal life has already taken place within the surrounding environment due to current land use practices. The destruction of the areas with undisturbed natural open savannah and wooded slopes and riparian areas will result in the permanent reduction of natural habitat of reptiles, birds, frogs, insects and mammals present within the areas. The destruction of the wooded slopes habitat type will be of special concern as this is where the host tree for the Pycna Sylva was encountered. The impact will be site specific in extent with impacts likely to occur on site. The severity of the impact was determined to be high.

The replacement of overburden and topsoil throughout the life of mine as well as the final replacement during the decommissioning phase may result in the restoration of the natural vegetation. This activity is considered to be medium in duration as it will be required for the decommissioning phase. The extent will be site specific with effects being on site. The severity of the impact was determined to be moderate.

2.3.5 Aquatics

The removal of topsoil and vegetation may impact on the water quality of the Dwars River. This activity which is expected for the haul and ring roads, mining infrastructure and portions of the opencast pit will result in the creation of areas susceptible to erosion. The loss of surface roughness will increase the run-off velocity for the catchment, increasing the erosion potential for the area. The eroded material will be transported to the Dwars River which will result in sedimentation of the system, impacting on the water and habitat quality of the system. The impact is expected for the duration of the project, for as long as areas are exposed to high run-off potential. Impacts to the Dwars River will not only be local, adjacent to the operational area, but impacts are expected to occur further downstream as sediment is transported away from the site. Owing to the fact that the Dwars River is considered to be in a largely natural state, as well as considering that the catchment is a FEPA and described as Highly Significant for the C-Plan, any impacts to the Dwars River are considered to be significant. The likelihood of the activity impacting on the system is highly probably.

The most notable impact to the Dwars River will be as a result of the proposed haul road crossing the river system. The activities associated with the construction of the haul road may result in spillages and leaks of contaminants into the system, impacting on the water quality of the system. Additionally, the loss of riparian areas which provide important services for the system such as bank stabilisation and habitat for biota. The loss of the riparian areas may result in the river banks becoming unstable and susceptible to erosion, as well as resulting in a loss of habitat. In addition to this, modifications to the natural channel will alter the hydrology of the system. The construction of the bridge for the haul road is expected to be permanent but impacts associated with the activity may be mitigated.

Impacts to the Dwars River are expected to be transported downstream away from the site, impacting on a larger river reach.

2.3.6 Groundwater

Due to numerical modelling not complete at the time of compiling this report, the potential impacts cannot be quantified. These impacts however, may include:

- Site clearing and removal of topsoil, may lead to surface water forming puddles in the cleared areas during the wet season and potentially lead to increased infiltration to the weathered and alluvial aquifers.
- Oil or fuel spillages from site clearing and construction machinery may collect in the soils.
- During rainfall events, hydrocarbon compounds from oils and fuel in the soils may migrate to the subsurface water bodies with water infiltrating through these polluted areas.
- Replacement of overburden in the opencast mining areas will lead to an increase in infiltration and subsequently to aquifer recharge. This will occur even after topsoil placement and re-vegetation, due to an increase in porosity that occurred compared to baseline conditions.
- Dewatering of underground mining areas will lead to a decline in the groundwater levels in the immediate surrounds of the mining area.
- Rainwater infiltrating through the overburden stockpiles, ore stockpiles and/or backfilled material and the underlying soils into the groundwater environment could pollute the aquifers, by means of an increased salt load.
- The storage of hazardous products and mine waste material such as sewage and discard may have a potential negative effect on groundwater quality should there be a spillage/leaks that could infiltrate through the soils to reach the groundwater table
- Rehabilitation activities at mine closure should reduce the potential for pollution from mining activities and have a positive impact on the recovery of the groundwater quality.

2.3.7 Surface water

The water environment in which the project will take place is in a relatively pristine state based on the SANS 241 and the WHO, 2011 drinking water quality guidelines. The execution of the project must ensure that there are no/ minimum impacts on the surface water environment particularly in terms of quality which has indicated most significance compared to quantity. The implementation of monitoring as an early impact detection tool must be enforced to ensure that the recommended mitigation measures are implemented in time.

Importantly, the on-going rehabilitation will significantly reduce the significance of the impacts on quality and quantity. This has to be implemented in the prescribed manner (particularly with the backfilling of overburden followed by the different soils).

The most significant impacts identified relate to surface water quality and these have a potential to spread from local to regional extent, thus the execution of the project must be

sensitive to the likely potential of these impacts arising. During the execution of the project, it will be imperative that surface water quality monitoring programme should be executed during all stages of the project.

The handling and storage of hazardous substances are most likely to present the most significant impacts. Another noticeable impact can be attributed to erosion in areas where vegetation has been cleared and on stockpiles (ROM, topsoil and overburden). It is also important to ensure that the frequency of monitoring is increased in the construction and decommissioning phases to enable the early detection of negative impacts.

The major surface water risks and findings within the project sub catchments are:

- The most significant impact could result from accidental spillage of hazardous substances (hydrocarbon containing, explosives and sewerage) and the pro-longed spillage of such materials;
- Soil erosion from the topsoil berms used for clean and dirty water separation (particularly in the dry season during construction phase) could result in adverse siltation impacts at the on-set of the raining season;
- Blasting could arise in water quality and quantity impacts as some of the explosives contain nitrates and ammonia and these could result in water contamination. At the same time improper blasting could result in unnecessary cracks in the aquifer bed, thus altering the surface water-groundwater interaction reducing stream flows;
- The mining process (particularly the strip mining methods), crushing and screening and handling of the ROM, topsoil, overburden and excess rock stockpiles could result in water contamination from the generated rock fines and dust;
- The removal of surface infrastructure could result in major and minor accidental spillages/ exposure of areas where there has been pro-longed leaks. Procedures for water management and decommissioning if followed carefully could prevent/ reduce the significance of resultant impacts. Good waste handling and appropriate disposal could reduce these impacts;
- The backfilling, re-vegetation and contouring of mining footprint will result in a neutral impact as it will result in restoring the clean runoff to the catchment once the reclamation and rehabilitation is completed (although he conditions may not be returned to pre-development state); and
- Residual impacts will include the altered hydrology of the sub catchment and the hydrocarbon water contamination which can remain altered even with the construction of closure water management structures.

2.4 Cumulative impacts

During the EIA phase cumulative impacts were assessed in order to determine how the proposed project will contribute to the already existing and potential future environmental impacts occurring in the area. A historical approach was taken to assessing the aspects together with current and proposed activities with the use of available resources to establish

the possible occurring cumulative impact within the geographical zone. Related consequences of identified cumulative impacts will be determined through a cause and effect relationship approach.

2.4.1 Soils

Cumulative impacts may result from repeated erosion and soil pollution events caused by numerous contractors operating at different sites. Most of the erosion however, is expected to occur in along main unpaved roads.

During the construction phase of the opencast mine project, the work carried out will be mainly setting up of infrastructure, viz. roads, buildings, workshops. This will entail clearing of areas and the disturbance of the topsoil. The topography and natural drainage lines may be disturbed; the overall impact will be loss of topsoil due to erosion and possible contamination of the soil by fuel and oils due to general construction activities. The main concern with soil contamination is that, due to the low permeability of the clay soils, oils and fuels could be washed into wetlands and streams.

As a result of the impact on the soils as described above, the soil and land capability is not expected to be affected negatively because the soil disturbance, contamination and pollution are confined to small areas. If heavy vehicles and machinery are not confined to the permanent roads, widespread erosion may take place. Although the land capability will be reduced in the immediate area of the infrastructure it is unlikely that the land capability of the total project area will be significantly affected.

As with soil impacts, the impact on land capability will be negative and may become widespread which would lead to a decrease in the land capability. There should not be any significant cumulative impacts.

2.4.2 Land Use and Land Capability

Past mining activity in the area has seen the loss of agricultural and grazing land, with mining occupying large areas of land for their operations. The proposed development of the Everest North Project will necessitate the acquisition of large expanses of land, thus adding to the loss of available agricultural and grazing land.

2.4.3 Air Quality

There are various developments around the mine, which include Everest South processing plant and other platinum mines around the area, such as Kennedy's Vale, Spitzkop and Modikwa, as well as Tubatse smelter near Steelpoort. These emit pollutants into the atmosphere, however; the emissions from these sources and developments have not been quantified.

2.4.4 Noise

Cumulative impacts should be considered for the overall improvement of ambient noise levels. The proposed project is considered a causative source of noise pollution of a low significance. Because of the lack of other major sources of high noise levels in the

immediate area of the proposed project, the proposed project in isolation is not considered a significant contributor to the cumulative noise impacts to the area.

Noise levels from the proposed project must therefore be monitored to determine potential sources of noise, increases and decreases in noise levels, and determine level of mitigation required. A grievance mechanism should be introduced whereby receptors and people in the area can may a complaint regarding noise levels. In this event each complaint is to be investigated to determine the source and possible noise reduction measures. The grievance mechanism forms part of the public participation programme.

After post closure phase of the proposed project, overall ambient levels will decrease to the pre-mining baseline and the cumulative impacts in the area could improve.

2.4.5 Visual environment

The region is characterised by mountainous topography which is predominantly used for game farming, cattle farming, crop agriculture and mining activities. The general sense of place can be described as being a remote and “off the beaten track”. The project boundary is located on a transitional zone between two vegetation types, being mixed bushveld and north-eastern mountain grassland (Acocks, 1988). The vegetation of the area can be described as being in good condition. There are no mining activities within a 10 km proximity to the project site, and therefore, the proposed mine will be the first in the area. It is expected that the proposed Everest North Mine will have a significant negative visual impact on the surrounding environment.

2.4.6 Fauna and Flora

When considered in isolation this Aquarius Platinum project might be able to mitigate certain impacts on the natural environment so that further disturbance and even extinction of the *Pycna* species would occur. However, when considering the Sekhukhuneland in its entirety the consequence of on-going mining in Sekhukhuneland is irreversible damage that could lead to the extinction of many endemic or Red Data species.

Various mining projects currently underway can be seen in Table 2-25. When considering these mining activities many concerns are apparent:

- The *Pycna sylvia* habitat which is very restricted is constantly being reduced and if continued will lead to the extinction of this species;
- SCPE is a biodiversity hotspot due to the many endemic species that only occur here. Large communities of Red Data species are being destroyed including all the endemics. This too can lead to the extinction of species;
- The mountainous ranges are important habitat for endemic species and Red Data species such as Leopard and Brown Hyena and this is constantly being reduced;
- Besides mining activities, residential developments are also planned that will increase human populations and so the anthropogenic impacts will increase on the environment; and
- The more the natural environment is impacted upon, the more the tourism value will decrease.

Information will be supplied to the environmental authorities to make a knowledgeable decision so that the remaining SCPE and areas of ecological importance remain conserved.

Table 2-25: Existing and planned mines in Greater Sekhukhune District Municipality (GSDM, 2010).

Mine	Controlling Company	Local Municipality
Expansion in progress or production building up		
Lebowa Platinum	Angloplat	Fetakgomo LM
Modikwa	Angloplat African Rainbow Minerals	Tubatse LM
Mototolo	Angloplat	Tubatse LM
Everest South	Aquarius	Within 30km of GSDM
Two Rivers	African Rainbow Minerals	Tubatse LM
Marula UG2	Implants	Tubatse LM
Bankable feasibility study completed		
Blue Ridge	Ridge	Elias Motsoaledi LM
Bankable feasibility study planned or underway		
Sheba's Ridge	Ridge	Elias Motsoaledi LM
Smokey Hills	Platinum Australia	Tubatse LM
Twickenham	Angloplat	Tubatse LM
Mareesburg	Eastern Plats	Tubatse LM
Marula Merensky	Implants	Tubatse LM
Pre-feasibility study in progress or completed		
Kennedy's Vale	Eastern Plats	Tubatse LM
Der Brochen	Angloplat	Tubatse LM
Booysensdal	Angloplat	Within 30km of GSDM
Advanced exploration		
Ga-Phasha	Angloplat	Fetakgomo LM
Loskop	Boynton	Elias Motsoaledi LM
Early exploration		
Grootboom	Boynton	Tubatse LM
Tjate	Jubilee	Tubatse LM
Kliprivier	Nkwe	Within 30km of GSDM
Tinderbox	Placer Dome	Elias Motsoaledi LM
Berg	Platfields	Within 30km of GSDM

The area of study is located within the Mpumalanga province and is therefore covered by the Mpumalanga Conservation plan, as discussed in the scoping report. According to the C-Plan data, the area of concern falls within the least concern category and the area of the property utilised for agriculture, indicated as no natural habitat remaining.

2.4.7 Aquatics

The Dwars River was determined to be in a largely natural state, with the system supporting sensitive aquatic biota. In addition to this, the catchment area is identified as a FEPA as well as an area of High Significance according to the C-Plan, this refers to the need for protection of the catchment as there is very limited choice for meeting selected targets. Findings from the study suggest that the surrounding land uses and activities are not impacting on the state of the system and as a result, the proposed mining operation is expected to have a considerable impact on the state of the system.

2.4.8 Surface Water

Platinum mining presents negative water quality impacts which emanate from the activities in the form of hard rock waste and other particulate matter impacts. These result in deterioration and alterations of the natural wetlands and streams thus prolonged risk to aquatic life, livestock as well as health risks to humans.

The proposed project area water resources have not yet been negatively impacted upon and the negative impacts from mining will then deteriorate the surface water environment. In order to reduce the deterioration of the water environment, the execution water management strategies and through the implementation of mitigation measures where the impacts arise should be performed.

The most significant impacts relate to the contamination of surface water in the catchment during the operational activities and reduced stream flows through the alteration of the aquifer bed resulting from blasting activities.

Although there will be alteration of the surface hydrology and volume of runoff reporting to the catchment, the minimization of the dirty area will limit the impacts and subsequent contaminated volume of runoff. The backfilling, grading and contouring of the rehabilitated areas should also be implemented to prevent runoff damming and to ensure that the surface runoff reports to the catchment.

2.4.9 Heritage and Archaeology

All sites that fall inside the proposed mine plan or within 500 m of the mineable resource area should be mitigated. General mitigations include adjustment of the proposed impact area as far as possible to conserve identified heritage resources *in situ* and implementing a watching brief during construction. Where adjustments of the proposed impact areas are not feasible, it is recommended that a Phase 2 Heritage Assessment be conducted and a Destruction Permit from the HRA be applied for. It is recommended that the Choma Village Complex be conserved *in situ* and nominated for Grade III Heritage Site status with the SAHRA. Due to its high cultural significance, it is recommended that the southern portion of the project area be declared a fatal flaw and excluded from the project.

2.4.10 Socio-economic environment

Mining activities are currently in progress in surrounding areas, including that of the Everest South Mine. It is therefore not always possible to clearly define cumulative impacts that are directly attributable to the proposed Project. However, it is anticipated that the Project will result in minimal new significant impacts, with several impacts being of a cumulative nature.

2.4.11 Availability of improved transport routes

Mining activity within the Thaba Chweu Municipal area has resulted in several new roads being built and upgraded. Although this has resulted in increased traffic volumes, the new roads have improved the local transport network. The roads required for the operation of the proposed project may result in further improvements to this network

3 REGULATION 50 (B) AND 50 (D)

(b) an assessment of the environment likely to be affected by the identified alternative land use or developments, including cumulative environmental impacts;

(d) a comparative assessment of the identified land use and development alternatives and their potential environmental, social and cultural impacts;

The project is currently in its prefeasibility phase therefore many alternatives have been investigated and narrowed down to those that are more viable than others. As the project progresses into feasibility these options will be eliminated and only the most suitable alternatives will be carried through as the base case scenarios.

3.1.1 Alternative Land Uses

In accordance with the current land uses in the vicinity of the proposed project, parts of the proposed project site could, as an alternative to mining in the project area, be used for conservation (maintain the natural habitat where possible) and agriculture or small scale farming. Although it is recommended that areas not used for mining be utilised or conserved, alternative land uses in some areas is limited by the relatively steep terrain and rockiness of the area. When considering the post rehabilitation land use alternatives, the only option considered to date is rehabilitation back to the current land use capability.

3.1.2 Project Alternatives

Alternatives are being considered for a number of the project components. For each component a set of selection criteria will be used to optimise environmental, technical and economic factors. The selection criteria for the various components are outlined below.

3.1.3 Alternative mining methods

In the proposed project area the target orebody outcrops on the surface and extends underground in a westerly direction. Both open pit and underground mining methods can be used to access the ore body. A significant portion of the mineable ore reserve (approximately 30%) is located within the top 40 m of the orebody, around the outskirts of the ore body. Due to the small nature of the orebody and for the proposed mine to be feasible, a combination of open pit and underground mining methods are being proposed to exploit the full extent of the ore body. It has been reported that no other feasible mining methods exist for this orebody.

3.1.3.1 Alternative processing options

Two options were considered for processing mined ore.

- Option 1: Develop a new site on the farm Vygenhoek 10JT for the mineral processing plant, mine residue disposal facilities, and supporting services and facilities; and
- Option 2: Transporting the mined ore to a nearby mining facility where existing processing, residue disposal and support facilities will be used. This option may

require the upgrading of existing infrastructure and/or additional infrastructure at the mine depending on available capacities. Any environmental authorisation required for this option will form part of a separate application by the relevant mine operators to the relevant government departments.

Option 2 was chosen as the preferred option due to the following selection criteria:

- Technical considerations;
- Capacity issues;
- Environmental protection (air, soils, water, surrounding communities, visual aspects, and biodiversity); and
- Affordability.

3.1.4 Alternative transport options

As option 2 above was chosen as the preferred option, two alternative transport options have been identified for transporting mined ore to EPM. These include:

- Transport by road using the existing road network; or
- Establishing a conveyor system between the project area and EPM.

Transport by road was chosen as the preferred alternative, based on the following criteria:

- Ecology and archaeology/heritage issues;
- Hydrology issues;
- Land use and land capability issues
- Long term visual impact issues;
- Proximity to residential areas/ dust issues;
- Public safety issues;
- Access to property and space availability;
- Operating, capital and closure costs; and
- Emergency management.

3.1.5 Alternative power supply options

Alternative power supply options such as diesel generators, solar panelling or combinations thereof will be investigated during the EIA/EMP report phase.

3.1.6 Alternative water supply options

The alternatives are local/regional boreholes, groundwater inflows into the workings, rainfall inputs to the pits, De Hoop dam, Lebalelo Pipeline, or a combination of the above. The selection criteria are:

- The sustainability of both the resource and the supply;
- Impact on existing water users; and
- Affordability.

3.1.7 Alternative surface infrastructure layout options

The placement of the proposed underground declines has been done to optimise the efficient mining of the resource. Different options regarding the locality and layout of mining and plant infrastructure are being investigated while giving due consideration to environmental, social and economic factors.

3.1.8 No-mining alternatives

The current use of land in the regional surrounding of the proposed project area is farming and agriculture. Although the proposed Everest North Project area is not currently actively used for farming and agriculture, it has the potential to serve as grazing land or subsistence farming and agricultural land for surrounding communities. The no-mining option would result in the continuation of such land use. Although economically viable, the continuation of agriculture may not provide the level of short-term economic growth to the area that mining would offer, such as increased employment of residents in the area, greater economic input into the area allowing better development of the towns and surrounding areas, and greater socio-economic stability in the area.

After mine closure and rehabilitation of mined areas, the land capability may return to a state which would allow the continuance of agricultural practices or grazing. The mine will also promote sustainable local economic development, to give communities the skills required to remain economically viable and successful on the long-term, after mine closure.

4 REGULATION 50 (C)

(c) an assessment of the nature, extent, duration, probability and significance of the identified potential environmental, social and cultural impacts of the proposed mining operation, including the cumulative environmental impacts;

4.1 Assessment and evaluation of impacts

The impacts have been described according to the project activities in order to provide an understanding of what objectives and recommended management measures are required to minimise the environmental impacts arising from these activities. This section describes the environmental impact assessment results associated with the proposed project activities. The proposed project activities are shown in Table 4-1 and these activities were assessed under each specialist aspect below. The impact assessment below is described per phase, and each activity is addressed.

Table 4-1: List of Project Activities

Phase		Activity
Construction	1	Site Clearing: Removal of topsoil & vegetation
	2	Construction of any surface infrastructure e.g. haul roads, pipes, storm water diversion berms (including transportation of materials & stockpiling)
	3	Drilling, blasting and development of initial boxcut for mining (incl. stockpiling from initial cuts).
	4	Temporary storage of hazardous products (fuel, explosives) and waste or sewage.
Operation	5	Removal of overburden and backfilling when possible (including drilling/blasting hard overburden & stockpiling)
	6	Use and maintenance of haul roads (incl. transportation of coal to washing plant)
	7	Removal of ore (mining process) and ROM stockpile
	8	Water use and storage on site
	9	Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste, sewage, discard)
	10	Concurrent replacement of overburden, topsoil and revegetation
Decommissioning	11	Demolition and removal of all infrastructure (incl. transportation off site)
	12	Rehabilitation (spreading of soil, re-vegetation & profiling/contouring)
	13	Installation of post-closure water management infrastructure
	14	Environmental monitoring of decommissioning activities

	15	Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste, sewage, discard)
Post-closure phase	16	Post-closure monitoring and rehabilitation

4.2 Methodology

In order to clarify the purpose and limitations of the impact assessment methodology, it is necessary to address the issue of subjectivity in the assessment of the significance of environmental impacts. Even though Digby Wells, and the majority of environmental impact assessment practitioners, propose a numerical methodology for impact assessment, one has to accept that the process of environmental significance determination is inherently subjective. The weight assigned to each factor of a potential impact, and also the design of the rating process itself, is based on the values and perception of risk of members of the assessment team, as well as that of the interested and affected parties (I&APs) and authorities who provide input into the process. Whereas the determination of the spatial scale and the duration of impacts are to some extent amenable to scientific enquiry, the severity value assigned to impacts is highly dependent on the perceptions and values of all involved.

It is for this reason that it is crucial that all EIA's make reference to the environmental and socio-economic context of the proposed activity in order to reach an acceptable rating of the significance of impacts. Similarly, the perception of the probability of an impact occurring is dependent on previous experience, perceptions, aversion to risk and availability of information.

4.2.1 Impact Identification

Impact identification was performed by use of an Input-Output model which served to guide Digby Wells in assessing all the potential instances of ecological and socio-economic change, pollution and resource consumption that may be associated with the activities required during the construction and operational phases of the project, as it is expected that the power stations will be handed over to a power utility for further use and maintenance.

Outputs may generally be described as any changes to the biophysical and socio-economic environments, both positive and negative in nature, and also included the product and anticipated waste produced by the project. Negative impacts could include, dust, noise, safety issues and changes to the bio-physical environment such as damage to habitats and loss of fertile soil. Positive impacts may include the construction of infrastructure, skills transfer or benefits to the socio-economic environment. During the determination of outputs, the effect of outputs on the various components of the environment (e.g. topography and aquatic environment) was considered.

During consultation with I&APs, perceived impacts were identified. These perceived impacts were included in the impact assessment and significance rating in order to differentiate between probable impacts and perceived impacts.

4.2.2 Impact rating

The impact rating process is designed to provide a numerical rating of the various environmental impacts identified by use of the Input-Output model. As discussed above, it has to be stressed that the purpose of the EIA process is not to provide an incontrovertible rating of the significance of various aspects, but rather to provide a structured, traceable and defendable methodology of rating the relative significance of impacts in a specific context. This gives the project proponent a greater understanding of the impacts of his project and the issues which need to be addressed by mitigation and also give the regulators information on which to base their decisions.

The equations and calculations were derived using Aucamp (2009).

The significance rating process follows the established impact/risk assessment formula:

$$Significance = Consequence \times Probability$$

Where $Consequence = Severity + Spatial\ Scale + Duration$

And $Probability = Likelihood\ of\ an\ impact\ occurring$

The matrix calculates the rating out of 147, whereby Severity, Spatial Scale, duration and probability are each rated out of seven as indicated in Table 4-2.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in the Environmental Management Programme (EMP). The significance of an impact is then determined and categorised into one of four categories, as indicated in Table 4-3.

Table 4-2: Impact assessment parameter ratings

Rating	Severity	Spatial scale	Duration	Probability
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or eco system. Persistent severe damage.	International The effect will occur across international borders	Permanent: No Mitigation No mitigation measures of natural process will reduce the impact after implementation.	Certain/ Definite. The impact will occur regardless of the implementation of any preventative or corrective actions.
6	Significant impact on highly valued species, habitat or ecosystem.	National Will affect the entire country	Permanent: Mitigation Mitigation measures of natural process will reduce the impact.	Almost certain/Highly probable It is most likely that the impact will occur.
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate	Province/ Region Will affect the entire province or region	Project Life The impact will cease after the operational life span of the project.	Likely The impact may occur.
4	Serious medium term environmental effects. Environmental damage can be reversed in less than a year	Municipal Area Will affect the whole municipal area	Long term 6-15 years	Probable Has occurred here or elsewhere and could therefore occur.
3	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month.	Local Local extending only as far as the development site area	Medium term 1-5 years	Unlikely Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur.
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/	Limited Limited to the site and its immediate surroundings	Short term Less than 1 year	Rare/ improbable Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the project but has happened elsewhere. The

Rating	Severity	Spatial scale	Duration	Probability
	without help of external consultants.			possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures
1	Limited damage to minimal area of low significance, (e.g. ad hoc spills within plant area). Will have no impact on the environment.	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month	Highly unlikely/None Expected never to happen.

Table 4-3: Probability Consequence Matrix

Significance									
	Consequence (severity + scale + duration)								
	1	3	5	7	9	11	15	18	21
Probability / Likelihood									
1	1	3	5	7	9	11	15	18	21
2	2	6	10	14	18	22	30	36	42
3	3	9	15	21	27	33	45	54	63
4	4	12	20	28	36	44	60	72	84
5	5	15	25	35	45	55	75	90	105
6	6	18	30	42	54	66	90	108	126
7	7	21	35	49	63	77	105	126	147

Table 4-4: Significance threshold limits:

Significance		
High	**108- 147**	
Medium-High	**73 - 107**	
Medium-Low	**36 - 72**	
Low	**0 - 35**	

Following the determination of the significance) for each aspect, the values were transferred to a single table and tabulated according to aspect. At this point each aspect was weighted according to the relevance for the project site. A value of one to seven was used for this weighting system, with one being the least important aspect and seven being the most important aspect. This weighting is used (by multiplying it by the established significances) to highlight the activity proposed for the project with potentially the most significant impact. The table below show the rating of the significance of each aspect on the project area (Table 4-5).

Table 4-5: Weighting values of significance per aspect on the project area

1	**Negligible**
2	**Minor**
3	**Low**
4	**Medium -low**
5	**Medium**
6	**Medium-high**
7	**High**

4.2.3 EIA Objective

Below the environmental impact assessment is described and assessed. The social and heritage impact assessments are described in **Sections 10** and **11** respectively, in order for appropriate methodologies to be utilised for the impact assessment for each of the aspects i.e. Environmental, Social and Heritage.

The main objective of the EIA Phase was to;

- Determine the sensitivity and ecological status quo of the receiving environment through specialist investigations;
- To identify the activities involved in all phases of the proposed project that may result in a detrimental impact to the receiving environment;
- To determine the significance of identified impacts; and

- To relay findings of the EIA to all stakeholders.

4.2.4 Impact Assessment Matrix Table

Below is the impact assessment matrix for which the methodology is described above. Gaps in the matrix do not necessarily mean that the activity has no influence on the aspect however the impact may not be direct and may be as a result of another activity.

Table 4-6: Significance of impacts during construction

Activity, Phase and Impact				ct
Activity Description	Impacted Environment	Summary of Impact	Significance (147)	Significance (147)
CONSTRUCTION PHASE				
Activity 1: Site Clearing: Removal of topsoil & vegetation	Visual	The removal of topsoil and vegetation will have a negative visual impact on the receiving environment. The project area will become noticeable to the nearby visual receptors as it will contrast the surrounding areas. If not managed appropriately, soil erosion may result, which may have further visual impacts. The removal of topsoil and vegetation by heavy machinery will generate large amounts of dust which will draw attention to the project area.	98	91
	Fauna & Flora	The partial degradation of natural vegetation and habitat for animal life has already taken place within the surrounding environment due to current land use practices. The destruction of the areas with undisturbed natural open savannah and wooded slopes and riparian areas will result in the permanent reduction of natural habitat of reptiles, birds, frogs, insects and mammals present within the areas. The destruction of the wooded slopes habitat type will be of special concern as this is where the host tree for the Pycna Sylva was encountered. The impact will be site specific in extent with impacts likely to occur on site. The severity of the impact was determined to be high.	119	112
	Aquatics	The removal of topsoil and vegetation may impact on the water quality of the Dwars River. This activity which is expected for the haul and ring roads, mining infrastructure and portions of the opencast pit will result in the creation of areas susceptible to erosion. The loss of surface roughness will increase the run-off velocity for the catchment, increasing the erosion potential for the area. The eroded material will be transported to the Dwars River which will result in sedimentation of the system, impacting on the water and habitat quality of the system. The impact is expected for the duration of the project, for as long as areas are exposed to high run-off potential. Impacts to the Dwars River will not only be local, adjacent to the operational area, but impacts are expected to occur further downstream as sediment is transported away from the site. Owing to the fact that the Dwars River is considered to be in a largely natural state, as well as considering that the catchment is a FEPA and described as Highly Significant for the C-Plan, any impacts to the Dwars River are considered to be significant. The likelihood of the activity impacting on the system is highly probably	96	90
Activity 2: Construction of any surface infrastructure e.g. haul roads, pipes, storm water diversion berms (including transportation of materials & stockpiling)	Visual	The development of haul roads, pipes and storm water diversion berms will have a negative visual impact on the receiving environment. The visual impact of surface infrastructure will in most cases occur for the life of the project. The transport of construction material and stockpiling will have a negative visual impact on the receiving environment. Vehicular activity and the resulting dust will draw attention to the project area. Infrastructure lighting will be visible at night and will have a negative visual impact on the receiving environment. These visual impacts will occur for the life of the project.	98	91
Activity 3: Drilling, blasting and development of initial boxcut for mining (incl. stockpiling from initial cuts).	Visual	Drilling and blasting will have a negative visual impact on the receiving environment. The boxcut will dramatically contrast the surrounding bushveld and grassland vegetation and will leave a permanent scar on the landscape. Dust resulting from the blasting will have a negative visual impact on the receiving environment. Topsoil and overburden stockpiling will have a negative visual impact on the receiving environment. Dust from stockpiles will have a negative visual impact on the receiving environment.	119	105
Activity 4: Temporary storage of hazardous product (fuel, explosives) and waste or sewage.	Soils & Land Capability	The potential for contamination exists during the construction phase due to the use of heavy machinery and associated fluids and lubricants. Fluids used for machine operation may spill during filling or directly from a machine in the event that damage to the fluid system goes unnoticed. Fuel storage facilities may cause soil pollution and contamination (i.e leakage of a storage tank).	40	24

Table 4-7: Significance of impacts during operation

OPERATIONAL PHASE				
Activity 5: Removal of overburden and backfilling	Visual	The removal of overburden by drilling and blasting (with explosives) will have a continual negative visual impact on the receiving environment. Overburden stockpiling will have a negative visual impact on the receiving environment. These visual impacts will occur for the life of the project. Dust from vehicle movement will add to the visual impacts.	119	119
	Air Quality	This activity includes drilling and blasting hard overburden and stockpiling. The initial operation is removal of topsoil and subsoil with large scrapers. The topsoil is carried by the conveyors and is placed in temporary stockpiles. The exposed overburden, the earth that is between the topsoil and the ore seam, is levelled, drilled, and blasted. The overburden material is removed down to the ore seam, by a shovel and truck operation. It is placed in the adjacent mined cut, forming a spoils pile. The uncovered ore seam is then drilled and blasted. A shovel or front end loader loads the broken ore into haul trucks, and it is taken out of the pit along graded haul roads to the RoM pile truck dump. As the strip mining progresses, the overburden is taken from the spoils piles and backfilled into the pit.	78	55
	Surface Water	There will be a decrease in water quantity reporting to the catchment as dirty and clean areas are separated. The drilling and blasting could cause aquifer bed fractures and alteration resulting in fewer bases flow water flowing to the streams. Baseflow is important in this catchment where most of the surface flow is mostly from the shallow groundwater aquifer.	75	24
Activity 6: Use and maintenance of haul road	Visual	Vehicular movement along haul roads will have a negative impact on the receiving environment. Heavy duty vehicles will generate dust which will have a further impact.	91	78
	Fauna & Flora	The vehicular activity of mining vehicles in general will result in the creation of soil based dust which will increase the deposits these materials on plant leaves, blocking stomata and inhibiting evapotranspiration. This will impact on the vegetation health and availability as food items as well as inhibit the ability of the plants units to provide ecological services. This activity will also have a negative effect on animal species in the area, as they could be hit by vehicles. This activity is considered to be long term in duration as it will be required for the construction, operational phases and closure phases. The impact will be site specific in extent with impacts likely to occur on site. The severity of the impact was determined to be moderate.	78	78
Activity 7: Removal of ore	Visual	The removal of ore will have a negative visual impact on the receiving environment. Ore will be trucked off site and vehicular movement will have a negative visual impact. Dust will be generated during this activity.	91	91
Activity 9: Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste, sewage, discard, PCD)	Visual	The storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste, sewage, discard) will have minor visual impact, however, the discard will have a higher visual impact on the receiving environment.	84	84
	Air Quality	Most significant waste is from the operational phase as there is a large amount of overburden removed. This includes fuel, explosives and waste or sewage. Hazardous materials and waste impacts are related to the types, amount of equipment and machinery used for the phase. The impacts include waste produced and material generated during the operation phase. It includes evaporation of diesel fuel and heavy fuel from temporary tanks on site that are used for re-fuelling of heavy machinery and trucks, as well as possible spills during loading of fuel from tankers to tanks. Some of the wastes include waste oils, chemicals and hazardous chemicals.	78	60
	Surface Water	There will be decreased water quantity reporting to the catchment as storage areas are isolated from the rest of the catchment.	39	36
Activity 10: Concurrent replacement of overburden, topsoil and revegetation	Visual	The process of concurrent replacement of overburden, topsoil and re-vegetation will initially have a negative visual impact on the receiving environment. Large amounts of dust are expected to be generated during this process due to heavy duty machinery. However, the long-term visual impact will be neutral as rehabilitation will assist to reduce the negative visual impact of mining	91	84

Table 4-8: Significance of impacts during decommissioning

DECOMMISSIONING PHASE				
Activity 13: Rehabilitation (spreading of soil, re-vegetation & profiling/contouring)	Visual	The process of rehabilitation will initially have a negative visual impact on the receiving environment. Heavy duty machinery will be used to spread soil as well as for profiling and it is expected that large amounts of dust will be generated. In the long-term, the visual impact will be neutral. Rehabilitation will assist to reduce the negative visual impact of mining on the receiving environment.	84	66

5 REGULATION 50 (E)

(e) determine the appropriate mitigatory measures for each significant impact of the proposed mining operation;

5.1 Mitigation Measures and Recommendations

Mitigation measures to reduce the significance of the impacts are listed in the EMP however below are important recommendations that have been highlighted by the specialist studies.

5.1.1 Air Quality

To mitigate the impacts of construction activities on atmospheric environment, various measures should be applied: Topsoil should not be removed during windy periods, as dust levels will increase. The area of disturbance must be kept to a minimum and no unnecessary clearing of vegetation must occur. Topsoil must be re-vegetated and drop heights when loaders dump soil into trucks or on stockpile should be minimised. Water or a binding agent can be used for dust suppression on roads. When using bulldozers and grading, there is need to minimise travel speed and distance, apply water to travel routes.

5.1.2 Visual

The following mitigation is proposed:

- Topsoil and vegetation should only be removed when and where necessary. If unnecessary clearing has occurred, these areas should be vegetated.
- Trees and shrubby vegetation adjacent to areas where infrastructure and roads are to be established should not be removed in order to conceal the development.
- Areas where vegetation has been cleared on slopes should be contoured appropriately in order to minimise soil erosion.
- Dirt roads should be moistened regularly to prevent dust plumes from occurring.
- Establish a hedge of local fast growing indigenous trees around infrastructure and roads at the beginning of the construction phase to conceal developments. Trees can be planted on berms to increase height.
- Construction vehicles should obey onsite speed limits at all times. This should reduce the amount of dust generated.
- Lighting at night during the construction phase should only be directed to necessary areas.

5.1.3 Fauna and Flora

The following mitigation measures are proposed:

- Keep the footprint of the disturbed area to the minimum and designated areas only. Vegetate and wet open areas to limit erosion.

- Declaring red data plant and animal locations no-go areas;
- Removal of vegetation during construction and operation will be minimised to reduce the risk of open areas occurring.
- Soils stockpiling without compaction to keep the seed bank viable if topsoil is replaced within a year.

5.1.4 Aquatics

The following mitigation measures are proposed:

- Ensure that construction takes place during the winter months in order to avoid the rainfall period.
- Berms should be constructed initially downslope of the development area between the site and the Dwars River in order to intercept any transported material.
- The mining infrastructure placement should be manipulated to consider a minimum buffer zone of 100m from the Dwars River. It is important to note that any activity within a 500m buffer zone may trigger a Water Use Licence Application.
- Make use of an existing river crossing if the opportunity is available. Upgrade this facility to accommodate the haulages as well as hydrology of the system.
- Construct a bridge to accommodate large flows in order to prevent inundation of the crossing area. Ensure that the hydrology of the Dwars River is not considerably altered.
- The bridge should be able to accommodate migratory movement of biota below the structure between the upper and lower reaches. The bridge should not be a barrier.
- The footprint of the construction area should be kept to a minimum. The riparian area should only be removed where required.

5.1.5 Surface Water

The following mitigation measures are proposed:

- It is important to avoid drilling and blasting in close proximity to the stream and adhere to the blast pattern so that blasting and detonation is done well and avoid cracks in the aquifer bed in unplanned fashion. Stream flow monitoring is also necessary during this time to ensure that impacts on surface water quantity are detected and mitigation is implemented.
- Ensure water quality monitoring and dust suppression is implemented and allow only trained and certified personnel to conduct the blasting and drilling. This will ensure that adequate quantities of explosives are utilised to minimise excess waste and the remaining rubble is correctly disposed. Regular monitoring of hydraulic machines and fitting them with drip trays could ensure prevention of hydrocarbon contamination.

- Reduce the extent of the cleared areas at each particular time and construct berms around the topsoil/ overburden stockpiles. Water quality monitoring to be conducted on a monthly basis where negative water quality impacts are detected, the frequency of monitoring must be increased and the source of pollution must be detected.
- Sediment control should be maintained during revegetation, and toxic overburden should be segregated and treated before being replaced to the area.

5.1.6 Groundwater

The following mitigation measures are proposed:

- Ensure that a storm water management plan is in place to collect runoff water for future use;
- Weekly / monthly water level and quality monitoring of the water supply boreholes to ensure a sustainable resource and identify impacts on local users;
- All waste water (discharged water) should also be contained in reservoirs big enough to avoid spillage of contaminated water into the environment;
- All fuel, oil and lubricant storage areas, as well as re-fuelling area must be bunded to ensure that no hydrocarbons enter the underlying soils or groundwater environment;
- Ensure that a storm water management plan is in place to collect runoff water for future use;
- Ensure that a sustainable resources is available for life of mine and that local groundwater users will not be impacted by the mine's water abstraction;
- Update the numerical model annually to monitor and predict water impacts;
- All waste water (discharged water) should also be contained in reservoirs big enough to avoid spillage of contaminated water into the environment;
- All fuel, oil and lubricant storage areas, as well as re-fuelling area must be bunded to ensure that no hydrocarbons enter the underlying soils or groundwater environment;
- Quarterly hydrocarbon monitoring of the water boreholes and quarterly water quality monitoring around waste disposal facilities; and
- The general waste facility should also be managed to ensure that paper and plastic is not transported by the wind across the area.
- Ensure that a storm water management plan is in place to collect runoff water for future use; and
- All waste water (discharged water) should also be contained in reservoirs big enough to avoid spillage of contaminated water into the environment.

6 REGULATION 50 (F)

(f) details of the engagement process of interested and affected persons followed during the course of the assessment and an indication of how the issues raised by interested and affected persons have been addressed;

Through public participation, I&APs are given an opportunity to raise issues, comments and concerns thereby influencing the decision making process. It is the only means whereby the issues and concerns raised by I&APs can be integrated effectively into the EIA/EMP Report to promote sustainable development and assist the proponent to take account of locally relevant conditions, which will facilitate the development of a socially and environmentally sensitive project.

6.1 Objectives

The objectives of the PPP for the Scoping and EIA phases were to:

- Identify and register all I&APs;
- Inform I&APs of the proposed project and the PPP followed;
- Ensure that stakeholders receive sufficient, and accessible information;
- Provide I&APs with an opportunity to raise issues of concern, suggest alternatives, and contribute to local knowledge; and
- Ensure that I&APs concerns have been considered in the specialist studies.

The following section details the PPP approach and methodology that has been implemented for the Scoping and EIA Phases of this project, and outlines future actions for implementation during the EIA/EMP phase.

6.2 Approach for PPP

The following approach to public participation was taken for the Scoping and EIA Phases:

- Develop a PPP appropriate to the scope of the proposed Everest North project to guide the consultation process;
- Facilitate the public participation process and document the outcome of such interactions;
- Record issues raised; and
- Record PPP activities undertaken.

This section covers the initial consultations undertaken for the Scoping and EIA Phases.

6.3 Methodology

In order to meet the aims of the PPP the following activities were undertaken:

- I&APs were identified, including government authorities, farmers, local communities and interested groups;

- Information documentation was developed;
- Stakeholders were notified of the project;
- One-on-one meetings were undertaken with relevant local authorities, directly affected and surrounding landowners, farm employees and communities from **1 November 2011 to 4 November 2011**;
- The Environmental Scoping Report in terms of NEMA process which was made available to I&APs from **7 December 2011 to 1 February 2012** and again from **17 February 2012 to 26 March 2012**.; and
- A Public information sharing meeting with authorities, the public, local communities and affected individuals was held on **11 February 2012**.
- This process will be repeated for the Draft EIA phase of this project as the Draft EIA will be made available to the public for comment and input.

The above activities are further discussed in the following sections.

6.4 Identification of interested and affected parties

I&APs were identified at the beginning of the project by means of Windeed searches, networking and from previous projects undertaken in the area. Identification of I&APs also took place through responses to newspaper advertisements and site notices. A proactive approach to identify key I&APs within the study area was followed by arranging and undertaking one-on-one consultations. Persons and organisations identified as possible I&APs were registered in an electronic database. I&APs who responded to notices and advertisements were also registered, thereby, ensuring their inclusion in the consultation process. Contact information of all registered I&APs has been recorded and an I&AP stakeholder database will be updated throughout the environmental authorisation process. Regulatory authorities

Relevant authorities were identified as these departments and divisions form part of the project decision-making process and need to be appropriately informed.

6.4.1 Authorities

- Department of Mineral Resources (DMR) for the MRA;
- Department of Water Affairs (DWA);
- Department of Public Works, Roads and Transport (DPWRT); and
- Mpumalanga Department of Agriculture, Rural Development and Land Administration (MDARDLA);
- Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET);
- Mpumalanga Tourism and Parks Agency (MTPA);

- South African Heritage Resource Agency (SAHRA);
- Ehlanzeni District Municipality managers, environmental and social departments; and
- Thaba Chweu Local Municipality municipal managers, ward councillor and environment departments.

6.4.2 Public

- Adjacent and surrounding land owners;
- Directly affected land owners;
- Claimant;
- Farm workers;
- Land occupiers;
- Neighbouring mines;
- Commerce and industry;
- Environmental groups; and
- Ward councillors.

All I&APs identified including contact details were recorded within a comprehensive database of affected parties and stakeholders.

6.5 Documentation developed and stakeholder notification

Various information sharing documents have been compiled to disseminate information about the proposed project, public participation and public review of the draft Scoping Report to I&APs. The documentation developed is briefly described below.

- A Background Information Document (BID) and the I&APs Registration and form was developed as part of the PPP which provided information about the proposed project, the legislative process to be followed, the PPP to be followed including the comment periods for the draft Environmental Scoping Report. The BID was distributed to relevant authorities and I&APs from **1 to 4 November 2011**. An I&AP registration form was included as part of the BID, which provided I&APs with the opportunity to raise any issues of concern and comments regarding the project, and to register as stakeholders for the project.
- Six (6) site notices in English, and Sepedi were compiled and placed at the following public areas to inform the directly affected farmers and surrounding communities of the proposed development for a period of 40 days.
- In compliance with environmental regulations and as stipulated in the NEMA, newspaper advertisements (English and Sepedi) were published in the Sowetan and Steelburger News on **3 November 2011**.

- Throughout the Scoping process, telephonic consultation with identified and registered I&APs took place to:
  - Obtain and verify contact details;
  - Inform I&APs of the project;
  - Inform I&APs of, and invite them to the public information sharing meeting; and
  - Gather any issues, comments and suggestions regarding the project.
  - Other notification methods included:
- Email: This method of distributing information was used mainly for the authorities and those parties who had access to email.
- Hand-Delivery: BID's were hand delivered to directly and surrounding farmers and land occupiers. This method of distributing information was found very useful and documents were distributed during the one-on-one consultation meetings.

6.6 Scoping Consultation Phase

6.6.1 One-on-one consultations with directly affected parties

Approximately 70 BIDs, registration forms and call for comment letters were delivered to directly affected landowners, surrounding landowners and farm occupants residing within a 100 meter boundary of the proposed mining area. The initial perceptions from the landowners and farm occupiers were gathered, and are included in the issues trail.

6.6.2 Public Information Sharing Meeting

A Public information sharing meeting was held A public meeting was held at Bosfontein primary school in Bosfontein, Lydenburg Mpumalanga on 11 February 2012 in terms of the National Environmental Management Act, Act No. 107 of 1998 (NEMA). This meeting was to provide updated information to I&APs about the Everest North Project. I&APs were notified about this meeting through invitation letters. The objectives of this meeting were to:

- Provide company and project information;
- Provide an opportunity for comments and gather issues and concerns;
  - Open communication channels; and
- Form constructive partnerships with relevant parties.

6.7 Public participation process and Scoping Report

The PPP Report contains information from all minutes of meetings and correspondence from I&APs. The Environmental Scoping Report was made available at the following venues.

- Lydenburg Public Library;

- On the Digby Wells Environmental website www.digbywells.com under public documents, or
- The report was made available on Compact Disc (CD) on request.

All registered I&APs were notified of the availability of the Environmental Scoping Report for public comment by post, fax or email. This provided I&APs with a further opportunity to provide inputs into the process, and ensure that their issues, comments and suggestions have been included in the EIA process.

6.8 PPP documentation notification dates

The PPP documentation was distributed as shown in Table 6-1 below.

Table 6-1: PPP Documentation

Date	Type of Consultation/ Documentation	By Means Of	Stakeholder Group
1 – 4 November 2011	Notification of Scoping phase of the Environmental Impact Assessment Process for the proposed project.	Email, fax and post, and site notices	Directly affected landowners, users, authorities and public in general
3 November 2011	Notification of Scoping phase of the Environmental Impact Assessment Project	Newspaper advertisements	General public
7 December 2011 to – 26 March 2012	Notification of the Public Review period of the Draft Environmental Scoping Report	Email, fax and telephone	Directly affected landowners
11 February 2011	Public information sharing meeting		Directly affected landowners, users, relevant authorities and public in general
23 April 2012 to 23 May 2012	Notification of the Public Review period of the Final Environmental Scoping Report		

6.9 Key issues and comments raised during the Scoping Phase

The comments and issued raised at captured in the comments and response report below (Table 6-2).

6.10 EIA Consultation Phase

6.10.1 Public Feedback Meeting

Invitations will be distributed to registered I&APs to invite them to the public feedback meeting. The aim of the public feedback meeting will be to provide feedback to I&APs on the findings of the EIA. The draft minutes of the meeting will be distributed to all attendees. The final minutes from this meeting will be incorporated into the EIR for submission to MDEDET and DMR.

6.10.2 Public Participation and EIA/EMP Report for Public Review

The PPP report will be updated with all the inputs received from I&APs during the Scoping phase and throughout the EIA process. The report, containing all the minutes from meetings and correspondence from I&APs will be an appendix to the EIA/EMP report. The EIA report and the PPP report will be made available for public review (30 days) at the same venues as the Scoping report. I&APs will be informed of the availability of the EIA/EMP report by email, fax, or post. This will give I&APs a further opportunity to provide inputs into the process, and an opportunity to ensure that their issues, comments and concerns have been included and addressed in the EIA report.

6.10.3 Notification of Environmental Decision

Once Environmental Authorisation has been issued by the regulatory authority, all registered I&APs will be notified via email, fax or registered post of the decision and appeal procedures.

Table 6-2: Comments and Response Report

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
1.Archeology			
Public Information Sharing Meeting 11 February 2012	Pakaneng Choma community committee member	Expressed a concern that a number of graves on the property have been impacted during the undertaking of the prospecting activities.	Sylvania Platinum and Aquarius Platinum (AQPSA) appointed a drilling contractor to undertake the drilling of prospecting boreholes. Details of transgressions must be forwarded to Sylvania Platinum will undertake to investigate any damage to graves.
E-mail 27 March 2012	Mr Phillip Hine: South African Heritage Resources Agency - Archaeology, Palaeontology and Meteorite Unit	The South African Heritage Resource Agency (SAHRA) Archaeology, Palaeontology and Meteorite Unit (APM) noted that there are three previous Archaeological Impact Assessments conducted in the area. These included projects on neighbouring farms such as Der Brochen and Mareesburg. More specific, an assessment was conducted as part of the EMP for the Everest North Platinum Mine by Dr Julius Pistorius. SAHRA has no record of the EMP or Heritage Report that was conducted for this project.	Digby Wells is currently undertaking a Phase 1 Heritage and Paleontological Impact Assessment (HIA) on the Vygenhoek property. This was considered necessary based on Digby Wells' gap analysis conducted on existing heritage reports. The assessment will include structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or view scapes.
		The draft Scoping report indicated that the area is archeologically sensitive. According to the report sixty-seven archaeological sites were identified, of which twenty-nine are located within the project area. These sites include: • Extensive Choma village from the historical period, including cattle enclosures, stone walls, stone cairns and graveyards. • Further graveyards situated outside and around the Choma village and	

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		other graves unrelated to the Choma village. Since high densities of archaeological sites occur in the area, SAHRA APM unit recommends that a new Heritage Impact Assessment must be conducted for this project. This new assessment must re-evaluate the heritage resources identified in the Pistorius (2006) Impact Assessment. Existing and newly identified burial grounds and graves must also be properly assessed. It is important that the significance of the sites be stated. It is further recommended that a broad base stakeholder consultation process be undertaken.	
		The developer must ensure that a Paleontological study be undertaken to assess whether or not the development will impact upon paleontological resources – or at least a letter of exemption form a Palaeontologist is needed to indicate that this is unnecessary.	
		Any other heritage resource that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewscape must also be assessed.	
Fax,14 May 2012	Mr Alan Sendzul: Pakaneng Choma Community	The community committee conducted a physical inspection of the drill site are in March 2012 and has reported back that graves have been desecrated and in some cases had been removed by Aquarius Platinum during the 2007 prospecting works	Digby Wells will recommend an independent specialist investigation to determine whether any damage to graves on Vygenhoek has indeed taken place.

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		programme carried out over Vygenhoek farm	
2.Compensation			
One-on-One Meeting,1 November 2011	Mr Johannes Mankge: farm occupant on portion 7 Vygenhoek farm	He suggested that Sylvania Platinum must pay cash compensation to the affected parties.	Noted. Once the feasibility study is completed, the outcome thereof will indicate whether negotiations with communities and landowners are to take place.
		The community is not interested in selling the affected farms to Sylvania Platinum. The intention will be to lease the farms.	Comment noted.
3.Employment			
One-on-One Meeting,1 November 2011	Ms Enika Mohlala: Farm occupant on portion 7 Vygenhoek farm	The farm occupants from the affected farms must be employed at the proposed mine.	Noted. Recommendations will be made in the Environmental Management Programme that employment from local communities must take preference, where possible and applicable.
4.Socio-Economic			
One-on-One Meeting,1 November 2011	Mr Johannes Mankge,: Ms Selina Mosotho Farm occupants on portion 7 Vygenhoek farm	How will the affected Vygenhoek community benefit from the proposed mine in the long run in terms of job creation and development and infrastructure development?	Communities may benefit indirectly due to possible employment and local spending.
		Sylvania Platinum must provide shares to the affected Vygenhoek community.	Noted. Once the EIA study is completed, the outcome thereof will indicate whether negotiations with communities and landowners are to take place.
Public Information Sharing Meeting, 11 February 2012	Public meeting attendee	What will the Pakaneng Choma Community benefit should Sylvania Platinum obtain the Mining Right?	Sylvania and Aquarius Platinum intends to have a well operated mine which will benefit the community at large. Realistic and practical documents (SLP and EIA reports) in support of the MRA will be compiled and submitted to the competent authorities. I&AP's were requested to actively participate in the processes undertaken in order to ensure their views are incorporated.
Fax,8 February 2012	Luyolo Poswa, POSWA Incorporated on behalf of the Pakaneng Choma community	What will be the proposed mines' contribution towards the socio-economic development of the area?	
Fax,8 February 2012		What is the envisaged impact of the	A socio-economic study will be undertaken during

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		proposed mine on the local economy and labour sending communities.	the EIA. Once a Mining Right has been authorised and the mine begins its operations, a Human Resources plan will be developed by the mine to address the issues raised.
		Expressed a concerned about the lack of a human resource development programme, plan to avoid job losses, retrenchments, procurement progression plan	
		Expressed a concern about lack of infrastructure and poverty eradication which the proposed mine plans to support.	
Public Information Sharing Meeting 11 February 2012	Mr Simon Choma: Pakaneng Choma community	Expressed a concern that the communities in the close vicinity of Aquarius operations experience high levels of poverty and unemployment.	Sylvania and Aquarius Platinum remain committed to the Mining Charter and support the spirit of the Charter which aims to uplift the community in the area of the mine rather than enrich a select few.
5.Mining Charter			
Public Information Sharing Meeting 11 February 2012	Mr Simon Choma: Pakaneng Choma community	The shareholding in the proposed mine must be inclusive of the community and in line with the Mining Charter.	Noted. Sylvania and Aquarius Platinum will ensure that the requirements of the Mining Charter are adhered to for this proposed mining operation. Discussion will be undertaken through the community's appointed legal representation (POSWA) Incorporated). The final structure will be subject to DMR approval.
6. Mining Right Application			
Fax,14 May 2012	Mr Alan Sendzul: Pakaneng Choma Community	The conducting of a mining right application over the above portions while the land claims has been in the final stage of being settled. This issue had been highlighted to Mr Terry McConnachie of Sylvania Platinum and raise with yourselves and DWA several times	We note your objection to the Mining Right Application (MRA) process currently being conducted, while a land claim is being processed. However, the following should be noted: • It is not a legal requirement that the MRA process is not to be conducted on properties where land claims have been lodged; • Due to the land claim by the Ba Choma
		The fact that the community objection to an attempt by Sylvania platinum to hold a public participation meeting on 11, February,2012 at Boschfontein farm as part of the application process has been ignored. That meeting had not been properly called and	

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		that, inter alia, it had not been mailed nor had time to study the Scoping report on the proposed mine. We oppose a mining rights being applied for until participation had been negotiated and that these views had been disregarded.	on Vygenhoek, the Ba Choma community was included in the EIA process as an I&AP, despite the fact that they are neither the current legal land owner of Vygenhoek, nor currently residing on Vygenhoek; • As per Digby Wells' previous correspondence, a public meeting was held in February 2012 for the EIA process in accordance with the NEMA. Initiations and notification of this meeting was done in accordance with the NEMA. This public meeting was compulsory in terms of NEMA and its Regulations and had to proceed even though the Ba Choma objected to such a meeting; • As stipulated by the NEMA, all registered I&APs were invited to attend this public meeting. It has to be noted that this meeting was well attended (more than 900 people attended this meeting, including members of the Ba Choma community); • When the Ba Choma indicated that they did not receive a copy of the Draft Scoping Report in time, the public review period was extended by an additional 30 days; • As indicated, this public meeting was held

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
			regarding the NEMA process for the proposed Everest North project. The EIA process in accordance with the MPRDA has not commenced yet; and • The final scoping report and associated public consultation report, including the minutes of the public meeting is currently available for public review until 24 May 2012. If comments or changes are recommended to these minutes, it can be forwarded to Digby Wells, as indicated in an information letter sent to all I&APs. It must be stressed that the public meeting was called as part of the process under NEMA; your reference to the minutes being included as supporting documentation for a mining right is a misunderstanding.
7.Project Information			
One-on-one meeting,2 November 2011	Mr Simon Choma: Pakaneng community	What is the planned life of mine (LoM)?	The estimated LoM for the Everest north Mine project is 14years.
8.Prospecting Permit			
One-on-One Meeting,2 November 2011	Mr Bethuel Maditlhaba: Pakaneng Choma community committee member	Requested that the prospecting permit for the affected farm properties be made available to the Pakaneng Choma Community.	Noted. Sylvania Platinum will be requested to provide a copy of the prospecting permit
Public Information Sharing Meeting	Mr Simon Choma: Pakaneng Choma community	The Pakaneng Choma has made numerous requests to Sylvania Platinum to make available the prospecting permit for the affected farms and to date this information has not being forthcoming.	Sylvania Platinum received approval from AQPSA to provide the prospecting permit. It should be noted that the prospecting permit does not contain details of the Social and Labour Plan and company structure for mining purposes. This

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
			information will only be divulged in the Mining Right Application and then be released into the public domain only once approved by the DMR. Sylvania will initiate discussions on community involvement with the appointed community
		The prospecting permit will provide information such as the estimated life of mine, mine production, shareholding and skills development.	The estimated life of mine is 14 years. He highlighted that information on the mine production, shareholding and skills development will not be contained in the prospecting permit. The information will be included in the Mining Right Application (MRA) which has not yet been submitted. It is proposed to submit the application in April 2012 to the Department of Mineral Resources. Digby Wells' appointment also includes the compilation of the Social Labour Plan (SLP). The compilation of the SLP will be undertaken in consultation with Thaba Chweu local municipality, the Pakaneng Choma community and other potentially affected communities.
9.Infrastructure			
One-on-One Meeting,1 November 2011	Mr Johannes Mankge: Farm occupant on portion 7 Vygenhoek farm	Will Sylvania Platinum Ltd (Pty) upgrade the existing school on the Vygenhoek farm?	Once the EIA study is completed, the outcome thereof will indicate whether negotiations with communities and landowners are to take place, as well as which local economic development projects could be undertaken.
10.Resettlement			
One-on-One Meeting,1 November 2011	Mr Josiah Mankge, Ms Enika Mohlala and Ms Aletha Makua: Farm occupants on portion 7 Vygenhoek farm	Will there be any resettlement of the Vygenhoek residents?	No physical resettlement of people and houses will be required.
	Mr Johannes Mankge: Farm	Houses which were built as part of the	

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
	occupant on portion 7 Vygenhoek farm	resettlement for the Everest south project are small in size and of a poor workmanship. He is concerned that this will be repeated with Everest north mining project.	
11.Landownership			
One-on-one meeting,2 November 2011	Mr Simon Choma: Pakaneng community	The Pakaneng Choma community intends to register the affected properties into a Trust and not into a communal property association.	Comment noted. Digby Wells will keep SCC and RLCC progress update as requested.
Registration form ,3 November 2011	Mrs M de Kock Acting Chief Director: Mpumalanga Department of Rural Development and Land Reform	Digby Wells' correspondence was referred to the Mpumalanga Provincial Shared Service Centre (SSC) for a response.	
		The affected properties (portion 3 and 7 Vygenhoek 10 JT) were acquired by the Regional Commission (RLCC) for restitution purposes, and are therefore under the custodianship of this department. The commission has completed the investigation, but the report needs to be presented to all affected parties. Therefore the state is currently representing their interest of the claimants, and it is not needed to involve the claimants at this stage. Digby Wells is requested to keep the SCC and RLCC updated regarding the project progress.	
Fax, 17 March 2012	Ms Marcia Malapane: Mpumalanga Department of Water Affairs	**Land claims:** The applicant shall note that if there is any land claim, a signed surface lease agreement with the land claimants must be submitted to Department of Water Affairs (DWA) to proof that there is a provision to use the land for mining purposes.	Comment noted.

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
Fax,14 May 2012	Mr Alan Sendzul: on behalf of Pakaneng Choma Community	The Ba-Choma community and the claimant M S Choma have been notified by the Regional Land Claims Commission that the land claim on Vygenhoek 10 JT (all portions) has been finalised. The state purchased that portions Vygenhoek 10 JT for restitution to the Ba-Choma in 2005 in furtherance of the section 11 notice published in the Government Gazette in 2002 and amended in 2003.	Digby Wells was appointed to conduct the EIA in terms of the procedures for both the National Environmental Management Act, 1998 (NEMA), and the Mineral and Petroleum Resources Development Act, 2202 (MPRDA) towards the end of 2011. However, until an application for a mining right has been accepted by the Regional Manager of the Department of Mineral Resources, studies are confined to the requirements of NEMA and its Regulations. During the course of the EIA process for the proposed Everest North Project, regular communication with the Department of Rural Development and Land Reform (DRDLR) has taken place and we are aware of the land claim that has been lodged in respect of the farm Vygenhoek by the Ba Choma community. We were requested by DRDRL to continue to liaise with the Department only in respect of the farm Vygenhoek, but there has nonetheless been an open door for interaction between the Ba Choma and Digby Wells, as is evidenced by the various records of meetings and proceedings.. The following should be noted: • Studies for the proposed Everest North Project only commenced in 2012, after initial contact was made with the Ba Choma community and studies towards a mining right application have not yet started at all; • No proof exist that indicate that any land claims were lodged on the neighbouring farm Mareesburg; • We note your assertion that the land claim on Vygenhoek 10JT has been
		The Land Commission has advised the Ba Choma that it has been in regular contact collectively with Digby Wells and informed about such a land claim. The Ba Choma has been the landowner in transition as early as 2005 and this information has been in the public domain ever since. Request an explanation as to why fist contact was only made with the Ba Choma in 2011 before which the community had not encountered Digby Wells and Associates despite it having conducted environmental studies on Vygenhoek and the adjoining Mareesburg property and laying claim to an extensive regional database.	
		The Ba-Choma community will now require Aquarius to enter into a formal agreement regarding Vygenhoek 10 JT and Schaapkraal 42 JT (also finalised) and to provide us with a detailed statement of all arrear servitudes paid to date on Vygenhoek 10 JT before commencement of any further activity on Everest North project. Such agreements will consist of a meeting between Aquarius Platinum as the mineral	

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		right holder and the Ba Choma committee wherein Aquarius Platinum sets out its rational for the Everest North open pit in light of the fact that it has recently mothballed Blue Ridge mine, and what is pre-emptive sale conditions are to the stakeholding in the project. Furthermore believes that the Vygenhoek project does not appear to be material to the Aquarius portfolio in the near term as it has been outsourced to a third party without any consideration for brad base empowerment or economic benefit to the Ba Choma community.	resolved in favour of the Ba Choma community and we have received no formal confirmation of this from the Department of Rural Development and Land Reform (DRDLR); • Until formal confirmation is received and transfer of the property has taken place, DRDLR remains the legal owner of Vygenhoek, and the Ba Choma community will be treated as an Interested and Affected Party (I&AP), in accordance with the requirements of NEMA; and • Possible agreement discussions will be held with the Ba Choma community, once proof of the resolution of the land claim on Vygenhoek has been provided. As the Ba Choma community is not currently the legal land owner of Vygenhoek, it has to be noted that any actions of intimidation against the EIA process are unlawful. Special reference is made to the intimidation of geohydrological drilling contractors by the Ba Choma community on 17 May 2012.
12.Integrated Water Use License			
Public Information Sharing Meeting 11 February 2012	Public Meeting attendee	Will the proposed mine commence without a water use license?	An Integrated Water Use License Application will be submitted to the Department of Water Affairs. A water use licence is required prior to the commencement of a mine.
Fax, 17 March 2012	Ms Marcia Malapane: Mpumalanga Department of Water Affairs	The applicant is requested to address the following issues prior to any recommendation by the Department of Water Affairs: 1) The applicant shall conducted	Comment noted. The Integrated Water Use License Application process, as recommended and stipulated in the National Water Act will be adhered to.

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		preliminary legal assessment to identify all the water use activities associated with the prospecting operation that require authorisation by DWA and shall note that in terms of section 22 (1) of the National Water Act,1998 (Act No.36 of 1998), "a person may only use water – a. Without a licence (i) if that water use is permissible under schedule 1,(ii) if that water use is permissible as a continuation of an existing lawful use (Section 32); or (iii) if that water use is permissible in terms of general authorisation issued under section 39;(iv) If the water use is authorised by a licence under this Act; or (v) if the responsible authority has dispensed with a licence requirement under subsection 3. 2) Therefore any other water use related activities associated with this project that are not permissible as indicated above shall have to be authorized by the DWA prior to such water use activities taking place. 3) A pre-application consultation meeting with DWA is also essential to guide on the water use authorisation requirements and	

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		water use identification relevant to the proposed mining activity.	
13.Environmental Management			
Fax, 17 March 2012	Ms Marcia Malapane: Mpumalanga Department of Water Affairs	Draft Scoping Report (DSR), page 15 section 3.4.3 use of waste rock for backfilling and rehabilitation, exemption from complying regulations of Government Notice 704 of 4 04 June 199(GN 704).an application for exemption from complying with the requirements of GN 704 should be accompanied by amongst other things: • Motivation and reason for exemption; • Alternative proposal to the specific requirements of GN704 • Impact Assessment of alternative proposal • Management Plan associated with alternative proposal; and • Proposed performance assessment and monitoring techniques.	Comment noted. If required, the recommended process will be undertaken and the relevant applications submitted to the DWA.
		Adequate storm water management must be practised during the contaminants are not introduced into water resources during the developmental and operational phases of the proposed mining activity. Refer to DWA best practice Guideline G1: storm water management guideline in this regard.	Comment noted. A surface water assessment will be conducted, which will also inform the storm water management to be done at the proposed mine.
		Use of dirty water storage tailings dam, waste rock dumps or any waste water dam infrastructure: The applicant must note that in terms of section 21 (g) of NWA “disposing of waste in a manner which may detrimentally impact on a water resource” is a water use activity that requires	Comment noted. An IWULA will be submitted as part of the authorisation process.

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		authorisation by the DWA unless if the use is permissible under Schedule 1 or general authorisation.	
		Dewatering and use of underground water: The applicant must note in terms of section 21 (j) “removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people “and 21 (a) “taking water from a water resource”, of the NWA, are water use activities that require authorisation by DWA unless if the use is permissible under Schedule 1 or general authorisation.	A hydrogeological study is currently being conducted. An IWULA will be submitted as part of the authorisation process.
		DSR Page 16, section 3.4.8, source of water for the project: use of water form boreholes and underground is a water activity which have to be registered and authorised before commencement: The applicant shall note that in terms of 21 (a) “taking water from a water resource”, of the NWA, are water use activities that require authorisation by DWA unless if the use is permissible under Schedule 1 or general authorisation.	A hydrogeological study is currently being conducted. An IWULA will be submitted as part of the authorisation process.
		DSR Page 16, section 3.4.8, The applicant shall submit a signed copy of service agreement if water will be sourced from the Lebalelo scheme and the De Hoop dam.	Comment noted.
		The applicant shall note that in terms of regulation 4 of the GN 704 of 04 June 1999: restriction of locality, ”No person in control of a mine or activity may (b) except in relation to a matter contemplated in regulation 10, carry on any underground or open cast mining, prospecting or nay other operation or	Comment noted. Floodline determinations have been conducted. No infrastructure will be constructed within these floodlines.

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		activity under or within 1;50 year floodline or within a horizontal distance of 100 meters from any watercourse or estuary, whichever is the greatest". Therefore the applicant shall demonstrate compliance with the stated regulation before commissioning of the prospecting operation.	
		Sewage Treatment Plants, The applicant shall provide information in terms of the type of sewage treatment plant and the management of final effluent thereof. The applicant shall further note that the use of septic tank and French drains requires authorisation by DWA in terms of section 21 (g) of NWA "disposing of waste in a manner which may detrimentally impact on a water resource unless if the use is permissible under Schedule 1 or general authorisation. Furthermore the discharge of sewage effluent into water resources will require authorisation by DWA in terms of section 21 (f) of NWA. The applicant is also advised to consider re-using of treated effluent back to the process as an option to reduce intake of raw water from boreholes and as part of best environmental management option.	Comment noted. An IWULA will be submitted as part of the authorisation process. An integrated waste management license according to the National Environmental Management Waste Act (NEMWA) will also be submitted to the relevant authority.
		DSR Page 15, section 3.4.8 general waste management: The general waste generated on site during the prospecting operation shall be stored, handled and transported to a permitted waste disposal site in such a manner as not to cause any nuisance or secondary pollution. Furthermore, the hazardous waste shall be disposed of at the waste disposal site permitted to handle such	Comment noted. An integrated waste management license according to the National Environmental Management Waste Act (NEMWA) will also be submitted to the relevant authority.

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		waste materials.	
		Storage of oil, diesel, hydraulic fluids and grease: Reasonable measures shall be taken to avoid the pollution of ground and surface water resources due to the storage and use of these fluids. It is recommended that the storage areas for these fluids be bunded with cement and in such a manner that any spillage can be contained and reclaimed without causing any pollution to the ground and surface water resources.	
14 .Servitude			
Registration Form;15 November 2011	Annelien Pretorius: Eskom Distribution	The proposed Everest North mine affects the exiting Eskom distribution Lydenburg-Rooikrans 22Kv and sub transmission Kv power lines, which traverses the above farm and proposed mining area.	Comment noted.
		Eskom Distribution has in principle no objection to the proposed project provided the following conditions are adhered to and accepted in writing:	
		1) There are 9 metres and 15, 5 metres building and tree restriction either side of the centre lines of the 22kV and 132kV power lines respectively, which must be adhered to in all future development and or construction. No construction work may be executed closer than 9 and 15,5 metres from any of Eskom's structures and or supporting mechanisms or other than those which were agreed upon on site between the authorised representatives of Eskom and the	

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		applicant; Sylvania Platinum Ltd (Pty). 2) Eskom should receive an application for undermining and construction near their services from Sylvania Platinum Ltd (Pty), upon which this office will then comment accordingly. 3) All work within Eskom's servitude areas will have to comply with the relevant Eskom earthing standards at the time of construction. 4) All work within Eskom Distribution reserve area and servitudes must be done in accordance with the requirements of the *Occupational Health and Safety Act No.85 of 1993* as *amended*. Special attention must be given to the clearances between Eskom's conductors, structures, cables and electrical apparatus and the proposed work as stipulated by *Regulation R15 of the Electrical Installations Regulations* of the aforementioned Act or any other legal requirements. 5) Eskom can't guarantee the exact position of the underground electrical cables and therefore the applicant's site representatives must expose the cables by hand, in order to establish their location.	
Fax,8 February 2012	Luyolo Poswa, POSWA Incorporated on behalf of the Pakaneng Choma Community	Expressed a concern regarding a lack of servitude and access agreement.	The South African government is currently the registered landowners of Vygenhoek 10 JT. The Department was notified of the proposed project, the EIA process and specialist studies to be

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
			undertaken, in accordance with the National Environmental Management Act (NEMA).
15.Public Participation			
One-on-one meeting,2 November 2011	Mr Bathuel Maditlhaba: Pakaneng Choma community	Expressed a concern that the Pakaneng Choma community was never consulted during the prospecting right application.	Noted. Communication during the course of the environmental impact assessment will be assured.
	Mr Simon Choma: Pakaneng community	He indicated that Mr Simon Mokomotwane and Alan Sendzul will handle all communication on behalf the Pakaneng Choma community .	Comment noted.
One-on-one meeting,3 November 2011	Clr Mamsie Mahlangu: Ward 5 Thaba Chweu Local Municipality	Requested that the local municipality must be involved throughout the process.	The Thaba Chweu local municipality is a registered stakeholder already participating in the EIA.
Registration form,4 November 2011	Mr Jacques Van Niekerk, Tubatse Chrome (Pty) Ltd	Requested to be registered as an interested and affected party (I&AP) for the proposed Everest north platinum mine	Mr Jacques Van Niekerk and Mr Mokomatwane Simon Choma was registered as an I&AP on the stakeholder database.
Fax,8 February 2012	Luyolo Poswa, POSWA Incorporated on behalf of the Pakaneng Choma community	Mr Mokomatwane Simon Choma expressed willingness to participate as an interested and affected party.	
Public Information sharing Meeting 11 February 2012	Mr Simon Choma: Pakaneng Choma community	The community is not happy that consultations were undertaken with the incorrect landowners of Vygenhoek in 2007 and 2009 during the Prospecting Right Application.	Digby Wells was not involved in the consultations undertaken during the prospecting application process. Digby Wells (the EAP) has initiated an extensive public participation process, in support of the mining right application (MRA), to include all interested and affected parties. The Scoping phase is inclusive to enable all parties with an interest in the project to participate through the EAP.
	Public meeting attendee	When were discussions initiated with the Pakaneng Choma community?	Digby Wells commenced with the public participation process (PPP) for the proposed Everest North EIA in November 2011. Digby Wells can however not comment on consultations

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
			undertaken during the prospecting phase of this project. The process is open and stakeholders can still register for participation in the EIA process.
16. General			
One-on-one meeting,2 November 2011	Mr Zeth Maphanga: Pakaneng Choma community committee member	Does Sylvania Platinum have intentions in future to apply for a mining right for portion 1,2,4,5 and 8 farm Vygenhoek 10 JT and Mareesburg 8 JT?	No, no additional properties are currently being investigated for mining to take place
		Will Sylvania Platinum consider submitting a joint application for the mining right with the Pakaneng community?	Noted. Once the EIA study is completed, the outcome thereof will indicate whether negotiations with communities and landowners are to take place.
	Mr Simon Choma: Pakaneng Choma community	Why is portion 6 Vygenhoek 10 JT not indicated on the Digby Wells maps?	Portion 6 Vygenhoek 10 JT is not registered at the Deeds office.
Fax,14 May 2012	Mr Alan Sendzul: Pakaneng Choma Community	*Expression of dissatisfaction and petitioning for removal of Digby Wells*: 1) Aquarius has a history of denying the existence of the several hundred years old Choma clan by not taking cognisance of its Pakaneng claim boundaries as per the survey done by the Commission prior to Aquarius acquiring the Vygenhoek property in 2000. 2) It neglected to consult Mr S Choma and the Ba Choma Community in line with the provision of the MPDRA of 2002 when a JV agreement was entered into on Vygenhoek 10 JT with Sylvania platinum in 2005. 3) Aquarius Platinum commissioned	Digby Wells has not been involved in any environmental studies on Vygenhoek prior to 2012. As previously indicated: • Until such time as formal confirmation of the resolution of the land claim on Vygenhoek is provided, the DRDLR will remain the legal land owner of Vygenhoek. Neither Aquarius Platinum, nor Sylvania Resources are thus required to enter into any agreements with any party not currently the legal land owner of the land; • No proof exist of a land claim submitted for the farm Mareesburg; • Digby Wells was not involved in environmental work conducted in 2006; and • The existing land claim on Vygenhoek

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		and then confined a Heritage Impact Assessment report(2006) which report identified the Choma clan, its GPS location and the extent of its cultural landscape as defined by the Choma Historical village 4) The nucleus of the Choma village Complex overlays the project area and extends into Mareesburg 8 JT, Schhapkraal 42 JT and Der Brochen 7 JT. 5) This information is material to the operation of the adjoining portion of the Everest North open pit and the envisaged access routes through Schaapkraal and therefore the Choma should have been included in the I&AP database to Mareesburg, complied by Digby Wells. 6) It is our opinion that such information was intentionally withheld from the affected parties and we further maintain that Digby Wells neglected to act on such information during the 2006 prospecting works programme and again when submitting a request to the MDEDET in 2010 to carry out an EIA on Vygenhoek and on Mercersburg 8 JT in 2006-8). 7) We lack confidence in the ability of Digby Wells to continue to perform an independent role as an EAP for the Everest North project for the Aquarius Platinum application given this backdrop.	was communicated to the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) and the DRDLR. Furthermore, the Land Claim Commission was contacted when the EIA process on Vygenhoek was initiated. Digby Wells as independent assessment practitioner (EAP) has conducted this EIA process in full compliance with the process stipulated in the NEMA We reject your statement that we wilfully withheld or failed to act on information available to us.

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		8) The Ba Choma community has resolved to have Digby Wells removed as the EAP given its past history of failure to act independently and apply its extensive regional database objectively.	
Public Information Sharing Meeting 11 February 2012	Public Meeting attendee	How long will the specialist studies take?	The EIA process for the proposed Sylvania Platinum mine will take approximately 12-14 months. I&APs will be informed timeously of the various phases of the EIA and the opportunity to comment on reports.
	Mr Samuel Choma: Pakaneng Choma community	The Pakaneng Choma Community will not allow Digby Wells permission to undertake it's activities until such time that the Prospecting Permit is made available to the community.	Comment noted. It should be noted that the Pakaneng Choma Community is the land claimants however; the registered owner of the land is still the Department of Land Affairs.
Fax,8 February 2012	Luyolo Poswa, POSWA Incorporated on behalf of the Pakaneng Choma community	Mr Simon Choma requested that the public information sharing meeting to be held on 11 February 2102 to be postponed as a result of non-receipt of documentation underlying the EIA and other key background documents which have been previously requested.	A public meeting intended for all interested parties, which has been widely advertised and which is intended to expand on information that has already been made available. The meetings were well publicized, enabling any party to arrange for representation by any advisers, legal or otherwise, had he so wished. Letters addressed to Mr Alan Sendzul dated 31 October 2011 and to Mr Sam Mako and Simon Choma dated 18 January 2012, had specific reference to the project and to the meetings.
		Mr Simon Choma requested that consultation to be held with their legal representation present. Sufficient time to organise that legal representation to be present is required and will communicate a more suitable date for the consultation to take place.	Comment noted.

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		Digby Wells must send all correspondence thorough Poswa Incorporated and to copy Mr Alan Sendzul, Mr Steve Mako and Mr Sam Choma	
		The proposed transfer of surface right to the Pakaneng will delay and restrict any future development on the project until negotiations between Pakaneng and Sylvania Platinum have been completed.	Comment noted. It should be noted that the process in terms of land claims is a separate process from the NEMA EIA process.
		Expressed a concern that transcripts from the land claims officials are inserted without Mr Simon Choma validation.	Comment noted. It should be noted that Mr Choma is not the legal land owner at present. According to the NEMA and associated EIA regulations, all comments from I&APs are to be noted and reflected in EIA consultation documents.
E-mail 2 March 2012	Alan Sendzul on behalf of the Pakaneng Choma community	The minutes of the meeting held on 11 April 2012 must be amended to reflect the following: 1) Mr Samuel Choma(incorrectly captured as Simon Choma junior) assembled a full representation at the Bosfontein farm of all the sub communities under the Pakaneng Choma ambit 2) The community members assembled from the “Pakaneng lands” which are seven contiguous farms in a circumference around the Heritage Site known as the Choma village complex on Vygenhoek 10 JT which is the seat of the Choma clan. 3) The members numbered several thousands in total and spoke through their leader M s Choma and his son Mr Samuel Choma.	Digby Wells is engaged is the preparation of all documents required to support an application for authorisation of the project in terms of the National Environmental Management Act, 1997 (NEMA). The public meeting conducted on 11 February 2012, aimed to provide, as a part of that process, project related information and to indicate the availability of the Draft Environmental Scoping Report that was compiled to fulfil the requirements of NEMA to all Interested and Affected Parties (I&APs). To date, it has been established that I&APs may consist of: • The relevant provincial authorising authorities; • Department of Land Affairs (as the legal land owner); • District and local municipalities; • Current land occupiers; • Land claimants (Pakaneng Choma

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		4) Mr Samuel Choma's opening statement was to the effect that the communities did not regard this gathering as a duly constituted meeting as Sylvania had been previously requested to provide information on the following: a. Copy of the Aquarius prospecting right permit and all renewals to date, including the prospecting works program conducted in 2007 by Sylvania, destruction permits issued by the South African Heritage Resource Agency (SAHRA) not received to date. b. Documentation (stakeholder database and EIA) relating to the consultation conducted in 2006/7 for its prospecting right works programme. The community maintains it has never been consulted in accordance with the MPDRA regarding such application. c. Heritage study conducted for Aquarius in 2006 by ASAPA accredited archaeologist DR JCC Pistorius on Vygenhoek 10 JT which details highly important graves and Heritage sites and which	Community); and • Any other person that may be interested in, or affected by the proposed project. In order for the competent authority to make an informed decision in respect to the authorisation of the proposed Everest North Project, comments and issues raised by all I&APs, at all meetings held between Digby Wells and I&APs, will be included in reports as required in terms of the NEMA as well as the Mineral and Petroleum Resource Development Act (MPRDA), once this process commences. The intention of the Public Participation Meeting held on 11 February was to engage a broader audience than simply the Pakaneng Choma Community, and other potential and registered I&APs having been notified of and invited to the meeting, were also present. Besides issues and comments raised by the Pakaneng Choma Community, through their leader, additional comments and concerns were also raised by other attendees. These issues and comments were also noted and will be included in all project-related reports; A notification letter regarding the availability of the Draft Scoping Report (DSR) was sent to Mr Mako by email on 7 December 2011 and a copy of the DSR was sent via registered post on 13 January 2012. The original time allowed for public review of this document was from 7 December 2011 to 1 February 2012, in compliance with the National Environmental Management Act (NEMA).

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		should have been disclosed to the Pakaneng and SAHRA in 2007. d. Physical delivery of the draft scoping report on Everest North 5) To date the community has never been presented with a hard copy of the draft scoping report and was therefore not in a state of preparedness on the 11 February 2012 to evaluate it let alone raise key issues regarding the proposed mine. 6) The fact was communicated to Digby Wells on 31 January 2012 at the Khubetswane village as well as Sylvania in the final week for January 2012 yet it insisted on forcing a meeting contrary to the spirit of the consultation process as envisaged by the MPDRA and despite acknowledgement by Sylvania that the 2006/7 Aquarius consultation was "flawed" and an undertaking that the process would be correctly handled this time around. 7) The point made by Mr Samuel Choma regarding the destruction of graves in contravention of the National Heritage Resources Act of 199 (Act 25) during the drill programme has been known to Sylvania since 2008 and was to	However, as requests were made for additional copies, copies of the DSR were also sent to Poswa Incorporated representing the Pakaneng Choma Community and Bosfontein Primary School on 10 February 2012. As these copies were sent towards the end of the initial public review period, the review period was extended to 26 March 2012 to afford all I&APs with sufficient time to review and comment on the document. Proof of submission can be provided upon request. Please note that all registered I&APs were also notified that the DSR was made available for public review at the following venues: • Lydenburg Public Library, N0 41 Viljoen Street, Lydenburg • Bosfontein Primary School, Bosfontein farm,R540,Lydenburg • Digby Wells Environmental www.digbywells.com under Resources Public Documents • Compact Disc's of the DSR were distributed at the public participation meeting held on 11 February 2012. A Register of Attendance at the Public Participation Meeting was properly compiled and Minutes duly taken. Issues relating to previous prospecting and matters that will be dealt with as a part of the mining right application should be referred to Sylvania or Aquarius.

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
		have been dealt with prior to the meeting. 8) During the meeting, the health and safety officer was obligated to explain to the community the procedure and reporting process for such an incident and what had been done. As this never occurred, we will be lodging through a formal complaint in writing with SARHA. 9) Lodges an objection to the validity of the attendance register of the 11 February 2012 on the basis that it appears not to have been compiled at the meeting locality and appears to have been randomly compiled to give the impression of a valid meeting 10) Object to the inclusion of the attendance register for an alleged consultation at Khubetswane village on 31 January 2012, participants were never informed that their discussion were to be included in the draft Scoping report.	
Fax, 17 March 2012	Ms Marcia Malapane: Mpumalanga Department of Water Affairs	Any pollution incident(s) originating from the prospecting operation must be reported to the DWA regional office within 24 hours.	Comment noted
		The mine manager must at all times adhere to the requirements of the regulations on the use of water for mining and related activities aimed at the protection of water resources as promulgated under GN No: 704 and published in Government Gazette No 20119 of June 1999.	

REFERENCE	NAME & ORGANISATION	ISSUE RAISED	RESPONSE
Fax:14 May 2012	Alan Sendzul on behalf of the Pakaneng Choma community	*Outstanding Documents:* 1) Prospecting license a copy of such programme and its project area (annexures A and B) submitted to the DMR in 2006 but still has not received it. 2) JV agreements which sets out the scope of Sylvania to apply for a mining g right on behalf of the Aquarius Sylvania JV which to date have not received. 3) DRA feasibility study on neither the Everest North project nor mine works programme which we are requesting with immediate effect.	It has to be re-iterated that none of the information requested by the Ba Choma community needs to be provided as: • Such documents, as a whole or in part, contains confidential information; • Is not public information; • Is not relevant at this stage of the NEMA environmental impact assessment.
		We are objecting to the submission of a Social Labour Plan, Local Economic Development project to the DMR without consultation and finalisation from the Ba Choma community. We also oppose to intention by Sylvania Platinum as the operator to deploy labour broker for sourcing of employment on the Everest North project	

7 REGULATION 50(G)

(g) identify knowledge gaps and report on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information

7.1 Knowledge Gaps and Future Commitments

The following chapter lists the knowledge gaps that currently exist for the EIA and work that has been proposed for the remainder of the process. Universal Coal is committed to finalise the work indicated below, after which an amended report will be submitted to the DMR for authorisation.

7.1.1 Groundwater

Due to the fact that the Geohydrological Specialist Study has not been completed yet, the following information and knowledge gaps exist at the time of compiling this report:

- Aquifer hydraulic parameters to be obtained from pump testing work;
- ABA chemical analyses and interpretation of the laboratory results;
- Incomplete geohydrological numerical model; and
- Incomplete quantification of the identified impacts.

7.1.2 Fauna and Flora

This assessment was based on information collected during a two seasonal site visits, a wet and a dry season. In order to obtain a comprehensive understanding of the dynamics of communities and the status of endemic, rare or threatened species in any area, fauna and flora assessments should consider investigations at different time scales (across seasons/years) and through repetition, specifically in the growing and flowering season of Red Data or protected species that may occur in the area.

7.1.3 Heritage and Archaeological Resources

The southern portion of the proposed Open Cast Pit and Ring Road lay directly over the extensive Choma Village Complex. Due to its connection with the royal Choma lineage, its intangible heritage for the surrounding communities, and the presence of burial sites within the complex, it has a high significance rating. It is suggested the mine plan be changed so as to decrease the mining area to exclude the village complex avoiding possible damage to the structures and burials, and lengthy consultation and mitigation processes. Additionally, it is recommended that the Choma Village Complex be nominated for Grade III Heritage Site status with the SAHRA and a Conservation Management Plan be completed.

7.1.4 Exact Location of Infrastructure

The list of infrastructure required has been confirmed however, detailed designs and the exact location of specific infrastructure is not yet known.

8 REGULATION 50(H)

(h) description of the arrangements for monitoring and management of environmental impacts;

8.1 Monitoring and Management

8.1.1 Soils

The following monitoring should be undertaken:

- Soil analyses of rehabilitated areas to ensure that the fertility of the soil is correct for the vegetation being grown. This is also required to calculate the fertiliser required for the next season;
- Monitor movement and stability of topsoil stockpile; and
- Monitor topsoil balance annually for volumes of soil.

8.1.2 Traffic

At the time of construction and as a responsibility of the contractor, a traffic engineer draft a Traffic Management Plan (TMP) incorporating traffic safety issues. These plans will have to be directly linked to safety of pedestrians, construction vehicles, protection of the road network from damage, etc.

8.1.3 Air Quality

8.1.3.1 Introduction

The monitoring programme outlined below is based on that of the Everest North Mining Project management plans, and will require updating/improvement once detailed project planning and design has been completed.

The main ambient monitoring objectives for the proposed Everest North Mining Project are:

- Determine the Status Quo of current ambient air quality in the area;
- Quantify the proposed project's impact in terms of ambient air concentrations of inhalable particulates (PM_{10});
- Track progress of air pollution control measures being implemented;
- Demonstrate compliance with adopted ambient air quality standards;
- Demonstrate continuous improvement.

8.1.3.2 Location

The Everest North Mining project area complex.

8.1.3.3 Parameters

South African NAAQS for particulate matter (PM_{10}), Draft National Dust Control Regulations, May 2011 (GN309:2011).

8.1.3.4 Objectives

- To ensure that the livelihoods and well-being of all those living and working in the project area are maintained, and preferably improved from the time of project planning through to after decommissioning and closure.
- To ensure that air quality within the Everest North Mining project area airshed is not compromised or deteriorating.

8.1.3.5 Key performance indicators

- Air Quality Management Plan is systematically adhered to.
- Grievance procedures are followed and there are records available to prove this (establish a Complaints Register to capture all grievances).
- Health records reflect no adverse changes in the baseline patterns of community health after the initiation of the project.
- Maximum daily average concentrations of PM_{10} not to exceed 120 µg/m^3 until end of 2014, and 75 µg/m^3 after 2014, with annual average concentrations of PM_{10} to be lower than 50 µg/m^3 until end of 2014, and 40 µg/m^3 thereafter.
- Maximum total daily dustfall (calculated from total monthly dustfall) of not greater than 600 mg/m^2/day for residential areas. Maximum annual average dustfall to be less than 1 200 mg/m^2/day on-site.
- Vegetation cover density for storage dumps are to be 80% on the entire slope up to 1m from crest, and dustfall immediately downwind is to be <1 200 mg/m^2/day (on-site) and <600 mg/m^2/day off-site.
- For unsurfaced haul roads associated with open cast mining, dust fall-out in and along the mining perimeter will be less than <1 200 mg/m^2/day (on-site) and <600mg/m^2/day off-site.
- The absence of visible dust plume at all material transfer points will serve as the indicator of effective control equipment in place. In addition, the dust fall in the immediate vicinity of various sources will be less than <1 200 mg/m^2/day (on-site) and <600mg/m^2/day off-site.

8.1.3.6 Responsibility

During project planning and construction, the person responsible for implementation of this plan will be the person responsible for the environmental aspects of the Environmental Impact Assessment (EIA). This person will be based at the project site. During the construction phase, the majority of activities taking place on site will be undertaken by

Aquarius Platinum Limited appointed contractors. Ultimate responsible for implementing the plans will still rest with Aquarius, rather than with the contractors. During operation, the overall responsibility for the management and monitoring plan will be an Environmental Management function.

8.1.3.7 Frequency

As required by the Air Quality Management Plan:

- Continuous PM_{10} monitoring; and
- Continuous dust fallout monitoring (on monthly basis).

8.1.3.8 Monitoring protocols

Monitoring protocols are to include monthly servicing of sites and calibration of instruments as per their calibration schedules.

8.1.3.9 Resources

- Staff and budget to implement the Air Quality management and monitoring plan.
- Support and commitment of community members, including key representatives such as chiefs (especially where the monitoring equipment is placed at the sensitive receptor locations).

8.1.3.10 Reporting structure

Aquarius will be required to compile operational monthly reports for internal use, as well as annual report on all air quality management and monitoring activities, as stipulated in the Air Quality management and monitoring plan. It will include results of implementation of the plans and the findings of the monitoring programme. Reports will be made available to the DEA and for internal reporting to the shareholders.

Air Quality reporting will be the responsibility of the Environmental Management function. The Environmental Management function will include the following monthly reports:

- Ambient monitoring data and performance.
- Meteorological data and performance.
- Mitigation measure implementation.
- Control equipment availability and efficiency.
- General observations pertaining to air quality.

A summary of the ambient air monitoring, performance assessment and reporting programme is provided in Table 8-1.

Table 8-1: Summary of the ambient air monitoring, performance assessment and reporting programme

Monitoring Strategy Criteria	Ambient PM_{10} Monitoring	Dustfall Monitoring
Monitoring location(s)	• Establish PM_{10} dust monitoring on mine premises	• Dustfall monitoring network comprising 7 single bucket monitors for Everest North Mine
Sampling frequency and duration	• Continuous PM_{10} monitoring	• Continuous monitoring (data stored as maximum daily values derived from monthly averages)
Environmental targets (i.e. receptor-based performance indicator)	• Maximum daily average concentrations not to exceed 120 µg/m^3, with annual average concentrations to be lower than 50µg/m^3 (up to 31 December 2014) • Maximum daily average concentrations not to exceed 75µg/m^3, with annual average concentrations to be lower than 40µg/m^3 (after 31 December 2014).	• Maximum total daily dustfall (calculated from total monthly dustfall) of not greater than 600 mg/m^2/day for residential areas • Maximum total daily dustfall (calculated from total monthly dustfall) of not greater than 1200 mg/m^2/day on-site

8.1.4 Noise

It is recommended that the monitoring plan be implemented to determine potential sources of noise, increases and decreases in noise levels, and determine level of mitigation required. Components to be included in the proposed monitoring plan are discussed below.

Noise monitoring is to be conducted on a quarterly basis throughout the construction phase to determine the impact of the noise levels on the relevant receivers as well as determine the level of mitigation. Once it is established that the mitigation measures have decreased the specific noise levels from the mining activities, the noise monitoring should be carried out on a bi-annual basis thereafter throughout the life of mine. The noise measurements should be taken at the communities bordering the proposed project boundary to the south as well as taken at the nearest communities along the proposed haul road towards Everest South. A report must be compiled quarterly/ bi-annual, depending on the intervals of the monitoring programme then submitted to management to ascertain compliance with the required standards. Mine management should be advised of any significant increase in the ambient sound level as operations continue. At each measurement point the ambient noise level will be sampled in terms of the following parameters:

- The A-weighted equivalent sound pressure level (LAeq) for duration not less than 30 minutes per monitoring point.
- Measurements to be taken during both daytime (06:00 to 22:00) and the night time (22:00 to 06:00) during the operational phase.

8.1.5 Visual environment

The following monitoring activities should be undertaken on a monthly basis for the life of the project:

- Dust monitoring as per the Air Quality Monitoring Plan;
- Vegetation screens need to be maintained and protected against fire and utilisation of the vegetation for fire wood, etc.; and
- Grievances from receptors must be monitored and addressed through a Grievance Mechanism.

8.1.6 Fauna and Flora

8.1.6.1 Location

During monitoring of the biological environment the direct and indirect effects of the infrastructure construction of the various phases can be measured. This can be accomplished through monitoring on various areas, more specifically on the construction areas, to measure direct effects, and monitoring within the vegetation communities to measure indirect effects. Three monitoring sites on construction sites areas and four sites per vegetation community will be sufficient. The vegetation communities that must be monitored are the Open savannah, river and riparian, wooded slopes and wetland and the ridges.

8.1.6.2 Parameters

For monitoring purposes it is suggested that a flora and fauna survey be performed by qualified specialists, in order to determine if trends are emerging in the composition of the flora and fauna environment. Baseline information as obtained in this report can be compared to future studies. On a landscape scale the extent and richness of the vegetation communities can be investigated, and on the species level, the extent of red data plant species can be investigated to determine if any trends are forming which could indicate a negative response by the natural environment to mining activities on site.

Any data collected during these surveys could be compared to previous surveys. The following parameters must be monitored within each vegetation community. This will indicate richness and extent of the community and of the species each contains.

Flora (specifically protected species)

- Species richness;
- Medicinal species;

- Alien invasive species;
- Red data and Protected plant species.

Fauna (specifically protected species)

- Mammals;
- Birds;
- Herpetofauna;
- Invertebrates (emphasis on *Pycna Sylva*).

8.1.6.3 Objectives

The objectives of the monitoring program will be to firstly document the current state of the biophysical environment, thereafter to compare this information with previous studies, which were completed prior to construction activities. A comparison between these two data sets will be used to identify trends, positive or negative, that are forming because of current construction or operational activities. With the information gathered, areas of concern can be identified and management plans can be implemented to rectify these. Of special concern will be all protected plant and animal species who's presence has been confirmed but also the species of concern that could occur on the project site.

8.1.6.4 Key performance indicators

Certain key performance indicators will be used to gauge the response of the biophysical environment in relation to the construction and operational activities. These key performance indicators will include the general species richness and alien invasive plant infestations present within each vegetation community and close to construction areas. The most critical measure will be the presence and state of officially protected plant and animal species.

8.1.6.5 Frequency

The frequency of these monitoring flora and fauna surveys must be during construction and thereafter every two seasons, or every two years.

8.1.6.6 Threshold or limits

Thresholds of potential concern will include the plant species richness of each vegetation community, if plant species richness decreases by 15% within the comparable same previous season then further studies are recommended to indicate what the exact reason is for the decrease in species richness, and to correct this as soon as possible.

The alien invasive plant species richness that is present within each plant community must not increase by more than 10%. The specific nature of the invasive plant species must also be a threshold, if highly aggressive invader species is encountered, then this must be of concern and rectified.

The presence of protected species is another threshold, and if these species are encountered during monitoring, then a relocation strategy must be implemented.

8.1.6.7 Corrective action

The management decisions made to accomplish certain goals, such as habitat management through minimising disturbance and eradicating alien invasive plant species, must be evaluated to ascertain if they are having the desired results. This is accomplished through monitoring as discussed previously, if this is not the case and the goals are not reached then adaptive management must take place where management plans or the implementation of these are adapted to suit specific situations better.

8.1.7 Surface Water

A monitoring programme is essential as a management tool to detect negative impacts as they arise and to ensure that the necessary mitigation measures are implemented.

8.1.7.1 Surface Water Quality

Various water quality variables will be monitored particularly the Variables of Concern (VoC) likely to emanate from mining activities as well as those variable identified in the baseline analyses (Fe). Variables that would need monitoring include Fe, NH_3, SO_4, Cl, NO_3 and EC, and will be monitored on a frequency prescribed by monitoring programme based on the activities (e.g. weekly during construction and decommissioning and monthly during operation). Surface water monitoring will be conducted at strategically identified locations as indicated on Plan 13.

8.1.7.2 Surface Water Quantity

Where possible the water quantity and channels geometry will be monitored in extreme flood events to determine any impact of the mining on river channels and water quantity in general, in the catchment.

8.1.7.3 Objectives of Monitoring Programme

The objective of the monitoring plan would be to monitor the impact of the platinum group metals mining, rock waste and its subsequent infrastructure through the continuous analyses of water quality and quantity (where possible).

8.1.7.4 Monitoring Frequency

The proposed monitoring programme for surface water quality will be implemented at different frequencies over the duration of the project as follows:

Phase	Variables	Frequency
Construction	All	Weekly
Operation	All	Monthly; and Where negative impacts are detected (spillage) frequency to be increased to weekly until the impacts are cleared.
Decommissioning	All	Weekly

8.1.8 Groundwater

A groundwater monitoring plan will be required however, will only be formulated once the hydrogeological study has been completed.

8.1.9 Heritage and Archaeology

Adhere to management measures as put out within the EMP.

8.1.10 Socio-economic environment

This section provides a plan to assist Aquarius in the implementation of the mitigation measures identified.

The goal of the social management programme (SMP) is to provide the Project management with a tool to aid in:

- Enhancing local economic development;
- Ensuring that existing negative impacts are adequately managed and positive impacts are enhanced as well as increased, focussing on those most directly affected by the mine;
- Ensuring that communication channels between the community and mine is developed to promote the accurate transfer of project related information; and
- Implementing continuous monitoring and evaluation measures to ensure that social-economic well-being is improved and social management is effectively implemented throughout the lifespan of Project.

The SMP for the Project is provided in section 13, with management measures provided per project phase. It should be noted that many of the measures are continuous and should be implemented through several project stages.

9 REGULATION 50 (I)

(i) inclusion of technical and supporting information as appendices, if any

9.1 Technical & supporting information

All the detailed specialist reports are included as supporting documents in the attached appendices to this report.

PART III: SOCIAL AND HERITAGE IMPACT ASSESSMENT

This section continues to be in compliance with Section 39 of the MPRDA (2002) and covers Regulations 50(a) through to Regulation 50(h) where relevant to social, cultural and heritage baseline studies, impact assessments and recommendations.

10 ARCHAEOLOGY AND HERITAGE

10.1 Resources located within the project area

During the pedestrian survey of the project area, a total of 50 heritage resources were recorded (Plan 14). These included individual findspots, Iron Age sites, historical sites, burial grounds and graves, and sites associated with the Choma Village Complex. The unique site numbers and GPS location of the identified heritage resources as summarised in Table 10-1 below.

Table 10-1: Summary Table of Identified Heritage Resources in the Project Area

SITE ID	DESCRIPTION	SA[8]	IA[9]
SYL1256/DW001	Extensive stone walled site, with terraced walling. Possibly Badfontein type walling with communal grinding area. Decorated potsherds found scattered between walling. Located next to current homestead and road.	4	94
SYL1256/DW002	Stone feature, possibly from clearing.	1	79
SYL1256/DW003	Stone walling on rise along road. Used natural boulders in the walling. Potsherds were noted on the site, both decorated and undecorated.	2	80
SYL1256/DW004 & DW005	Stone walling on rise, some terraced walling. Associated communal grinding area to the south of stone walls. Close to site DW003	3	81
SYL1256/DW006	Stone features, including walling, circles and mounds. Potsherds noted at the site.	2	80
SYL1256/DW007	Stone walling associated with a rise, located along road. Potsherds noted at the site, none decorated.	3	81
SYL1256/DW008, DW009 & DW046	Stone walled site with a communal grinding area (DW009). Used natural boulders in construction of walling. Lower grind stone identified at DW046	2	80
SYL1256/DW010	Stone walling at the base of rise. Some terracing. Potsherds and an Upper grind stone noted at the site.	2	26
SYL1256/DW011	Stone walling, some terracing on the northern side. Possible communal grinding area associated with stone walling.	2	26

[8] Significance Assessment

[9] Impact Assessment

SYL1256/DW012	Single burial. Name on headstone: Moraka Phillimon Lekgeu. Rising sun image on headstone.	4	28
SYL1256/DW013	Stone walling with possible communal grinding area in close proximity.	2	26
SYL1256/DW014	Stone walling around natural boulders. Walls are large and well preserved with an enclosure approximately 15m in diameter.	4	28
SYL1256/DW015	Stone walling associated with a rise. Communal grinding area is in close proximity. Potsherds noted around the site.	2	26
SYL1256/DW016	Single findspot of MSA flake and potsherd on open, exposed rock surface.	1	25
SYL1256/DW017	Grinding surface area. Single MSA faceted quartz flake identified.	1	25
SYL1256/DW018	Stone walling - Natural boulders packed with stone. Not substantial.	2	26
SYL1256/DW019	Substantial stone walling, large and well preserved. Enclosure of approximately 15m diameter with a clearly defined entrance.	4	28
SYL1256/DW020	Stone walling, not extensive.	2	26
SYL1256/DW021	Stone walling, not extensive and not well preserved.	1	25
SYL1256/DW022	Stone walling - Double walling, straight and approximately 10m long	2	26
SYL1256/DW023	Burial site. 5 graves with no formal headstones. Site lies directly next to DW022. Grave have stone surface dressing and are tended.	4	28
SYL1256/DW024	Stone walling - Enclosure approximately 5m in diameter	3	27
SYL1256/DW025	Burial site. 8 graves identified with formal grave dressing with headstones. Surface grave goods associated with the graves.	4	28
SYL1256/DW026	Stone walling - Collapsed and not extensive or well preserved.	1	25
SYL1256/DW027 & DW028	Stone walling - Straight, approximately 20m long. Enclosure with entrance. Next to communal grinding area	4	28
SYL1256/DW029	Recent homestead - old fencing found, cleared area and tomato plants growing. No other physical structures identified.	1	25

SYL1256/DW030	Stone foundations - outside project area	1	1
SYL1256/DW031	Grinding surface area. No other heritage features identified	2	2
SYL1256/DW032	Stone walling - Single stone wall, possibly for erosion gully.	2	38
SYL1256/DW033	Findspot in erosion gully - MSA & LSA tools identified. Single potsherd with notch identified.	1	37
SYL1256/DW034 & DW035	Stone walling - Stone enclosures, one approximately 15m in diameter. Possibly associated with Choma Village to the north.	4	40
SYL1256/DW036	Stone Walling - Stone wall foundations with communal grinding area. Rectangular in shape.	3	99
SYL1256/DW037	Stone walling - scatter of small stone walls in front of Choma Village. Lower grindstone and potsherds found in wash around stone walls. Associated with larger Choma Village.	3	99
SYL1256/DW038	Stone Walling - Rectangular walling. Porcelain found amongst walling. Potsherds also found. Associated with Choma Village	3	136
SYL1256/DW039	Stone Walling - Large, well preserved circular stone walling. Lower grind stone identified.	3	136
SYL1256/DW040	Stone Walling - Circular stone enclosure approximately 3m in diameter on the slope of a rise at the bottom of the Choma Village.	3	51
SYL1256/DW041	Grinding surface with 6 large, well defined grinding grooves.	3	27
SYL1256/DW042	Burial site - Area is fenced off and untended. 5 identified graves with headstones and formal dressing, the remainder with stone dressing.	4	28
SYL1256/DW043 & DW044	Burial site - Area is fenced off and also had large stone walling at its entrance. It is tended. 12 graves were identified, 7 with headstones and formal dressing, the remainder with stone dressing. 1 Lower grind stone identified.	4	28
SYL1256/DW045	Single findspot - Large lower grind stone.	1	25
SYL1256/DW047	Single monolith, possible headstone. No other feature identified.	2	26
SYL1256/DW048	Possible single burial site	4	28
SYL1256/DW049	Stone walling - Single L-shaped wall.	2	26

SYL1256/DW050	Historic - Trig Beacon VH10	1	113
Choma Village Complex (Pistorius 2006)	Historical Settlement Complex. Several stone walled circles in primary context. Potsherds scattered throughout settlement, several lower grind stones noted.	5	138
Pistorius (2006) C004	Burial site located within the Choma Village Complex. Surrounded by stone wall enclosure, large and intact.	4	116

Plan 14: Identified Archaeological Sites Within and Surrounding the Project Area

Plan 15: GPS Track Log of Field Survey and Identified Heritage Resources

10.2 Comments raised relating to heritage resources

Table 10-2: Comments raised relating to heritage resources

ISSUE	RESPONSE
Heritage	
Public Information Sharing Meeting 11 February 2012: Pakaneng Choma community committee member expressed a concern that a number of graves on the property have been impacted during the undertaking of the prospecting activities.	Aquarius Platinum (AQPSA) appointed a drilling contractor to undertake the drilling of prospecting boreholes. Details of transgressions must be forwarded to Aquarius Platinum to investigate the issues, which will involve consultation with the community elders. Prior to construction however all sensitive areas will be fenced off to avoid any damage to resources.
E-mail 27 March 2012: Phillip Hine from the South African Heritage Resource Agency (SAHRA) Archaeology, Palaeontology and Meteorite Unit (APM) noted that there are three previous Archaeological Impact Assessments conducted in the area. These included projects on neighbouring farms such as Der Brochen and Mareesburg. More specific, an assessment was conducted as part of the EMP for the Everest North Platinum Mine by Dr Julius Pistorius. SAHRA has no record of the EMP or Heritage Report that was conducted for this project.	Digby Wells undertook a Phase 1 Heritage Impact Assessment (HIA) on the Vygenhoek property. This was considered necessary based on Digby Wells' gap analysis conducted on existing heritage reports.
E-mail 27 March 2012: Phillip Hine noted the draft Scoping report indicated that the area to be archeologically sensitive. According to the report sixty-seven archaeological sites were identified, of which twenty-nine are located within the project area. These sites include: ■ Extensive Choma village from the historical period, including cattle enclosures, stone walls, stone cairns and graveyards. ■ Further graveyards situated outside and around the Choma village and other graves unrelated to the Choma village. Since high densities of archaeological sites occur in the area, SAHRA APM unit recommends that a new Heritage Impact Assessment must be conducted for this project. This new assessment must re-evaluate the heritage resources identified in the Pistorius (2006) Impact Assessment. Existing and newly identified burial grounds and graves must be also properly	Digby Wells undertook a Phase 1 Heritage Impact Assessment (HIA) on the Vygenhoek property. This was considered necessary based on Digby Wells' gap analysis conducted on existing heritage reports.

ISSUE	RESPONSE
assessed. It is important that the significance of the sites be stated. It is further recommended that a broad base stakeholder consultation process be undertaken.	
E-mail 27 March 2012: Phillip Hine notes that the developer must ensure that Palaeontological study be undertaken to assess whether or not the development will impact upon paleontological resources –or at least a letter of exemption form a Palaeontologist is needed to indicate that this is unnecessary.	Digby Wells undertook a Phase 1 Heritage Impact Assessment (HIA) on the Vygenhoek property. This was considered necessary based on Digby Wells' gap analysis conducted on existing heritage reports.
E-mail 27 March 2012: Phillip Hine states that any other heritage resource that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewscape must also be assessed.	Digby Wells undertook a Phase 1 Heritage Impact Assessment (HIA) on the Vygenhoek property. This was considered necessary based on Digby Wells' gap analysis conducted on existing heritage reports.

10.3 Statement of Significance/Heritage Value

Site significance is determined by Section 3 of the NHRA. This act provides nine categories whereby heritage resources' significance may be measured against.

Table 10-3: Criteria used to determine value and significance of heritage resources, NHRA Section 3

NHRA reference	Description of defining criteria
3(1)(a)	its importance in the community, or pattern of South Africa's history;
3(1)(b)	its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
3(1)(c)	its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
3(1)(d)	its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
3(1)(e)	its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
3(1)(f)	its importance in demonstrating a high degree of creative or technical achievement at a particular period;
3(1)(g)	its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;

3(1)(h)	its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
3(1)(i)	sites of significance relating to the history of slavery in South Africa.

Table 10-4: Proposed field ratings/grades describing value and significance of heritage resources of tangible heritage resources, based on NHRA Section 7(1) and SAHRA Minimum Standards.

FR/Grade	Significance	Mitigation recommendation
National and Provincial Protection, NHRA 7(1)(a, b)		
I	National SAHRA responsibility High significance	Heritage resource conserved/preserved; No mitigation as part of development recommended
II	Provincial SAHRA responsibility High significance	Heritage resource conserved/preserved; No mitigation as part of development recommended
Local Protection, NHRA 7(1)(c)		
IIIA	Local PHRA responsibility High significance	Retained as heritage register site; Mitigation as part of development not advised
IIIB	Local PRHA responsibility High significance	Could be mitigated and part retained as heritage register site
General Protection, NHRA 7(1)(c)		
IV A	Local PRHA responsibility High/Medium significance	Heritage resource should be mitigated before destruction
IV B	Local PRHA responsibility Medium significance	Heritage resource should be recorded before destruction
IV C	Local PRHA responsibility Low significance	Heritage resource has been sufficiently recorded Phase 1 requiring no further recording before destruction

Table 10-5: Identified heritage resources that will be impacted upon by the haul road

Site number, development phase and activity			Recommended mitigation	Site significance	Impact significance	Impact significance (post-mitigation)
SYL1256/DW001 – Iron Age	C, O, D	1, 2, 6 11 & 12	Project Mitigation: Adjust planned Haul Road & associated infrastructure to bypass heritage resource. (*As far is feasible*) Heritage Mitigation: Conduct a Phase 2 HIA including sampling through test excavation and mapping. Apply for a Destruction Permit from the relevant HRA. Implement a monitoring programme during construction.	4	94	34
SYL1256/DW002 – Feature	C, O, D	1, 2, 6 11 & 12	Project Mitigation: Adjust planned Haul Road & associated infrastructure to bypass heritage resource. (*As far is feasible*). Heritage Mitigation: No mitigation is required.	1	79	28
SYL1256/DW003 – Iron Age	C, O, D	1, 2, 6 11 & 12	Project Mitigation: Adjust planned Haul Road & associated infrastructure to bypass heritage resource. (*As far is feasible*)	2	80	29
SYL1256/DW004 & DW005 – Iron Age	C, O, D	1, 2, 6 11 & 12	Heritage Mitigation: Record and document the extent of the site through extensive mapping, photographs and surface collection. Apply for a Destruction Permit from the relevant HRA.	3	81	30
SYL1256/DW006 – Feature	C, O, D	1, 2, 6 11 & 12	Project Mitigation: Adjust planned Haul Road & associated infrastructure to bypass heritage resource. (*As far is feasible*). Heritage Mitigation: No mitigation is required.	2	80	29
SYL1256/DW007 – Historical	C, O, D	1, 2, 6 11 & 12	Project Mitigation: Adjust planned Haul Road & associated infrastructure to bypass heritage resource. (*As far is feasible*)	3	81	30
SYL1256/DW008, DW009 & DW046 - Historical	C, O, D	1, 2, 6 11 & 12	Heritage Mitigation: Record and document the extent of the site through extensive mapping, photographs and surface collection. Apply for a Destruction Permit from the relevant HRA.	2	80	29

Table 10-6: Identified heritage resources that will be impacted on by mining

Site number, development phase and activity			Recommended mitigation	Site significance	Impact significance	Impact significance (post-mitigation)
SYL1256/DW036 – Historical	C, O, D	1, 2, 3, 10, 11 & 12	Project mitigation: Adjust planned location of Open Cast Pit to avoid irreparable damage to heritage resource. Heritage mitigation: Conduct a Phase 2 HIA including sampling through test excavation and mapping. Apply for a Destruction Permit from the relevant HRA.	3	99	43
SYL1256/DW050 – Feature	C, O, D	1, 3, 5, 10, 11 & 12	Project mitigation: No mitigation is required Heritage mitigation: No mitigation is required	1	113	106
SYL1256/DW043 & DW044 – Burial			Project mitigation: Preserve burial ground in situ, draft management plan, and site monitoring; Heritage mitigation: relocation process must be implemented, including Public Participation	4	28	28
SYL1256/DW048 – Burial				4	28	28

Table 10-7: Recommendations for the Choma Village Complex

SYL1256/DW034 & DW035 – Choma Village	C, O, D	1, 2, 3, 10, 11 & 12	Project mitigation: Adjust the mine plan to exclude the complex from the mining area. Preserve the site. Heritage mitigation: Conservation management plan and nomination of the site as a Regional Heritage Site with SAHRA	4	40	40
SYL1256/DW037 – Choma Village	C, O, D	1, 2, 3, 10, 11 & 12		3	99	43
SYL1256/DW038 – Choma Village	C, O, D	1, 2, 3, 10, 11 & 12		3	136	53
SYL1256/DW039 – Choma Village	C, O, D	1, 2, 3, 10, 11 & 12		3	136	53
SYL1256/DW040 – Choma Village				3	51	51

Choma Village Complex (Pistorius 2006)	C, O, D	1, 2, 3, 5, 6, 10, 11, & 12		5	138	55
Pistorius (2006) C004	C, O, D	1, 2, 3, 5, 6, 10, 11, & 12		4	116	54

10.3.1 Mitigation for archaeological resources

- No mitigation is recommended for sites SYL1256/DW10-33; 41-42, 47; 49; 50, as these sites are either of no heritage value or further than 500 m outside the proposed impact area.
- Adjustment of the haul road and associated infrastructure as far as is feasible be conducted for sites SYL1256/DW1-9 and 46. Where this is not possible, heritage mitigation will include a Phase 2 Heritage Assessment consisting of test excavation, shovel test pits (STP), sampling and collection of material culture, and detailed mapping for site SYL1256/DW1. Recording of sites SYL1256/DW3-5; 7-9; and 46 through surface collections, photographs and detailed mapping is also recommended. On completion of the recommended heritage mitigations, a Destruction Permit from SAHRA can be applied for on behalf of Aquarius.
- For heritage resources impacted upon by mining infrastructure and activities, it is recommended that the proposed mine plan be amended as far as is feasible to avoid irreparable damage to heritage resources. Additionally, *in situ* preservation for burial sites SYL1256/DW43-44 and 48 with an associated draft management plan and monitoring programme is recommended. Where this is not possible, a Phase 2 HIA consisting of STP's, sampling and collection of material culture, detailed mapping and an application for a Destruction Permit from SAHRA is recommended for SYL1256/DW36. For burial sites SYL1256/DW43-44 and 48, relocation of the graves including PPP is recommended.
- Adjustment of the mine plan to exclude the Choma Village Complex is recommended. In addition, it is recommended that the Choma Village Complex be conserved, a conservation management plan be developed and that the complex be nominated for Grade III Heritage Site status with SAHRA.

11 SOCIO-ECONOMIC ASSESSMENT

The socio-economic baseline section outlines the social and economic status of the area within which the Project falls. This section incorporates a regional (provincial, district and local) overview, as well as a local (project area) socio-economic perspective.

The baseline section incorporates data obtained from primary and secondary sources, including previous studies undertaken in the area, together with various stakeholder engagement processes.

11.1 Regional administrative overview

11.1.1 Project locality

The Project is a situated within the southern end of the Eastern Limb of the South African Bushveld Complex in Mpumalanga Province, near the provincial border with Limpopo between the towns of Roosenekal (Limpopo Province) and Lydenburg (Mpumalanga Province).

It is located in Mpumalanga's Ehlanzeni District Municipality, in the Thaba Chweu Local Municipality. The Project lies within the Groot Dwars River valley, approximately 28 km north-east of Roossenekal and 30 km west of Lydenburg.

11.1.2 Ehlanzeni District Municipality

Ehlanzeni is the northern-most district of the Mpumalanga Province and covers a total surface area of 27,895.47 km^2 (as represented in Table 11-1). It borders the Nkangala and Gert Sibande Districts to the south-west, Mozambique to the east, and the Mopani and Sekhukhune Districts of Limpopo to the north and north-west. The District consists of five local municipalities, which are as follows:

- Mbombela Local Municipality;
- Bushbuckridge Local Municipality;
- Nkomazi Local Municipality;
- Thaba Chweu Local Municipality; and
- Umjidi Local Municipality.

Table 11-1: Area coverage of the Local Municipalities in the Ehlanzeni District*

Municipality	Area (Km²)
Thaba Chweu	5,719.06
Mbombela	3,411.75
Umjindi	1,745.38
Nkomazi	3,240.37

Bushbuckridge	2,589.59
District Management Area	11,189.32
Total	**27,895.47**

*Source: Demarcation Board GIS Spatial data files

11.1.3 Thaba Chweu Local Municipality

The Thaba Chweu Local Municipality is located in the north-western region of Mpumalanga province and covers an area of approximately 5,719 km^2. The total population of the Thaba Chweu Local Municipality is 426,475 with a total of 27,943 households (projections from Statistics SA, 2001 and Thaba Chweu Baseline and Backlog Survey, 2009).

According to the Thaba Chweu Municipal IDP (2009/2010), there are three tribal areas within the municipality. These were part of the former Lebowa government and are situated on the far northern part of the municipality along road P170/1 from Graskop towards Ohrigstad/Steelpoort/Burgersfort, thus largely situated north of the Project area. These tribal authorities are as follows:

- Mogane Traditional Authority;
- Mashile Traditional Authority; and
- Mohlala Traditional Authority.

Although these traditional authorities and tribal groups are located throughout the municipality (and stretching into the Limpopo Province), they were deemed to be largely unaffected by the Project.

11.1.4 Ward councils

All local municipalities within South Africa are divided into a number of administrative wards. Each ward has a democratically elected ward councillor, as established by the Municipal Structure Act 117 of 1998. The Act requires that local municipalities establish ward committees as agents of communities with the main purpose of bridging the gap between communities and municipalities. According to the Ehlanzeni Integrated Development Plan (IDP) (2009/2010), there are 12 official wards within the Thaba Chweu Local Municipality, with the proposed Project being located within Ward 4. The municipality has a total of 23 Councillors of which 12 are ward councillors and 11 are Proportional Representation (PR) councillors. The ward councillor's role is to communicate relevant information and decisions made at the municipal level, to communities and residents of a geographically defined ward (Thaba Chweu Municipality, 2009). PR councillors are primarily accountable to their political party structures. They are allocated to a specific ward and provide direct support to the ward councillor.

A recent review of the ward demarcation of the Thaba Chweu Local Municipality proposed the demarcation of 14 wards, as opposed to the existing 12 wards (The Province of Mpumalanga, 2010). In terms of these new demarcations, the Project would be located in

Ward 5, however, for the purposes of this report, as in the 2011/2016 Thaba Chweu municipal IDP, the current ward demarcations have been used, as no mention is made of the finalisation of the new ward demarcations.

11.2 Regional socio-economic overview

This section provides a socio-economic overview of the Ehlanzeni District Municipality and the Thaba Chweu Local Municipality.

11.2.1 Demographic data

11.2.1.1 Population and settlement

According to Statistics South Africa (2007), the Ehlanzeni District Municipality had a population of 1,526,236 (2007 EST.). This represented approximately 42% of Mpumalanga's total population of 3.6 million in 2007. The breakdown of the district population is represented in Table 11-2 below.

According to the Provincial Integrated Spatial Framework, the Ehlanzeni District has the largest population with 17% being urbanised. Nelspruit, Hazyview, Barberton, White River and Malelane are the largest urbanised areas in Ehlanzeni District. Other service centres in the Ehlanzeni District are Nkomazi, Mapulaneng and Lydenburg (Mashishing) (Ehlanzeni IDP, 2011/2012).

Table 11-2: Local municipality population distribution

Municipality	Population	Population as a % of the district population
Thaba Chweu	87,545	5.7%
Mbombela	527,293	34.5%
Umjindi	60,475	3.9%
Nkomazi	338,095	22.1%
Bushbuckridge	509,970	33.4%
District Management Area	2,948	0.2%
TOTAL	**1,526,326**	**100%**

*Source: Ehlanzeni IDP, 2011/2012

Comparatively, the population of Ehlanzeni District has increased from 1,447,053 in 2001, to 1,526,236 in 2007. This represents a population growth of 5.47% (Ehlanzeni IDP, 2011/2012). The Ehlanzeni IDP explains that the high rate of Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) infection, which is amongst the highest in South Africa, poses major constraints to the social-economic development of

the region, and is expected to have a major role in the relatively low increase in population from 2001 to 2007. The population of the Ehlanzeni District is influenced by settlement patterns such as those of the previous homeland areas and service centres focused on the economic hubs (Ehlanzeni IDP, 2011/2012). Reports from the local IDP manager outlined that development continues to have an impact on settlement patterns in the area, as people migrate in search of employment, with the majority settling in Mashishing Township. Accordingly, the township is said to have expanded substantially over the last few years with two new extensions being opened to cater for the newcomers.

According to the Thaba Chweu municipal IDP (2011-2016), the total estimated population of the municipality was 87,545 (data from Statistics SA Community Survey, 2007), equating to approximately 5.7% of the total district population. Figures from Statistics South Africa's 2001 Census revealed that there were 21,073 households, with an average of 3.9 persons per household (Statistics SA 2001 Census). When assessing the population increases from 2001 (81,681 people) to 2007 (87,545 people), this equates to an annual growth rate of 1.16% over the six year period. The projected population of the local municipality is estimated to be 92,752 in 2012 and should reach 98,269 in 2017 (Thaba Chweu IDP, 2011-2016).

11.2.1.2 Age and gender

According to Statistics South Africa (Community Survey, 2007) the highest percentage of the population in 2007 was located within the lowest age groups. Approximately 35% of the population are under the age of 15 years. This indicates that a large percentage of the population are dependent on others for their livelihoods. The gender composition of the Ehlanzeni District reveals that there are slightly more females than males with 53% being female and only 47% being male. According to figures obtained from the Ehlanzeni IDP, (2011/2012), the gender distribution represents a male/female ratio of 89 males for every 100 females. Although there is migration by both genders to other provinces, this is unlikely to be a true reflection of migration because the province is also host to many migrant workers from other provinces.

According to Thaba Chweu IDP (2010/2011), the largest proportion of the population in each of the local wards is between the ages of 18 to 34 years and 35 to 65 years (2009). Population groups older than 65 years are in the minority. Data presenting the overall age distribution profile of the municipality shows that 24.7% of the municipality's population are younger than 18 years, while 35.5% falls between 18 and 34 years, 35.7% are between 35 and 65 years and only 4.1% are older than 65 years of age. Figure 11-1 below illustrates this distribution.

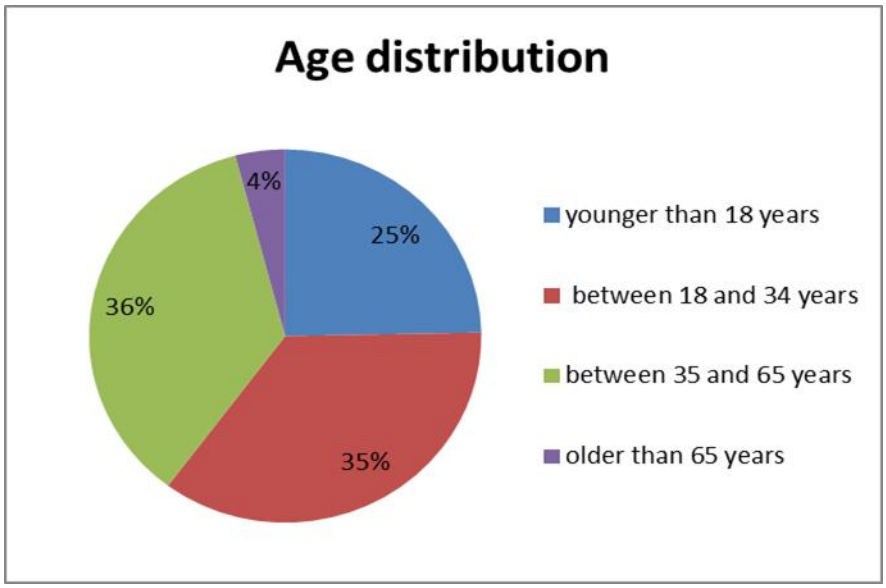

Figure 11-1: Age distribution in the Thaba Chweu Municipality

The Statistics SA 2007 Community Survey revealed that there are slightly more females than males in the local municipality. The distribution profile reflects that 50.3% of the population was female, whilst 49.7% was male.

11.2.1.3 Language, ethnicity and culture

In 2001 94.4% of the population in the district municipality consisted of the African or Black ethnic group, whilst much smaller percentages represent other races such as Whites (4.7%), Coloureds (0.5%), and Indian and Asians (0.3%).

According to the 2001 Census, the population of Thaba Chweu comprised a variety of ethnic groups. The Northern Sotho or Ba-Pedi people account for approximately half the population; while the other half is made up of Nguni people (dominated by the Swazi), the Tsonga, Coloured, Indian, English, Afrikaners, and immigrants from the rest of Africa, Europe and Asia. More recent information provided by the Statistics SA Community Survey (2007) further revealed similar race distributions for the Ehlanzeni District Municipality. The data showed that 79.7% of the population in Thaba Chweu Municipality consisted of the African (Black) ethnic group. The remainder of the recorded population (20.3%) was made up of White (16.6%), Coloured (3.3%), and Indian and Asian (0.3%) ethnic groups (Statistics South Africa, 2007).

Within the Thaba Chweu Municipal area Sepedi is the dominant language, spoken by 43.0% of the population (as their home language). This is followed by Siswati (21.1%), Afrikaans (12.3%), Xitsonga (6.3%) and IsiZulu (6.0%) (Statistics SA, 2001).

11.2.2 Economic overview and development

11.2.2.1 Economic overview

The main economic activities within the Ehlanzeni District Municipality are agriculture, forestry and tourism. Major industrial centres in the district include Nelspruit, White River and

Nsikazi. The building, manufacturing and service sectors are steadily increasing economic growth in the Nelspruit and White River areas (Ehlanzeni IDP, 2011/2012).

According to the Development Bank of South Africa (DBSA), community services were the largest economic contributor to the Ehlanzeni District economy, contributing 25% in 2005. This was followed by manufacturing (22%); trade (20%) and agriculture (9%), with mining only contributing 3%. The remaining contributing sectors are illustrated in the figure below. The gold mining sector has contributed in the past decade to between 17% and 26% of the Provincial gross domestic product (GDP). Although most of the current mining activity is taking place in the neighbouring Greater Tubatse Municipality, mining is still perceived to have important economic and development benefits for Thaba Chweu Local Municipality (Thaba Chweu IDP, 2009/2010).

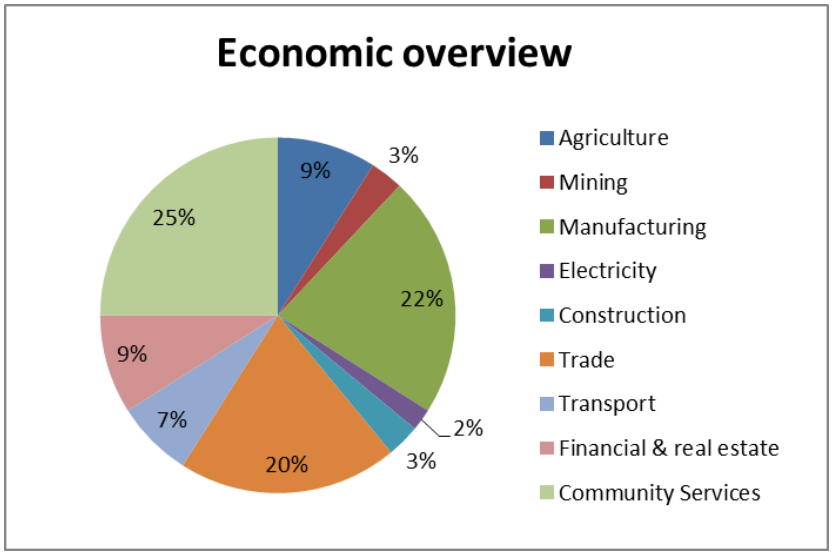

Figure 11-2: Economic contributor to the district municipality

Source: Development Bank of South Africa 2005

Agriculture and forestry were the dominant economic sectors in the Thaba Chweu Local Municipality between 2001 and 2005. The Thaba Chweu Municipality's main agricultural produce, according to the Thaba Chweu IDP (2009/2010), is beef and citrus, found mostly in areas such as Lydenburg, Sabie, Pilgrim's Rest and Graskop

The tourism sector in Ehlanzeni District is an important source of foreign revenue. Numerous tourism activities are centred around the areas of Pilgrim's Rest, Blyde River Rivierspoort, Sabie and Graskop. The Thaba Chweu Municipality is well known for hunting, forestry and fishing and is a popular tourist destination with attractions such as the historical mining town of Pilgrims Rest, God's Window, the potholes at Bourke's Luck and numerous waterfalls, such as the Mac-Mac falls and trout fishing opportunities. More than 20 registered natural heritage sites fall within the local municipality

A 2007 survey (Thaba Chweu Formal Business Survey, 2007) indicated that there were some 525 formal business undertakings in various towns within the Thaba Chweu Municipal area. Mashishing (Lydenburg) had 844m^2 of vacant business floor area. The survey revealed that the formal businesses in Mashishing represented 58.7% of the total area of

formal businesses in the municipal area. Mashishing has larger numbers of enterprises dealing in specialised commodities than the other towns in the Thaba Chweu Municipal area where a concentration of enterprises dealing in convenience commodities are mostly found.

11.2.2.2 Employment

The Ehlanzeni District's unemployment rate in 2001 was 19.1%, however employment levels were seen to have improved over the preceding years. The economically active population comprises all people with the capacity to be employed in the economy, which includes both the employed and unemployed between the ages of 15-65. According to Statistics South Africa's September 2005 labour force survey, agriculture was the fourth highest formal employer in the province, contributing 11.5% of the province's formal employment.

Trade was the largest sector employer in the Ehlanzeni District followed by community services, agriculture, and then manufacturing sectors. According to the statistics documented in the Ehlanzeni IDP, employment for the trade sector increased by 4.8% (98,940 to 106,036 people) from 2001 to 2005.

According to Statistics South Africa, in 2007 approximately 57.2% of Thaba Chweu Municipal population were employed compared to only 36.4% of the Ehlanzeni District population, as show in Table 11-3. Calculations based on these figures show that the local municipality contributes 10% of the districts employment, but only contributes to 4.7% of the district unemployment levels.

Table 11-3: Comparison of Thaba Chweu Municipal and Ehlanzeni District employment statistics for 2007

Description	Thaba Chweu		Ehlanzeni	
	Number	Percentage (%)	Number	Percentage (%)
Employed	32,882	57.3%	325,270	36.4%
Unemployed	8,082	14.1%	171,602	19.2%
Not economically active	16,423	28.6%	396,459	44.4%
TOTAL	**57,387**	**100%**	**893,331**	**100%**

*Source: Statistics SA Community Survey 2007 (People aged from 15 till 65 years)

Thaba Chweu has high unemployment rates compared to the rest of the district municipality– highlighting challenges regarding job creation, particularly amongst the youth. Recent studies (2005), indicate that unemployment rate in the Thaba Chweu municipal area increased from 15.2% to 16.8% between 2001 and 2005 (The South African LED Network, 2010). The same study revealed that there is a high level of poverty, with 70% of households earning less than R 1,800 per month and 25% of households earning less than R 400 per month (The South African LED Network, 2010.)

11.2.3 Land use and land tenure

The land use patterns of urban or rural areas are mostly influenced by a diverse set of factors, which include climate, topography, and resource base in the area such as minerals, soil types, water availability, and biodiversity (Daniel and Hopkinson, 1989).

Following a strategic planning workshop held by the Thaba Chweu IDP Steering Committee, it was established that a large percentage of people (increase of 118% in the last year) reverting to subsistence farming to sustain their livelihoods (in comparison to a national average of 22.5%).

Gold mines are operating at Barberton and Pilgrims Rest and chrome mines at Mashishing. The future development of the Eastern Limb of the Bushveld Complex directly west of Mashishing will also have an influence on the future land use patterns within the Thaba Chweu Local Municipality. The Ehlanzeni District is predominately rural with most developments taking place around the urbanised areas.

Together with difficulties in land management, the slow pace of the land reform programme is affecting the establishment of townships and settlements in rural farm areas. Thaba Chweu is the largest municipality (25% of the Ehlanzeni District Municipality) with limited populated areas, therefore presenting several geo-spatial challenges. The Thaba Chweu Municipality is in the process of adopting its Spatial Development Framework (SDF), with the aim of giving direction to development, taking into account the need for and compatibility of land uses. The purpose of the SDF is to plan, direct and control development but it does not provide land use rights (Thaba Chweu IDP, 2009/2010).

Ward 4 constitutes mainly rural areas, such as Shaga and Draaikrall. Subsistence agriculture is an important part of life for communities in these areas, particularly where employment is limited. A strategic planning workshop held by the Thaba Chweu IDP Steering Committee revealed that a large percentage of people between 2006 and 2011 (increase of 118% in the last year) had reverted to subsistence farming to sustain their livelihoods (in comparison to a national average of 22.5%).

Informal housing is still prevalent and continues to increase in particularly throughout Ward 3 Ward 6 and Ward 7.

11.2.4 Education and skills

Education levels Ehlanzeni District Municipality are low in that approximately one third of the population have some primary schooling and the same proportion has complete secondary schooling - Table 11-4 below. Less than 10% of the population have higher (tertiary) education, highlighting the lack of access to tertiary education. According to a 2011 estimate, 26.1% of persons aged between 5 and 24 years were not attending school.

This highlights the need for improvements in training and education, ranging from pre-school level to tertiary level. There is therefore a great need (in the province) to develop tertiary institutions to improve the state of education. The lack of appropriate education and training impacts negatively on job seekers who, according to findings of the IDP Steering Committee, have and stopped trying to find employment.

Education is critical in the development of communities and impacts greatly on economies. Improved education and training for the poor will allow for access to more meaningful occupations and career development.

To highlight the educational challenges within the district, and in particular the Thaba Chweu Municipality, a comparative review of education (between the Ehlanzeni District Municipality and the Thaba Chweu Local Municipality) has been provided in the table below.

Table 11-4: Comparative view of the levels of education within the district and local municipalities

Description	Thaba Chweu		Ehlanzeni	
	Number	**Percentage**	**Number**	**Percentage**
No Schooling	7,226	9.4%	184,473	13.8%
Some Primary Schooling	20,708	26.9%	395,617	29.6%
Complete Primary Schooling	4,666	6.1%	85,735	6.4%
Some Secondary Schooling	11,392	14.8%	187,911	14.1%
Complete Secondary Schooling	26,130	34.0%	393,529	29.5%
Higher education	6,717	8.7%	88,935	6.7%
TOTAL	**76,839**	**100%**	**1,336,200**	**100%**

*Source: Statistics SA Community Survey 2007 (Children under 5 years of age are not included)

The level of education is an important indicator of development and affluence of a society. The 2001 Census figures indicated that 39.1% of persons in Thaba Chweu were illiterate. Furthermore, in 2001, more than a quarter of the population (26.8%) did not complete Grade 7 and thus did not complete any formal education.

11.2.5 Infrastructure and services

Most community needs identified throughout the district and local municipalities centre on basic services which included water, electricity, sanitation and waste removal, roads, storm-water drainage, transport, cemeteries, and recreational facilities.

Chief service requirements in the Thaba Chweu municipality, according to the IDP manager, include greatly improved rural sanitation, improved housing and access to electricity, through improved infrastructure. It was noted during interviews with the IDP manager, that the local Municipality has a relationship with the existing Everest South project. They are apparently

working on several infrastructure and service improvements throughout the municipality, although no detail was provided.

11.2.5.1 Health

The provision of community health such as primary health clinics and ambulance services in the Ehlanzeni District Municipality is primarily the responsibility of the provincial health departments (Ehlanzeni IDP, 2011/2012). The Department of Health makes use of mobile clinics to provide primary health care in rural areas where access to clinics and hospitals is difficult. In the case with many rural communities, they have to travel long distances to access primary health care facilities. The problem, however, with health services is the lack of continuity and reliability. For example mobile clinics only service rural communities once or twice a week. There is therefore a great need for full time health care. Hospitals located within the Ehalnazeni District currently need to serve 9,520 residents.

The greatest health challenge facing the Ehlanzeni District is HIV & AIDS. The high HIV rate in the district municipality (according to the findings of the IDP Steering Committee in 2011) was 32%, compared to the national average of 10%; however, there has been progress in fighting HIV & AIDS when comparing past years. Although higher than the national average, Ehlanzeni is the only district to have shown a decrease in HIV prevalence in past five years, compared to other districts in Mpumalanga (Ehlanzeni IDP, 2011/2012).

Similarly, health facilities in the Thaba Chweu Municipality are limited, with lack proper infrastructure. Through the assessment of community needs, as outlined in the Thaba Chweu IDP (2009/2010), it is clear that there is a shortage of health facilities and services. Communities in the Thaba Chweu Municipality generally need to travel long distances to access health services and often have to wait for mobile clinics, which are often a very unreliable service.

There are three health facilities located within Mashishing and Lydenburg, each having to serve approximately 2,200 people residing within the Lydenburg town as well as an additional 5,393 people residing within the Mashishing Township (adjacent to the main town) (Concession Creek Consulting, 2007).

11.2.5.2 Education

Within Mpumalanga's educational system, there are a number of problem areas such as lack of infrastructure, human resources, financial and technological aspects. Provincially, Mpumalanga is lacking a university to cater for pupils completing matric in the province. This forces pupils to enrol in universities in other provinces.

There is a great need to increase capacity of existing schools and establish new ones within the broader Ehlanzeni District and in particular, more rural Thaba Chweu Local Municipality. This will allow, particularly rural communities, easier access to education thereby improving their education and skill levels. The Ehlanzeni IDP (2011/2012) notes that although there has been an increase in the number of learners within the region, there has been a decrease in the number of learners in rural areas. This suggests that learners may be migrating out of

rural areas to predominately urban areas. The IDP also mentions a backlog of 2,230 classes/classrooms in the district.

Key strategies should be aimed at combating unemployment and crime. This may be addressed through several methods, including the establishment of higher learning institutes to cater for the unemployed youth who have completed secondary schooling.

Through the undertaking of a community needs analysis, it was determined that the provision of schools (secondary schools in particular) was a high priority for Ward 4. This included library facilities and transport for learners to and from school (Thaba Chweu IDP, 2009/2010).

11.2.5.3 Water and energy resources

A large portion of the Ehlanzeni District Municipality is dominated by rural areas, with many people not having adequate access to potable water. Where infrastructure is in place, there is often poor operation and maintenance by the relevant authorities. Some local municipalities have not yet developed their indigent registers and are thus not capable of providing free basic water to the eligible communities within those areas. Certain rural communities have access to free water (unmonitored). Between 2001 and 2005, the Ehlanzeni District Municipality spent R 93,322,000 on water infrastructure, however little impact has been made in terms of sustainable water supply infrastructure (Ehlanzeni IDP, 2011/2012).

The Thaba Chweu Local Municipality has a separate water schemes aimed at improving access to water. Lydenburg's (Mashishing's) urban scheme involves raw water being abstracted from Sterkspruit via the Lydenburg town dam, however floods during December 2002 has reduced yield of the dam hampering the schemes production. Existing water treatment infrastructure in Mashishing includes two treatment works, where water is treated for primary water use, however, a major upgrade is required to ensure reliable and constant water supply (Thaba Chweu IDP, 2009/2010). Mentioned was made by informants from the local municipality that an additional water project is planned within the Thaba Chweu Municipality, with some water towers already available.

11.2.5.4 Waste and sanitation

A 2005 survey undertaken by the Ehlanzeni District Municipality and various local municipalities compiled a service backlog report for water and sanitation which culminated into the Blue Print for Water and Sanitation for the Ehlanzeni District. The study revealed that the majority of those living in informal villages lack access to sanitation. However, more than 50% of the total households in these areas have pit latrines which must be upgraded to VIPs (Ehlanzeni IDP, 2011/2012). Table 11-5 below outlines the availability of basic sanitation facilities, comparing the Ehlanzeni District and Thaba Chweu Municipal standards. The results show that there are a large percentage of households in the Thaba Chweu Municipality with low or no sanitation services compared to the broader district municipality, highlighting the needs of households in the local municipality.

Table 11-5: Sanitation service levels in Ehlanzeni

Municipality	Number of Households	Basic Service		Full Service		Below Service	
		Households	%	Households	%	Households	%
Thaba Chweu	387,318	66,889	17.3	83,574	21.6	236,855	61.2
Ehlanzeni	28,258	1,334	4.7	17,719	62.7	9,205	32.6

*Source: Ehlanzeni District Municipality Blue Print on Water and Sanitation

The major challenges faced by local municipalities in addressing sanitation issues include:–

- Geotechnical properties of soil in the Ehlanzeni are of a sandy nature. During the rainy season, the water table is very high and this increases the health risks of pit latrines with ventilation (VIP) and pit latrines;
- Certain areas in Bushbuckridge are dependent on boreholes for water supply and, due to the sandy soil, these boreholes are contaminated as a result of the VIP and pit latrines;
- The implementation plan for VIPs is slow and time consuming. Another approach is necessary to convince the communities of the benefits;
- Millennium goals will not be met due to resource constraints, capacity and huge backlog.

Lydenburg, Coromandel, Sabie, Graskop and Pilgrims Rest each have their own sewage purification works. All the consumers in the rural areas have very basic sanitation systems i.e. pit latrines or septic tanks. Most of the sanitation units do not comply with minimum RDP standards of service. Proper sanitation still remains a challenge for households residing in farm areas (Thaba Chweu IDP, 2009/2010).

11.2.5.5 Roads and transport

The road network within Ehlanzeni District consists of surfaced tar roads and several gravel roads. Roads within the rural areas are primarily in poor condition. They comprise gravel/dirt roads and, in most instances, are not surfaced, making access difficult during rainy seasons. According to figures from 2007, there were 426km of tarred public commuter transport roads within the Ehlanzeni District, of which 43km are within the Thaba Chweu Local Municipality (Local Municipalities Ehlanzeni District, 2007). Maintenance and upkeep of these roads is an on-going challenge with many roads often having large potholes.

There are different types of transportation systems that operate within the Ehlanzeni District. A rail network transverses the entire district along the N4 Maputo corridor to Komatipoort and to the north along the R40 to Phalaborwa. The railway system only serves long distance and commercial purposes with the majority of commuters using buses or taxis. The bus sector carries more than 85% passengers on 500 routes, with 139 terminals and 338 buses. The taxi industry accounts for less than 20% of commuters with about 1,200 registered vehicles, twenty taxi associations and a number of metered taxis (although many operate without licences).

11.2.5.6 Housing

According to a provincial survey conducted in January to July 2006, there was a backlog of 95,000 houses in the Ehlanzeni District. The Mpumalanga Department of Human Settlement has since been implementing housing projects in the district. A large number of people in rural areas currently reside in traditional and informal housing. The increase in informal settlements in the Ehlanzeni District also contributes to a shortage of proper housing. Poor attempts in rectifying the housing shortage (poor construction and corruption), have placed increased pressure on service delivery and the provision of proper housing (Ehlanzeni IDP, 2011/2012).

According to the Thaba Chweu IDP (2009/2010), some of the most urgent needs in the local municipality relate to land reform and housing. There are huge backlogs for housing, in areas such as Mashishing, Sabie and Graskop. This backlog is primarily due to the high influx of people from the rural and farming areas as well as jobseekers from other parts of the country. The slow pace of the land reform programme implemented by provincial government is delaying the establishment of formalised settlements in rural farm areas. Tenure upgrading is further exacerbated by inadequate funds and poor coordination between departments, which delays the transfer of land from “current” owners to land restitution beneficiaries (Thaba Chweu IDP, 2009/2010).

Data from the 2001 Census (Statistics SA, 2001) describe 69,1% of households in the Thaba Chweu Municipality as having lived in formal housing types, with 21,5% living in informal housing, 9.0% in traditional housing and 0.4% in other housing types. In the past year the Provincial Department of Local Government and Housing has implemented a number of housing projects. This increase in the number of informal housing is attributed to the uncontrolled influx of people to these towns in search of improved housing. Ward 4 represented the highest number of traditional type dwellings (651 households), with the next highest being Ward 9 with 444 traditional households (Statistics SA, 2001).

11.2.5.7 Safety and security

Crime in the Ehlanzeni District poses a major challenge to government and communities. The contributing aspects relate to various social factors and social ills. Lack of adequate police stations and limited capacity within existing police stations has had a negative impact on the safety and security of communities.

Property-related crimes are the highest reported crimes in the Ehlanzeni District Municipality with 17.3%, followed by social/domestic crime at 7.4% and lastly violent crimes at 2.3%. Each police station in the Ehlanzeni District serves an average of 41,021 people, with one police officer/official serving 1,000 people.

Statistics from the Thaba Chweu Local Municipality show that security services in the area are limited, particularly within isolated rural areas. A 2009 community survey (Thaba Chweu IDP, 2009/2010) highlighted the need for satellite/mobile police stations. This may serve as a short-term solution, however, more temporary facilities will need to be established, particularly with the increasing size and number of informal settlements.

11.3 Local socio-economic overview

This section provides an overview of the socio-economic status of the project area including surrounding communities and human settlements. The proposed Project is situated on the farm Vygenhoek 10 JT (Project area/Vygenhoek), approximately 40 km (30 km via direct route) from the town of Lydenburg (Mashishing) to the east and the town of Roossenekal, approximately 28 km south-west of the project area.

The “project area” or “area of influence” incorporates settlements (both formal and informal) and landowners on the farm Vygenhoek 10 JT and directly surrounding settlements. Plan 16 illustrates the settlements localities relative to the project area and proposed mine infrastructure.

11.3.1 Brief overview

It was determined through the social investigations that there are two major stakeholder groups active in the area, namely the land claimants (Pakaneng Choma Community Trust) and the current residents/land occupants (Pakaneng/Vygenhoek community).

The Choma Clan (Choma) are a family lineage thought to have historically occupied certain areas surrounding the Project site (including Vygenhoek 10JT and various surrounding farms). The Choma (represented through the Pakaneng Choma Community Trust) are current claimants to the land in which the proposed Project falls. The land claim is being assessed through the DRDLR and the Land Claims Commissioner.

The current occupants of Vygenhoek 10JT comprise several families, their relatives and numerous informal settlers, many of whom do not have relations or ties to the Choma Clan. The Pakaneng community, being the land occupants during the time of the investigation, was identified as falling within the area of Project influence and deemed the primary stakeholder group for the purposes of assessing socio-economic impacts.

Plan 16: Location of settlements in relation to the project area

11.3.2 Demographics, population growth and distribution

Approximately 27 households were identified within the Project footprint area (on Vygenhoek 10 JT) following a scoping site visit undertaken in February 2012. These households form part of the Vygenhoek, or Pakaneng community. However, the number of households that constitute this community increased to 35 following identification of additional household during a second site visit in May 2012. A comprehensive household survey was not completed, however, interviews with local community members indicated approximately seven to ten people her household: the Pakaneng community may thus be estimated at 250 to 300.

Community reports indicated that Vygenhoek had been occupied by several generations. The reports further state that the population increased over the past two to five years. This growth is generally attributed to withdrawal of individual family or household members, thereby creating their own autonomous households within the settlement. In addition, larger-scale population movement also contributes to the community's population growth. Apart from families expanding, there are also new people moving / migrating into the area. Respondents maintain that more people are currently establishing themselves in the community than during the past two to three years, with an estimated 20 people reported to have settled in the project area over the last year.

General community perception regarding the increase/growth of the settlement was negative. Vygenhoek residents maintained that no improvements or benefits have been experienced to date due to recent population growth and there are no expectations for future improvements. The present communities prefer a stable population where people are familiar and generally trustworthy (i.e. familial, traditional growth). Population growth is expected to impact on available resources, including land, in terms of access and distribution resulting in increased competition.

Within the Pakaneng community, population distribution is reportedly 60:40 males to females. Although this is outside the Provincial norm where females outnumber males, this distribution may be linked to jobseekers migrating to the area, who tend to be males.

Community informants stated that within the Pakaneng community, the younger generation (no age limit was provided) outnumber the elderly and although no reason could be provided for this distribution, it is expected that the youth settle in the area in search of employment.

11.3.3 Settlement within the project area

According to reports made by the Pakaneng community, the Choma people migrated out of the area many years ago (no date was provided). Following their reported migration from Vygenhoek 10JT, several other families settled such as the Mohlalo family who apparently settled there in 1918; and the Mankge family who settled there around the 1960's. It should be noted that these are reports made by the existing land occupants on Vygenhoek 10JT. Documented reports relating to the land claim and history behind the claim, reveal a comprehensive recollection of the settlement history. These reports have been submitted to the DRDLR in support of the claim.

Community residents stated that there has been increased influx into the area. Reasons stated included perceptions regarding potential employment by surrounding mines as well as in Lydenburg, whilst it was noted that agricultural-based influx has decreased.

Influx settlement is generally uncontrolled: residents described people settling on land without notification or permission. In a traditional setting, newcomers onto the land would require certain permissions from the traditional authority, however in the case of the existing community residents, it appears that either no such authority exists. Community members further stated that although influx has increased, people seldom migrate out of the area. Some incomers are said to assert relations to the Choma Clan thereby 'entitling' their settlement.

According to the community members, they are not aware of any traditional process for acquiring land or rights to the land and do not assert any forms of their own settlement process. At present, influx is characterised by illegal squatting with migrants often from diverse backgrounds and not necessarily local (i.e. from within the Province). Although influx is an evident issue to the Pakaneng community, control methods have been established.

11.3.4 Social organisation and administration

The social/cultural organisation the community does not take the form of a traditional system. Community informants stated that a representative committee was established comprising five community members, although there is no traditional hierarchy present. The committee reportedly addresses and attends to various community issues. This committee is understood to meet monthly or on an *ad hoc* basis.

The Choma community is headed by the Choma family with Simon Choma as their leader.

According to community residents, tension around the land claim has led to some conflict arising between the claimants and the land occupants. The claimants are said to have made requests that the residents should discuss community issues directly with them and not with outside parties on aspects related to the land claim. It was mentioned by residents that the claimants and their representatives reside in Groblersdal and not in the project area.

As a means of communicating with surrounding mines, Vygenhoek residents reported that they established a 'Phedla' – an Everest South Mine committee, however, direct communication between the community and mines does not effectively take place, allegedly causing issues such as miscommunication.

11.3.5 Language, ethnicity and culture

The community residents stated that the most of the community are Northern Sotho speakers from the Pedi group with Pedi being the most predominant in the community. Correspondingly, residents are majority Sotho speaking, with some speaking Zulu. Northern Sotho is mostly spoken in the north-eastern parts of South Africa, generally north-east of Tshwane, parts of Gauteng, Limpopo and Mpumalanga.

11.3.5.1 Economic activity and livelihoods

This section provides an overview of economic and livelihood activities taking place within the project area.

Mining

Local mining operations are major role players in providing local employment, comprising a vital economic component of the Thaba Chweu Municipality. Two important mines – Everest South and Two Rivers Platinum - are situated near the proposed project area, but access to these is difficult. The Vygenhoek community does not, however, benefit from these mining operations, either economically or in terms of provided services, thus mining plays a limited economic role in the local environment.

Agriculture

Subsistence agriculture was determined to represent the primary livelihood activity in the project area. Crop and livestock farming was widely practiced.

Predominant crops include maize, sorghum, beans and potatoes. Fruit trees such as peaches were also reported, however this is to a much lesser degree. Livestock includes cattle and goats as well as fowl.

Employment

High unemployment levels in the project area reflect that of the local and district municipality statistics. Previous studies (Concession Creek Consulting cc, 2007), reported that household wage earners were mostly men employed as seasonal farm labourers. Recently, however, community residents reported that there are no residents currently employed on farms as work demand has declined. Women were usually unemployed and family incomes were generally low.

Only nine people were reported to be formally employed at nearby mines, only one of which was a woman, with the remaining eight being male.

Trade

None of the Vygenhoek residents were involved in any trade – small or larger scale. Although agricultural activity is practiced in the area, no surplus crops are sold or traded, further illustrating their reliance on and the importance of subsistence farming

Government funding and grants

As a direct result of the high unemployment rates discussed above, many residents are eligible for various government grants, including child and pension grants. Persons interviewed stated that monthly child grants amounted to R 280 per child (age limit unknown). Orphans received R 600 per month and pensioners R 1 200 per month.

Land use and land tenure

Site visits confirmed that the project area is of rural nature void of any formal settlements or infrastructure. The general topography is mountainous with grassy plains providing ample

grazing. Primary land use is for subsistence agriculture, discussed above. The project area is surrounded by several farms and mining activity is taking place in certain areas.

The Vygenhoek community constitutes the primary settlement in the project area, with much of the surrounding land falling under the Republic of South Africa or private land owners. Structures associated with the settlement consist of cement brick houses as well as several informal structures.

Land tenure is under jurisdiction of the Mpumalanga/Limpopo Provincial Government. However, a land claim has been lodged by the Pakaneng Choma Community Trust resulting in several disputes between the resident Vygenhoek community and claimants (as discussed above).

11.3.6 Services and infrastructure

Generally speaking, there are limited public services and infrastructure available directly within the project area.

Recent population growth in the area has placed strain on resources, services and service delivery, with reports from community informants stating that services provided by the local municipality are not sufficient to accommodate everyone.

11.3.6.1 Water and energy supply

Previous reports (Concession Creek Consulting cc, 2007) indicated that communal stand pipes provide access to water in the project area and these are supplied by municipal services. Interviewees however stated that the supply is limited and not reliable.

Several streams and rivers (tributaries of the Groot Dwars River) are utilised for domestic purposes, crop irrigation and watering of livestock. The Molotsane River is the closest natural water source available to the community: it is believed to be perennial with sufficient water for use by the entire community. However, in winter water levels may be periodically low. In the past, pipes transported water from the river to the settlement, but these are no longer functioning. People are now required to travel an estimated one kilometre to the river to fetch water. According to residents several boreholes exist on the farm, however they are unused as pumps are required.

Concerning water quality interviewees stated that the river water is dirty due to communal use that stirs up sediment. Notwithstanding the poor water quality, water is still consumed by people without any sterilising or filtering treatment. This problem is acknowledged by residents who realise that they are likely to become ill as intestinal related illnesses are prevalent.

The community has no direct access to electricity, although a high voltage transmission line does traverse the settlement. Other forms of electricity such as by generators are also not available. Fuel for household use is therefore predominantly wood, whilst liquid fuels such as paraffin is also used. Wood is gathered from the surrounding environment and not purchased, confirming lack of any trade in the project area.

Health

No established health facilities exist in the project area, although a mobile clinic had previously been providing sporadic service to the Vygenhoek community.

The closest health services are located in Lydenburg (Lydenburg Hospital and Lydenburg Clinic) and a clinic Mashishing Township. These facilities often have large numbers of patients seeking medical assistance and are often not able to attend to everyone.

The mobile health unit serviced the community monthly providing free health care. However, at the time of the survey the service was suspended due to a damaged vehicle. A lack of funds, resources and staff may result in the discontinuation of this service, as reported by health informants.

Traditional medicine, and by inference healers, are still used by some often complementary to formal treatment.

In terms of prices, respondents mentioned that the cost of a standard consultation at the hospital is apparently R20, whilst a consultation with a specialist doctor is R300. Unlike treatment at the hospital, health care at the Lydenburg Clinic is free of charge. It was mentioned that there are some people, such as pregnant women, children under five years of age and the elderly (over 65) who do not need to pay for treatment at the hospital.

According to the community residents, they have been experiencing declining levels of health over the years. This is perceived to be as a result of a lack of health care, the high price of services (apart from services at the clinic) and the far distances required to access these services.

Education

No schools are located directly within the project area, nor within close proximity to the settlement. A primary school was identified in previous reports (Concession Creek Consulting cc, 2007) in or near the project area. However, this school has since closed. Bosfontein Primary is the nearest school situated approximately 10 km from the project area.

All children in the project area were reported to attend primary school, all of whom (27) attend Bosfontein. Average cost per child was stated as R 50 per year, admin fee. Bosfontein Primary is a government listed “No Fee” school. Government supplied busses transport children to and from the school.

Approximately 75% of children leaving primary school are anticipated to enter Grade 8, mostly attending secondary school in Lydenburg. However, many do not complete Grade 12 and leave school at various stages for diverse reasons.

For children able to attend a tertiary institute, key informants mentioned that the nearest tertiary education centres are available in Nelspruit, namely the University of Johannesburg, with The University of the Free State reported to have a centre in White River and the University of South Africa (UNISA) having branch in Nelspruit .

Roads and transport

Routes leading to the Vygenhoek settlement are in a very poor condition. The main access route is gravel leading from a tar road. This gravel road is not well maintained and in general poor condition. The road is often not suited to vehicle traffic due to floods. Repair and maintenance is not undertaken in such cases, making transport difficult and dangerous.

Travel within the project area is generally by foot. People often walk to nearby locations and the closest main road (R577) from where taxis are generally used. There are two buses and two combis/minibuses that transport children to and from the settlement. The minibuses transport the children from the settlement to the tar road, whilst the buses transport them from the tar road to school. Only one local taxi reportedly operates in the area whilst no public buses (apart from the bus allocated for transporting children) are used / available. It was reported that people sometimes pay a transport fee to local's residents who own their own vehicles. Investigation by Digby Wells showed that there are four people from Vygenhoek who own their own vehicles. These owners generally offer to transport residents for a pre-arranged fee.

The distance from Vygenhoek settlement to the tar road is approximately 16 km, where people either walk or pay a local resident to drive them. Community residents mentioned that it takes approximately five hours to walk from the settlement to the tar road (including intermittent stops/rests). Once at the main road, people are required to travel to Lydenburg Town which is a further 30 km. According to reports, it costs R80 to travel from Vygenhoek to tar the road, and a further R45 by taxi to Lydenburg. In general, surrounding transport infrastructure is good with several tarred roads. The nearest tarred road to the project area is the Roosenekal-Lydenburg road (R577) approximately 15 kilometres south of the project area. Although the tar roads are generally maintained, they are often damaged by heavy mining vehicles.

Markets and retailers

No markets or retailers exist in the project area, but a small shop on Rooikraans farm supplies limited goods however it is reportedly expensive and thus not often used. Community residents are generally required to travel to Lydenburg town to get fresh produce, domestic products and other essentials. According to respondents, there are no additional markets in close proximity to the settlement utilised by the community.

Housing and related infrastructure

The housing and housing infrastructure within the project area is generally informal in nature, with several structures of a poor quality. There are a variety of structures and houses within the project area, ranging from several traditional structures (mud, brick, wooden structures with thatch and corrugated iron roofs), informal structures from wood and plastic covering and more sturdy cement brick houses with corrugated roofs. Several more formalised brick structures are located in regions surrounding the project area.

There are several livestock enclosures located within the project area comprising wooden poles, wire and steel gates.

Waste and sanitation

Households are ill-equipped in terms of waste and sanitation facilities. Residents generally have access to pit latrines (often shared); alternatively they make use of the natural bush.

No waste management services are supplied to the community and no waste management system was observed. This service delivery gap was identified as a priority item by the local municipality during recent interviews with Digby Wells.

Crime, social ills and policing

It was reported that high levels of crime pose a problem in the project area, with theft being the main issue. It was noted that crime has increased quite substantially over the last few years as more people have moved in to the area. High crime levels are attributed to unemployment as people who do not find employment quite often resort to criminal activity to acquire money.

The theft of livestock, housebreaking and petty theft are the main crimes reported by the community. There are apparently very few cases of domestic violence and there are few major crimes such as rape and murder, with the last reported case of rape three years ago. Criminals and offenders are said to be people from outside of the area, but some locals are also believed to be involved. Although employment is low, it was noted that there is no prostitution occurring in the project area.

Localised policing in the area is very limited with the police stations being located in Lydenburg and Mashishing Township respectively. Crime is controlled by a community policing forum (CPF) that is operational in the area (extending past Vygenhoek farm), however the direct involvement of the residents of Vygehoek in this CPF is limited. The CPF are viewed as helpful, trustworthy and are relied upon by the community.

One key informant noted that there are signs of potential human trafficking and kidnap, as people are seen offering children lifts whilst walking on the tar road, but these claims could not be confirmed.

11.3.7 Project perceptions and community needs

This section provides a summary of the most pertinent perceptions and concerns raised by the community regarding the proposed Everest North Project. These aspects have been outlined in the PPP report.

- Although the community feel the proposed Everest North Project is a good development, for people to be happy they must actually see the benefits through opportunities and services.
- The community raised a point that proper communication between the community and the mine (Aquarius) is essential and people need to be aware of progress and any influences they may experience from the mine.
- The need for local employment was raised, highlighting that employment opportunities should be afforded to those within the local environment and not to people from outside.

The latter would result in more people moving into the area causing more issues and resource competition.

- Requests for the development of local skills was raised with the need for training and the development of adult based education and training (ABET). This will allow residents to truly benefit from the Project.
- The community are concerned about empty promises and false expectations that will be created by the mine, thus the community should be fully aware of any realistic opportunities that may be available and full project progress should be available to the community.
- There are issues with claimants, as they have requested that the community should communicate directly with them and not with the mine or the consultants.
- The community mentioned that there have not been any community benefits from the development of other mines in the area, thus there is a feeling that this mine (the Project) will not create any benefits.
- The development of the Project is expected to result in many people moving into the land creating competition for land and resources and creating related social issues.
- Concern was raised by some community members around potential damage to housing as a result of blasting.
- Concern was raised that the mining can result in loss of fields and land thus reducing the amount of land available for cattle to graze and crops to crow.
- Residents are concerned about the damage to burial sites and graves and requested to know what will happen to graves and burial sites if they are to be damaged.

11.4 Impact assessment methodology

The impact assessment methodology that was utilised for this SIA was developed by Digby Wells for the purpose of assessing a range of social impacts according to severity, spatial scale, duration and probability. The primary aim of the methodology is to identify the potential “influence” that each impact may have on the Project affected population, in order to formulate relevant and adequate management actions that will effectively manage those impacts, either to enhance them (positive impacts) or mitigate them (negative impacts).

11.4.1 Identification and assessment of impacts

A range of issues and potential socio-economic impacts of the proposed project were identified through the public participation process, interviews and focus group discussions with key informants and through specialist opinion. Impacts are categorised according to the Project phase (construction, operation and decommissioning) and impacts associated with each project phase were classified as being either positive or negative. Data collected during the site visits and from secondary sources were used to estimate whether and to what extent each of these impacts is likely to materialise as a result of the proposed project.

11.4.2 Impact rating system

The impact rating process employed in this assessment has been designed to provide numerical ratings of the various socio-economic impacts identified. The significance rating process is based on the established impact/risk assessment formula:

Significance = Consequence x Probability of an impact occurring

where

Consequence = Type of impact x (Intensity + Extent + Duration)

and

Probability = Likelihood of an impact occurring

In the formula for calculating Consequence,

Type of impact = +1 *(for positive impacts)* ***or -1*** *(for negative impacts).*

The rating options and weighting for each variable/parameter in the formula, as well as the criteria for selecting a particular option, are presented in Table 11-6 to Table 11-10 below.

Table 11-6: Impact rating options - Intensity

Rating	Definition	
	Negative impacts (Type of impact = -1)	Positive impacts (Type of impact = +1)
7	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order	Noticeable, on-going social benefits which have improved the livelihoods and living standards of the local community in general
6	Irreparable damage to highly valued items of cultural significance or breakdown of social order	Great improvement to livelihoods and living standards of a large percentage of population
5	Very serious widespread social impacts. Irreparable damage to highly valued items	On-going and widespread positive benefits to local communities which improves livelihoods
4	On-going serious social issues. Significant damage to structures / items of cultural significance	Average to intense social benefits to some people
3	On-going social issues. Damage to items of cultural significance	Average, on-going positive benefits, not widespread but felt by some
2	Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected	Low positive impacts experience by very few of population

Rating	Definition	
1	Minimal social impacts, low-level repairable damage to commonplace structures	Some low-level social benefits felt by very few of the population

Table 11-7: Impact rating options - Extent

Rating	Definition
7	International: The effect will occur across international borders
6	National: Will affect the entire country
5	Province/ Region: Will affect the entire province or region
4	Municipal Area: Will affect the whole municipal area
3	Local: Extending across the site and to nearby settlements
2	Limited: Limited to the site and its immediate surroundings
1	Very limited: Limited to specific isolated parts of the site

Table 11-8: Impact rating options - Duration

Rating	Definition
7	Permanent: The impact will remain long after the life of the Project
6	Beyond project life: The impact will remain for some time after the life of the Project
5	Project Life: The impact will cease after the operational life span of the Project
4	Long term: 6-15 years
3	Medium term: 1-5 years
2	Short term: Less than 1 year
1	Immediate: Less than 1 month

Table 11-9: Impact rating options - Probability

Rating	Definition
7	Certain/ Definite: There are sound scientific reasons to expect that the impact will definitely occur

Rating	Definition
6	Almost certain/Highly probable: It is most likely that the impact will occur
5	Likely: The impact may occur
4	Probable: Has occurred here or elsewhere and could therefore occur
3	Unlikely: Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur
2	Rare/ improbable: Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures
1	Highly unlikely/None: Expected never to happen.

Impacts are rated prior to mitigation or enhancement and again after consideration of the proposed mitigation or enhancement measures. After an impact had been rated on each variable, its significance was calculated. Each impact was then categorised into one of eight categories in terms of its significance, as indicated below. The relationship between consequence, probability and significance ratings is also graphically depicted in Table 11-10.

Table 11-10: Significance ratings

Score	Description	Rating
109 to 147	A very beneficial impact which may be sufficient by itself to justify implementation of the Project. The impact may result in permanent positive change	**Major (positive)**
73 to 108	A beneficial impact which may help to justify the implementation of the Project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment	**Moderate (positive)**
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the Project. These impacts will usually result in positive medium to long-term effect on the social and/or natural environment	**Minor (positive)**
3 to 35	A small positive impact. The impact will result in medium to short term effects on the social and/or natural environment	**Negligible (positive)**
-3 to -35	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the social and/or natural environment	**Negligible (negative)**

Score	Description	Rating
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the Project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the social and/or natural environment	**Minor (negative)**
-73 to -108	A serious negative impact which may prevent the implementation of the Project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe effects	**Moderate (negative)**
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the Project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects	**Major (negative)**

Significance

Probability																																								
7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Consequence

Figure 11-3: Relationship between consequence, probability and significance ratings

Table 11-11: Significant social impacts identified

Impact	Pre-Mitigation Significance	Post Mitigation Significance	Objectives	Mitigation/Management measures	Timing and frequency	Responsible person
Construction phase						
Disruption of daily movement patterns and accessibility	Moderate - negative	Minor - negative	Reduce impact on daily movement patterns and access to households and fields	▪ Allow people access during peak travel times, particularly children travelling to school. ▪ Where access is completely restricted, develop safe alternative paths that can be utilised by the community. Routes should be decided through consultation with affected community ▪ - Where possible, avoid impeding access to agricultural fields, grazing land and cultural sites (those not requiring resettlement). Access should be within appropriate safety guidelines	Investigation prior to construction. Implement during early stages of construction	Mine manager Community liaison officer
Operational Phase						
Direct & Indirect job creation- operation	Minor - positive	Moderate - positive	Maximised local job creation	▪ As per measures for construction employment ▪ Local employment opportunities should be maximised as far as possible ▪ Ensure objectives in SLP are met.	Continue into operation	HR manager
Growth and diversification of local economy	Minor - positive	Moderate - positive	Continued support and economic benefit of local suppliers	▪ Develop a register of local SMMEs that may provide services and benefit economically. ▪ Establish linkages with other industries operating in the area to provide local employment. ▪ Development initiatives under a CSR programme and as set out in the SLP to promote local development	Continue into operation	Social manager Mine manager
Increase in social pathologies	Moderate - negative	Minor - negative	Reduce the level of social pathologies Community awareness	▪ As for the construction phase. Access to appropriate information in advance of project impacts occurring. ▪ Partner with local policing units to monitor criminal activity ▪ Develop induction programmes for new contract workers - increase sensitivity to local norms and customs. ▪ Work with local health services in monitoring changes in levels of community health ▪ Implement a HIV/AIDS awareness programme	Continue throughout operation. Continuous monitoring	Mine manager Community liaison officer
Decommissioning/closure phase						
Direct job creation – decommission	Minor - positive	Minor - positive	Maximised local job creation at	▪ Maximise local employment, particularly unskilled positions	Recruitment at start	HR manager

Impact	Pre-Mitigation Significance	Post Mitigation Significance	Objectives	Mitigation/Management measures	Timing and frequency	Responsible person
ing/closure			closure		closure	
Loss of local employment	Moderate - negative	Minor - negative	Suitable transition following closure Usable skills for future employment	▪ Development of a mine closure plan focussed on transition following closure ▪ Partner with local organisations to assist with post-closure opportunities ▪ Assist employees during operations (prior to retrenchment) with retraining portable skills ▪ Offer financial planning advice and professional support to employees	Initiate during operation and continue skills development	Mine manager HR manager

PART V: ENVIRONMENTAL MANAGEMENT PROGRAMME

12 REGULATION 51(A)

a) A description of the environmental objectives and specific goals for- -

(i) mine closure;

(ii) the management of identified environmental impacts emanating from the proposed mining operation;

(iii) the socio-economic conditions as identified in the social and labour plan;

(iv) historical and cultural aspects, if applicable;

12.1 EMP

The draft Environmental Management Plan can be seen below in Table 12-1.

Table 12-1: Construction Environmental Management Programme

Impact/ Risk (I/R)	Potential Impact	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Transportation: Construction Material			
Air Quality	Increased dust emissions due to entrainment of dust particles on gravel roads by vehicles transporting construction materials to site via the provincial and access roads.	Impacts on national and provincial roads cannot be mitigated. Access roads will be gravel and must be sprayed with a dust suppressant to reduce entrainment of dust.	Environmental Awareness Plan
	Increased atmospheric greenhouse gas emissions from vehicles transporting construction materials to site.	Trucks must be services on a regular basis to make sure it is fuel efficient.	Environmental Awareness Plan
Noise	Increased noise levels on national, provincial and local roads due to vehicles transporting construction materials to site.	Trucks must be services on a regular basis to make sure it is fuel efficient.	Environmental Awareness Plan
Temporary storage of construction material			
Soils	Potential soil contamination due to the spillage of construction materials (e.g. cement, paints, etc.) during storage.	Construction materials will be stored in bunded areas. In the event of spillage, the spill must be cleaned and any contaminated soil rehabilitated or removed by a specialist contractor for disposal at an appropriate waste facility.	Environmental Awareness Plan
	Soil compaction due to the weight of large quantities of construction materials being stored.	The sourcing of construction material will be phased so that large quantities of construction materials are not stored for long periods of time. Contaminated or compacted soil must be rehabilitated to a state similar to its pre-mining land capability.	Environmental Awareness Plan
Surface Water	Potential surface water contamination due to runoff coming in contact with construction materials (e.g. cement, paint, etc.) during storage.	Construction materials will be stored in bunded areas. In the event of spillage, the spill must be cleaned as soon as possible to prevent further impacts. In un-bunded storage areas, berms must be constructed around the areas to ensure that runoff does not come into contact with construction materials.	Environmental Awareness Plan
Groundwater	Potential groundwater contamination due to the infiltration of runoff contaminated by construction materials (i.e. cement, paints, etc.) during storage.	Construction materials will be stored in bunded areas to prevent the infiltration of runoff contaminated by construction material into the groundwater zone.	Environmental Awareness Plan
Air Quality	Increased dust emissions due to wind entrainment of construction material (e.g. cement) being stored.	Where appropriate, construction materials that are susceptible to wind entrainment will be stored in closed containers. Dust fallout monitoring should be conducted in order to determine trends in dust emissions and plan corrective action.	Environmental Awareness Plan
Fauna and Flora	Potential damage or death to natural vegetation due to the weight of large quantities of construction materials being stored.	Storage yards will not be located in areas with undisturbed natural vegetation.	Environmental Awareness Plan

Impact/ Risk (I/R)	Potential Impact	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Visual	Changes in the visual character of the area due to the storage of large quantities of construction materials.	Storage yards will not be located in areas with undisturbed natural vegetation.	Environmental Awareness Plan
Storage of fuel, lubricants and explosives			
Soils	Potential soil contamination due to the spillage of fuels, lubricants and/or explosives.	Fuels and lubricants must be stored in bunded areas. Explosives must be stored in danger areas, as required by the OHS Explosive Regulations. In the event of spillage, contaminated soil must be rehabilitated or removed by a specialist contractor for disposal at an appropriate waste facility.	Environmental Awareness Plan
Surface Water	Potential contamination of surface water due to the spillage of fuels, lubricants and explosives, or runoff coming into contact with contaminated soil.	Material will be stored in bunded areas. In the event of spillage, the spill must be cleaned as soon as possible to prevent further impacts. In un-bunded storage areas, berms must be constructed around the areas to ensure that runoff does not come into contact with construction materials.	Environmental Awareness Plan
Operation of construction equipment			
Soils	Potential soil contamination due to spillage of lubricants from operating construction equipment.	Construction equipment will be serviced regularly to check for leaks. In the event of spillage, the spill must be cleaned and any contaminated soil rehabilitated or removed by a specialist contractor for disposal at an appropriate waste facility.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Soil compaction due to the movement of heavy construction equipment.	Construction equipment will be restricted to construction areas to ensure that soil compaction outside construction areas does not occur.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface Water	Potential contamination of surface water due to the spillage of lubricants from operating construction equipment.	Construction equipment will be serviced regularly to check for leaks. In the event of spillage, the spill must be cleaned to prevent further impacts.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Potential siltation of surface runoff due to soil erosion caused by increased runoff over compacted areas	Silt traps or berms will be constructed to contain silt transported downslope during runoff events. These structures will be monitored throughout the construction phase to identify problem areas and to plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Groundwater	Reduced infiltration of surface water into groundwater zone due to soil compaction	Construction equipment will be restricted to construction areas to ensure that soil compaction outside construction areas does not occur.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine

Impact/ Risk (I/R)	Potential Impact	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Air Quality	Increased dust emissions due to entrainment of dust particles by the movement and operation of construction equipment.	Construction areas will be sprayed with water and a dust binding agent. Dust fallout monitoring should be conducted in order to determine trends in dust emissions and plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Increased atmospheric greenhouse gas emissions due to operating construction equipment.	Construction equipment will be serviced regularly and fuel efficiency monitored to identify inefficient fuel consumption.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Noise	Increase in noise levels due to operating construction equipment.	Construction activities will be restricted to daylight hours to reduce impact on sensitive receptors.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Natural Vegetation	Potential damage or death to natural vegetation due to movement of construction equipment.	Construction equipment will be restricted to construction areas to ensure that no damage or death occurs to natural vegetation. Offenders will be punished.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Animal Life	Potential injury or death to animals due to movement of construction equipment.	Construction equipment will be restricted to construction areas where animals are unlikely to occur. Offenders will be punished.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Site Clearance			
Soils	Increased erodibility of soils due to the removal of vegetation during site clearance.	Vegetation will only be removed just prior to physical construction in order to reduce the time soil is exposed to wind and water. Vegetation removal will be restricted to construction areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface Water	Increased surface runoff from cleared areas.	Vegetation removal will be restricted to construction areas. Where possible, vegetation will be re-established upon completion of construction (e.g. office and workshop areas) to reduce the velocity of surface runoff.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Potential siltation of surface runoff due to soil erosion	Silt traps or berms will be constructed to contain silt transported downslope during runoff events. These structures will be monitored throughout the construction phase to identify problem areas and to plan corrective action. Where possible, vegetation will be re-established upon completion of construction (e.g. office and workshop areas) to reduce the velocity of surface runoff and improve soil stability.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Groundwater	Reduced infiltration of surface water into groundwater zone due to removal of vegetation.	Vegetation removal will be restricted to construction areas. Where possible, vegetation will be re-established upon completion of construction (e.g. office and workshop areas) to reduce the velocity of surface runoff and improve groundwater infiltration.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Air Quality	Increased potential for dust emission due to wind erosion from cleared areas.	Vegetation will only be removed just prior to physical construction in order to reduce the time soil is exposed to wind. Vegetation removal will be restricted to construction areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine

Impact/ Risk (I/R)	Potential Impact	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Noise	Removal of vegetation reduces the landscape's ability to adsorb noise from construction activities.	Vegetation removal will be restricted to construction areas. Where possible, vegetation will be re-established upon completion of construction (e.g. office and workshop areas) to improve the on-site noise adsorption capacity.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Natural Vegetation	Destruction and removal of natural vegetation during site clearance.	Vegetation removal will be restricted to construction areas. Where possible, vegetation will be re-established upon completion of construction (e.g. office and workshop areas).	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Animal Life	Removal of natural vegetation destroys the natural habitat of fauna species, causing them to move away (Red Data "Vulnerable" and "Near threatened" species observed on site).	Vegetation removal will be restricted to construction areas. Habitats of Red Data species will be preserved.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Surface water contamination due to siltation may negatively affect aquatic invertebrates	Silt traps or berms will be constructed to contain silt transported downslope during runoff events. Surface water monitoring will take place throughout the construction phase to identify problem areas and to plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Visual	Altered quality of the visual landscape due to the removal of vegetation.	Vegetation removal will be restricted to construction areas. Where possible, vegetation will be re-established upon completion of construction (e.g. office and workshop areas).	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Topsoil removal			
Soils	Damage to the natural soil structure due to soil handling and removal.	Different soil types and horizons will be removed and stockpiled separately according to a stripping plan. Stockpile heights should not exceed pre-determined height restrictions.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Increased erodibility of soils due to damage to the natural soil structure	Topsoil will be stockpiled for use during rehabilitation and these stockpiles vegetated in order to stabilise soil particles and prevent erosion.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Land capability	Decreased land capability due to damage to the natural soil structure and soil loss through wind and water erosion	Different soil types and horizons will be removed and stockpiled separately for later use during rehabilitation. Stockpile heights must not exceed pre-determined height restrictions and should be vegetated to reduce the risk of erosion.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface Water	Altered surface flow dynamics due to removal of topsoil and topographical alterations.	Topsoil removal will be restricted to the areas that absolutely require it.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Potential siltation of surface runoff due to soil erosion	Silt traps or berms will be constructed to contain silt transported downslope during runoff events. Surface water monitoring will take place throughout the construction phase to identify problem areas and to plan corrective action. Topsoil stockpiles will be vegetated to reduce the risk of water erosion.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine

Impact/ Risk (I/R)	Potential Impact	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Air Quality	Increased potential for dust emissions due to wind erosion during removal of topsoil, tipping soil into trucks and onto stockpiles, as well as exposure of stockpiles to wind erosion.	Areas where topsoil is removed and topsoil stockpiles will be sprayed with water and a dust binding agent. The drop distance from which soil is tipped should be minimised. The slope of topsoil stockpiles should not exceed 30º in order to reduce the wind erosion potential of the stockpile sides. Topsoil stockpiles will be vegetated to stabilise particles and reduce the risk of wind erosion. Dust fallout monitoring should be conducted in order to determine trends in dust emissions and plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Animal Life	Reduction in the amount of soil micro-organisms due to anaerobic conditions created in topsoil stockpiles.	Stockpile heights must not exceed pre-determined height restrictions in order to prevent compaction and damage to the soil micro-organisms.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Archaeology and cultural heritage	Potential need to relocate graves prior to topsoil removal.	Graves and artefacts will be preserved, relocated or sampled, as required in the relevant SAHRA permits issued for the various collieries.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Earthmoving activities and infrastructure construction			
Topography	Changes to topography due to the levelling, infill or blasting of areas for infrastructure construction.	Engineer and environmental consultant will supervise levelling, infill and blasting in accordance with post mining topographical plan.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Soils	Damage to the natural soil structure and soil compaction due to levelling, infill or blasting of areas for infrastructure construction.	The activity will be restricted to the areas that absolutely require it. However, the impact is inherent in the activity's nature and cannot be mitigated.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Increased erodibility of soils due to damage to the natural soil structure and soil compaction.	The activity will be restricted to the areas that absolutely require it. Where possible, vegetation will be re-established upon completion of construction to improve soil stability.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface Water	Altered surface flow dynamics due to alterations in the on-site topography	Engineer and environmental consultant will supervise levelling, infill and blasting in accordance with post mining topographical plan.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Increase surface run-off over compacted surfaces.	The activity will be restricted to the areas that absolutely require it. Where possible, vegetation will be re-established upon completion of construction to reduce the velocity of surface runoff.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Potential siltation of surface runoff due to soil erosion	Silt traps or berms will be constructed to contain silt transported downslope during runoff events. Surface water monitoring will take place throughout the construction phase to identify problem areas and to plan corrective action. Where possible, vegetation will be re-established upon completion of construction to reduce the velocity of surface runoff and improve soil stability.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine

Impact/ Risk (I/R)	Potential Impact	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
	Increased nitrate levels in surface water due to blasting of earth for infrastructure construction.	Spillages of ammonium nitrate-based explosives, during charging of holes, misfires and incomplete combustion of explosives will be monitored and managed to minimise the potential of surface water pollution.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Air Quality	Increased potential for dust emissions during the levelling, infill, or blasting of areas for infrastructure construction.	Construction areas will be sprayed with water and a dust binding agent. Dust monitoring will take place on a monthly basis to identify problem areas. Where possible, vegetation will be re-established upon completion of construction to reduce the surface's susceptibility to wind erosion.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Visual	Altered quality of the visual landscape due to changes to the topography	Engineer and environmental consultant will supervise levelling, infill and blasting in accordance with post mining topographical plan.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Temporary sewage handling and treatment			
Soils	Potential contamination of soil due to incorrect handling of raw sewage.	An adequate number of chemical toilets will be available for construction workers at various construction sites. The sewage will be removed off-site by a specialist contractor. In the event of spillage, the spill will be cleaned and the soil rehabilitated.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface Water	Potential contamination of surface water due to incorrect handling of raw sewage and potential spillages.	An adequate number of chemical toilets will be available for construction workers at various construction sites. The sewage will be removed off-site by a specialist contractor. In the event of spillage, the spill will be cleaned to prevent further impacts on surface water.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine

Table 12-2: Operational Environmental Management Programme

Impact/ Risk (I/R)	Objectives	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Operation of mining equipment			
Soils	Potential soil contamination due to spillage of lubricants from mining equipment (e.g. bull dozers, dragline, excavators, etc.)	Mining equipment will be serviced regularly to check for leaks. In the event of spillage, the spill must be cleaned and any contaminated soil rehabilitated or removed by a specialist contractor for disposal at an appropriate waste facility.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Soil compaction due to the repetitive movement of heavy mining equipment (e.g. bull dozers, dragline, excavators, etc.)	Topsoil will be removed in most areas prior to mining. Equipment will be restricted to these areas to ensure that soil compaction outside mining areas does not occur.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface Water	Potential contamination of surface water due to the spillage of fuel and lubricants from operating mining equipment.	Mining equipment will be serviced regularly to check for leaks. In the event of spillage, the spill must be cleaned to prevent further impacts.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Potential siltation of surface runoff due to soil erosion caused by increased runoff over compacted areas	Silt traps or berms will be constructed to contain silt transported downslope during runoff events. These structures will be monitored throughout the operational phase to identify problem areas and to plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Groundwater	Potential groundwater contamination due to the infiltration of water contaminated by spilled hydrocarbons from operating mining equipment	In the event of spillage, the spill must be cleaned as soon as possible to prevent further impacts on groundwater.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Reduced infiltration of surface water into groundwater zone due to compaction of soil by operating mining equipment	Mining equipment will be restricted to mining areas to ensure that soil compaction outside these areas does not occur.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Air Quality	Increased dust emissions due to entrainment of dust particles by the movement and operation of mining equipment.	The entire mining area will be sprayed with water and a dust binding agent. Dust fallout monitoring should be conducted in order to determine trends in dust emissions and plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Increased atmospheric greenhouse gas emissions due to operating construction equipment.	Mining equipment will be serviced regularly and fuel efficiency monitored to identify inefficient fuel consumption.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Noise	Increase in noise levels due to operating mining equipment.	Mining machines will be fitted with standard silencing systems to limit noise production and such system will be maintained as specified by the original equipment manufacturer (OEM). Physical noise control structures will be implemented, where required, to reduce the impact of noise on affected parties. This includes the establishment of berms around noise sources to limit the propagation of noise.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine

Impact/ Risk (I/R)	Objectives	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Natural vegetation	Potential damage or death to natural vegetation due to movement of mining equipment in restricted areas.	Mining equipment will be restricted to mining areas to ensure that no damage or death occurs to natural vegetation. Offenders will be punished.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Clearing of surface			
Soils	Increased erodibility of soils due to the removal of vegetation during the clearance of opencast areas.	Vegetation only be removed just prior to topsoil removal in order to reduce the time soil is exposed to wind and water. Vegetation removal will be restricted to opencast areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface Water	Increased surface runoff from cleared areas.	Vegetation will only be removed just prior to topsoil removal in order to limit the effects of site clearance on surface water flow dynamics.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Potential siltation of surface runoff due to soil erosion.	Silt traps or berms will be constructed to contain silt transported downslope during runoff events. These structures will be monitored throughout the LOM in order to identify problem areas and to plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Groundwater	Reduced infiltration of surface water into groundwater zone due to removal of vegetation.	Vegetation removal will be restricted to opencast areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Air Quality	Increased potential for dust emission due to wind erosion from cleared areas.	Vegetation will only be removed just prior to mining in order to reduce the time soil is exposed to wind. Vegetation removal will be restricted to opencast areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Noise	Removal of vegetation reduces the landscape's ability to adsorb noise from mining activities.	Vegetation removal will be restricted to opencast areas. Physical noise control structures will be implemented, where required, to reduce the impact of noise on affected parties. This includes the establishment of berms around noise sources to limit the propagation of noise.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Natural vegetation	Destruction and removal of natural vegetation during site clearance.	Vegetation removal will be restricted to opencast areas. Sensitive or red data species should be removed and re-established elsewhere, or used during rehabilitation.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Visual	Altered quality of the visual landscape due to the removal of vegetation.	Vegetation removal will be restricted to mining areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Topsoil removal and stockpiling			

Impact/ Risk (I/R)	Objectives	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Soils	Damage to the natural soil structure due to soil handling, removal and mixing of soil types and horizons.	Different soil types and horizons will be removed and stockpiled separately according to a stripping plan. Stockpile heights should not exceed pre-determined height restrictions.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Increased erodibility of soils due to damage to the natural soil structure.	Mitigation as per Impact 16.1. Topsoil will be stockpiled for use during rehabilitation and these stockpiles vegetated in order to stabilise soil particles and prevent erosion.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Leaching of soil nutrients during long-term stockpiling.	Topsoil should be replaced as soon as possible following the backfill of opencast strips to minimise the time during which topsoil is stockpiled.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Reduction in the amount of soil micro-organisms due to soil handling and removal.	Stockpile heights must not exceed pre-determined height restrictions in order to prevent compaction and damage to the soil micro-organisms.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface water	Altered surface flow dynamics due to removal of topsoil and topographical alterations.	Topsoil removal will be restricted to opencast areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Potential siltation of surface runoff due to soil erosion.	Silt traps or berms will be constructed to contain silt transported downslope during runoff events. Surface water monitoring will take place throughout the LOM to identify problem areas and to plan corrective action. Topsoil stockpiles will be vegetated to reduce the risk of water erosion.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Air quality	Increased potential for dust emissions due to wind erosion during removal of topsoil, tipping soil into trucks and onto stockpiles, as well as exposure of stockpiles to wind erosion.	Areas where topsoil is removed and topsoil stockpiles will be sprayed with water and a dust binding agent. The drop distance from which soil is tipped should be minimised. The slope of topsoil stockpiles should not exceed 30º in order to reduce the wind erosion potential of the stockpile sides. Topsoil stockpiles will be vegetated to stabilise particles and reduce the risk of wind erosion. Dust fallout monitoring should be conducted in order to determine trends in dust emissions and plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Animal life	Reduction in the amount of soil micro-organisms due to anaerobic conditions created in topsoil stockpiles.	Stockpile heights must not exceed pre-determined height restrictions in order to prevent compaction and damage to the soil micro-organisms.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Visual	The removal of topsoil and creation of stockpiles alters the visual quality of the landscape.	Topsoil stockpiles should be located away from main routes in order to reduce the visual impact on passers-by.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Removal and stockpiling of soft overburden			
Topography	Alteration of the local topography and disturbance of natural drainage lines.	Impact is unavoidable and cannot be mitigated. During rehabilitation, soft and hard overburden will be used as backfill material in opencast areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine

Impact/ Risk (I/R)	Objectives	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Surface Water	Altered surface flow dynamics due to alterations in the on-site topography	Engineer and environmental consultant will supervise soft overburden removal and continuous rehabilitation in accordance with post mining topographical plan.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Potential siltation of water by fine materials released during soft overburden removal	Silt traps or berms will be constructed to contain silt transported downslope during runoff events. Surface water monitoring will take place throughout the LOM to identify problem areas and to plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Groundwater	Disturbance and dewatering of shallow aquifers due to the removal of soft overburden.	Impact is unavoidable and cannot be mitigated. Alternative supplies of water to surrounding land users can be negotiated on a case-by-case basis.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Air Quality	Increased potential for dust emissions during the removal of soft overburden, tipping material into trucks and onto stockpiles, as well as the exposure of overburden stockpiles to wind erosion.	Soft overburden stockpiles will be sprayed with water and a dust binding agent. The drop distance from which material is dropped should be minimised. The slope of stockpiles should not exceed 30º in order to reduce the wind erosion potential of the stockpile sides. Dust fallout monitoring should be conducted in order to determine trends in dust emissions and plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Visual	The creation of overburden stockpiles alters the visual quality of the landscape.	Overburden stockpiles should be located away from main routes in order to reduce the visual impact on passers-by.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Drilling and blasting of hard overburden			
Topography	Alteration of the local topography and disturbance of natural drainage lines.	Impact is unavoidable and cannot be mitigated. During rehabilitation, hard overburden will be used as backfill material in opencast areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface Water	Altered surface flow dynamics due to alterations in the on-site topography	Engineer and environmental consultant will supervise drilling and blasting in accordance with post mining topographical plan.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Increased nitrate levels in surface water due to blasting of hard overburden.	Spillages of ammonium nitrate-based explosives, during charging of holes, misfires and incomplete combustion of explosives will be monitored and managed to minimise the potential of surface water pollution.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Siltation of surface water by dust particles emitted during drilling and blasting events.	Ensure that all soft overburden is removed prior to drilling and blasting. Drill rigs should be equipped with dust collectors. Blasts should avoid overshooting and be designed to limit the tonnage yield per blast. Silt traps or berms should be constructed to trap silt-loaded surface runoff.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Groundwater	Disturbance and dewatering of surrounding aquifers.	Impact is unavoidable and cannot be mitigated. Alternative supplies of water to surrounding land users can be negotiated on a case-by-case basis.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine

Impact/ Risk (I/R)	Objectives	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Air Quality	Emission of dust during drilling and blasting.	Ensure that all soft overburden is removed prior to drilling and blasting. Drill rigs should be equipped with dust collectors. Blasts should avoid overshooting and be designed to limit the tonnage yield per blast. Dust fallout monitoring should be conducted in order to determine trends in dust emissions and plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Noise	Sporadic and significant increase in noise due to drilling and blasting events.	Blasting on opencast days will be avoided as far as is possible to limit the severity and distance of air blast propagation. Physical noise control structures will be implemented where required to reduce the impact of noise on surrounding land users. This includes the construction of berms around blasts areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Ore removal			
Topography	Alteration of the local topography and disturbance of natural drainage lines.	Impact is unavoidable and cannot be mitigated. During rehabilitation, hard overburden will be used as backfill material in opencast areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface water	Permanent alteration of natural geological sequence.	Engineer and environmental consultant will supervise Ore removal and continuous rehabilitation in accordance with post mining topographical plan.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Alteration of the local topography and disturbance of natural drainage lines.	The drop distance from which the ore is dropped into trucks or onto conveyor belts should be minimised in order to reduce the amount of dust emitted. Surface water monitoring will take place throughout the LOM to identify problem areas and to plan corrective action.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Air quality	Permanent alteration of natural geological sequence.	The drop distance from which the ore is dropped into trucks or onto conveyor belts should be minimised.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Transport activity on haul roads			
Surface water	Surface water runoff over haul roads will results in erosion and consequent siltation of surface water resources.	Culverts and diversion berms should be constructed in order to minimise the rate of surface water flow over haul roads, or to divert the surface water flow away from haul roads.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Potential contamination of surface water runoff over haul roads due to the spillage of fuel or lubricants from vehicles traveling on haul roads.	Diversion berms should be constructed in order to divert surface water flow away from haul roads. Mining equipment will be serviced regularly to check for leaks. In the event of spillage, the spill must be cleaned in order to prevent further impacts on surface water resources.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Air quality	Dust emissions due to vehicle entrainment of dust on haul roads.	Haul roads will be sprayed with water and a dust binding agent to reduce the dust generating potential of the haul road surface.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine

Impact/ Risk (I/R)	Objectives	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
	Increased atmospheric greenhouse gas emissions due to mining vehicles.	Mining vehicles will be serviced regularly and fuel efficiency monitored to identify inefficient fuel consumption.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Noise	Increase in noise levels due to continuous vehicular movement on haul roads.	Mining vehicles will be fitted with standard silencing systems to limit noise production and such system will be maintained as specified by the original equipment manufacturer (OEM). Physical noise control structures will be implemented, where required, to reduce the impact of noise on affected parties. This includes the establishment of berms around noise sources, such as the haul roads, to limit the propagation of noise.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Transport activity on haul roads			
Soils	The use of in-pit water for dust suppression may cause the acidification of soils.	The use of in-pit water and underground water for dust suppression will be controlled so that it is restricted to "dirty" operational areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Excessive spraying of water can result in runoff and water erosion of soils.	Spraying will also be done in such a way as to prevent excessive runoff to adjacent areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Surface Water	Potential siltation of surface water due to runoff resulting from excessive spraying.	Silt traps or berms can be constructed to trap silt-loaded surface runoff.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
	Use of in-pit water for dust suppression may negatively impact on surface water quality.	The use of in-pit water and underground water for dust suppression will be controlled so that it is restricted to "dirty" operational areas.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Ore stockpiles			
Groundwater	Potential infiltration of surface water contaminated through contact with Ore stockpiles into the groundwater zone	Ore stockpile areas should be paved to ensure that contaminated surface water does not infiltrate the underlying soil. Dirty water areas should be established around stockpiles to ensure that clean water does not come into contact with ore and that during rain events, contaminated water is diverted to the PCD for treatment.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Air Quality	Increased dust emissions due to wind entrainment of dust from stockpiles.	Stockpiles should be sprayed with water to reduce its susceptibility to wind erosion. Stockpile sizes should be limited.	Environmental Awareness Plan Falls within the Emergency Response Plan of Aquarius Mine
Concurrent replacement of overburden and topsoil			

Impact/ Risk (I/R)	Objectives	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Soils	Potential drainage problems in areas where overburden and topsoil have been replaced.	Replacement of stockpiled soil should be done in accordance with the soil management plan. Soil sampling should be conducted prior to the replacement of topsoil to determine whether soil amelioration (e.g. neutralisation or fertilisation) is needed.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
	Loss of soil quality due to incorrect placement or mixing of soil horizons and forms during topsoil replacement.	Replacement of soils should not be done during periods of high rainfall. Vegetation should be established immediately after topsoil replacement in order to stabilise soil particles and limit erosion.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Surface water	Potential drainage problems in areas where overburden and topsoil have been replaced.	Appropriate freebord will be maintained by means of pumping arrangements.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
	Loss of soil quality due to incorrect placement or mixing of soil horizons and forms during topsoil replacement.	Engineer and environmental consultant will supervise overburden and topsoil replacement in accordance with post mining topographical plan in order to prevent excessive runoff over rehabilitated areas. Silt traps or berms should be constructed to contain contaminated runoff. Areas where topsoil has been replaced should be re-vegetated as soon as possible to reduce the area's susceptibility to water erosion.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Air Quality	Soil loss following topsoil replacement due to water erosion over unstable rehabilitated areas during rainfall events.	Topsoil and overburden stockpiles and areas where backfilling has been completed should be sprayed with water or a dust binding agent. The drop height from which topsoil and overburdened is tipped during replacement should be minimised. Vegetation should be established immediately after topsoil replacement to minimise the area's susceptibility to wind erosion.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Concurrent vegetation of mined strips			
Natural vegetation	Spread of alien invasive species in areas where vegetation has been re-established.	Rehabilitated areas should be monitored for alien invasive infestation in order to determine the success of the rehabilitation effort and to establish whether alien invasive species should be eradicated.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Animal life	Gradual return of animal species to rehabilitated areas previously affected by pre-mining agricultural activities.	Positive impact can be enhanced by replacing vegetation immediately after topsoil replacement to accelerate the rate at which animal species return to rehabilitated areas.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan

Table 12-3: Decommissioning EMP

Impact/ Risk (I/R)	Objectives	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
Demolition of infrastructure			
Soils	Movement and operation of machinery and vehicles used to demolish infrastructure will result in compaction of soil in areas unaffected by opencast mining or areas that have already been rehabilitated.	Machinery and vehicles will be restricted to demolition areas to ensure that soil compaction in unaffected or rehabilitated areas does not occur.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
	Potential soil contamination through spillages and leaks of fuels or lubricants from machinery and vehicles used to demolish infrastructure, or the incorrect disposal of waste generated during demolition.	Machinery and vehicles will be serviced regularly to check for leaks. In the event of spillage, the spill must be cleaned and any contaminated soil rehabilitated or removed by a specialist contractor for disposal at an appropriate waste facility. Demolition waste should be removed off-site for disposal at a permitted waste disposal site.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Surface water	Potential surface water contamination due to spillages and leaks of fuels or lubricants from machinery and vehicles used to demolish infrastructure, or the incorrect disposal of waste generated during demolition.	Machinery and vehicles will be serviced regularly to check for leaks. In the event of spillage, the spill must be cleaned to prevent further impacts on surface water. Demolition waste should be removed off-site for disposal at a permitted waste disposal site.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Air quality	Increased dust emissions due to entrainment of dust particles by the movement and operation of machinery and vehicles used to demolish infrastructure.	Demolition areas will be sprayed with water and a dust binding agent. Dust fallout monitoring should be conducted in order to determine trends in dust emissions and plan corrective action.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
	Increased atmospheric greenhouse gas emissions due to operating construction equipment.	Demolition equipment will be serviced regularly and fuel efficiency monitored to identify inefficient fuel consumption.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Noise	Noise levels will remain high during the demolition of infrastructure.	The demolition of infrastructure will be restricted to daylight hours to reduce impact on sensitive receptors.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Final replacement of overburden and topsoil			
Topography	Potential drainage problems in areas where overburden and topsoil have been replaced.	Engineer and environmental consultant will supervise final overburden and topsoil replacement in accordance with post mining topographical plan in order to prevent drainage problems (e.g. ponding of water).	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Soils	Loss of soil quality due to incorrect placement or mixing of soil horizons and forms during final topsoil replacement.	Final replacement of stockpiled soil should be done in accordance with the soil management plan. Soil sampling should be conducted prior to the final replacement of topsoil to determine whether soil amelioration (e.g. neutralisation or fertilisation) is needed.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan

Impact/ Risk (I/R)	Objectives	Preventative, Management, Corrective Measures	Outline of the Implementation Programme Action Plans*
	Soil loss following final topsoil replacement due to water erosion over unstable rehabilitated areas during rainfall events.	Final replacement of soils should not be done during periods of high rainfall. Vegetation should be established immediately after topsoil replacement in order to stabilise soil particles and limit erosion. Areas where rehabilitation is complete should be monitored to identify problem areas and plan corrective action.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Surface Water	Potential siltation of surface water due to runoff causing water erosion of soil over rehabilitated areas.	Engineer and environmental consultant will supervise overburden and topsoil replacement in accordance with post mining topographical plan in order to prevent excessive runoff over rehabilitated areas. Silt traps or berms used during the operational phase should be maintained as long as possible following rehabilitation. Areas where final topsoil replacement has taken place should be revegetated as soon as possible to reduce the area's susceptibility to water erosion.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Air quality	Slight increase in dust emission during the disturbance and removal of topsoil and overburden stockpiles required during final rehabilitation.	Topsoil and overburden stockpiles and areas where backfilling has been completed should be sprayed with water or a dust binding agent. The drop height from which topsoil and overburdened is tipped during final replacement should be minimised. Vegetation should be established immediately after final topsoil replacement to minimise the area's susceptibility to wind erosion.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Final re-vegetation of disturbed areas			
Natural vegetation	Re-establishment of natural vegetation affected by pre-mining agricultural activities.	Where possible, naturally occurring species will be reintroduced as part of continuous and final rehabilitation efforts.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
	Spread of alien invasive species in areas where vegetation has been re-established.	Rehabilitated areas should be monitored for alien invasive infestation in order to determine the success of the rehabilitation effort and to establish whether alien invasive species should be eradicated.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Animal life	Gradual return of animal species to rehabilitated areas affected by pre-mining agricultural activities.	Positive impact can be enhanced by replacing vegetation immediately after final topsoil replacement to accelerate the rate at which animal species return to rehabilitated areas.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Rehabilitation of discard dumps			
Soils	Potential wind and water erosion of soils used to cap discard dumps.	Vegetation should be established on topsoil immediately after capping of the discard dump. Ongoing monitoring of the rehabilitated discard dump should be undertaken in order to identify potential erosional problems and to plan corrective action.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan
Surface Water	Potential siltation of surface runoff from discard dump due to water erosion of soils used to cap discard dumps	Vegetation should be established on topsoil immediately after capping of the discard dump in order to prevent siltation of surface runoff from discard dump. Berms surrounding the discard dump should be maintained to catch silt-loaded surface runoff. Ongoing surface water monitoring surrounding the rehabilitated discard dump should be undertaken in order to identify potential erosional problems and to plan corrective action.	Falls within the Rehabilitation and Closure Plan Environmental Awareness Plan

12.2 Social Management Plan

The SMP provides a plan to assist Aquarius in the implementation of the mitigation measures identified. The SMP has been developed according to identified impacts in order to provide an understanding of what objectives and recommended management measures are required to minimise the significance of socio-economic impacts arising from the proposed project and where possible enhance positive socio-economic impacts. To facilitate implementation and compliance auditing, the SMP has been separated into the various project phases.

Table 12-4: Social Management Plan

Impact	Pre-Mitigation Significance	Post Mitigation Significance	Objectives	Mitigation/Management measures	Timing and frequency	Responsible person
Construction phase						
Direct & Indirect job creation- construction	Minor - positive	Minor - positive	Maximise employment benefits for local population	▪ Maximise & monitor local recruitment ▪ Prevent nepotism/ corruption in local recruitment structures ▪ Promote employment of women and youth ▪ Use of labour-intensive construction and mining methods	Construction, continue through to operation	Social Manager, HR manager
Direct & Indirect economic benefits	Minor - positive	Minor - positive	Generate economic benefit for local suppliers and businesses	▪ As for maximising employment benefits. Also: ▪ Development of a register of local SMMEs ▪ Linkages with skills development/ SMME development institutions ▪ SMME skills development as part of SLP	Construction, continue through to operation	Social Manager Mine manager
Physical and economic resettlement	Minor - negative	Minor - negative	Avoid or at least minimise displacement	▪ Determine requirement for resettlement through a basic assessment ▪ RAP development if displacement is required ▪ Investigate ways to avoid resettlement where possible	Construction, continue through to operation	Social Manager, appointed consultant
Reduced quality of water resources	Minor - negative	Negligible - negative	Maintain safe water resources utilised by communities and livestock	▪ Identify exact locations where communities locate water for various uses ▪ Establish potential for mine influence on these sources ▪ Investigate potential to supplement community with alternative water sources, e.g. boreholes	Construction phase Monitoring throughout operation	Environmental Manager
Conflict between land occupants and land claimants	Minor - negative	Negligible - negative	Avoid conflict between stakeholders Transparent communication	▪ Open and transparent engagement with all project stakeholders ▪ Discuss potential impacts that influx can create with both stakeholder groups ▪ Open discussion with local government departments and stakeholder groups to clarify and resolve issues	Establish at start of construction On-going throughout operation	Social Manager Mine Manager
Increase in social pathologies	Minor - negative	Minor - negative	Reduce the level of social pathologies Community awareness	▪ Provide access to information for the affected community in advance of project impacts occurring (awareness) ▪ Partner with local policing units to monitor criminal activity and work with local health services (monitoring and awareness, particularly HIV/AIDS)	Establish at construction, continue throughout operation	Mine manager Community liaison officer
Establishment of informal settlements	Minor - negative	Minor - negative	Controlled influx and reduced informal settlement	▪ Hold discussions this with local government making them aware of potential for settlement and implications ▪ Develop control plan in collaboration with local community representatives to control influx and informal settling ▪ Establish relationships with local police and community policing forums to assist with monitoring and controlling informal settlement	Initiate prior to construction. On-going monitoring	Mine Manager Community liaison officer
Increase pressure on community and municipal resources	Minor - negative	Minor - negative	Management of resource usage Understanding current needs	▪ Focus a larger proportion of job opportunities to locals (where possible) – thus reducing the need for outsiders who will settle in the area ▪ Appropriate measures suggested to manage population influx	Implement at start of construction. On-going monitoring through operation	Mine manager Environmental manager

Impact	Pre-Mitigation Significance	Post Mitigation Significance	Objectives	Mitigation/Management measures	Timing and frequency	Responsible person
				▪ Local municipality should be informed of the project timeframes and the nature and extent of services that might be required and the awareness of what services are required.		
Disruption of daily movement patterns and accessibility	Moderate - negative	Minor - negative	Reduce impact on daily movement patterns and access to households and fields	▪ Allow people access during peak travel times, particularly children travelling to school. ▪ Where access is completely restricted, develop safe alternative paths that can be utilised by the community. Routes should be decided through consultation with affected community ▪ - Where possible, avoid impeding access to agricultural fields, grazing land and cultural sites (those not requiring resettlement). Access should be within appropriate safety guidelines	Investigation prior to construction. Implement during early stages of construction	Mine manager Community liaison officer
Potential health and safety hazards	Minor - negative	Negligible - negative	Avoid health and safety hazards during construction	▪ Promote community awareness about safety issues around construction activities. ▪ Put in place necessary safety measures along roads and around construction sites. Ensure access control. ▪ Undertake dust suppression methods as recommended in the Air Quality report	Initiate prior to start of construction. Continue throughout construction	Mine manager SHE manager
Operational Phase						
Direct & Indirect job creation-operation	Minor - positive	Moderate - positive	Maximised local job creation	▪ As per measures for construction employment ▪ Local employment opportunities should be maximised as far as possible ▪ Ensure objectives in SLP are met.	Continue into operation	HR manager
Growth and diversification of local economy	Minor - positive	Moderate - positive	Continued support and economic benefit of local suppliers	▪ Develop a register of local SMMEs that may provide services and benefit economically. ▪ Establish linkages with other industries operating in the area to provide local employment. ▪ Development initiatives under a CSR programme and as set out in the SLP to promote local development	Continue into operation	Social manager Mine manager
Opposition due to unmet expectations	Minor - negative	Negligible - negative	Properly informed and cooperative communities Realistic community expectations	▪ Establish early stakeholder engagement (foster community goodwill) ▪ The findings of EIA specialist studies and management measures should be presented to communities ▪ Communicate plans for LED and CSI initiatives ▪ Transparency regarding employment practices	Initiate at construction, continue throughout operation	Mine manager, Social manager
Increase in social pathologies	Moderate - negative	Minor - negative	Reduce the level of social pathologies Community awareness	▪ As for the construction phase. Access to appropriate information in advance of project impacts occurring. ▪ Partner with local policing units to monitor criminal activity ▪ Develop induction programmes for new contract workers - increase sensitivity to local norms and customs. ▪ Work with local health services in monitoring changes in levels of community health	Continue throughout operation. Continuous monitoring	Mine manager Community liaison officer

Impact	Pre-Mitigation Significance	Post Mitigation Significance	Objectives	Mitigation/Management measures	Timing and frequency	Responsible person
				▪ Implement a HIV/AIDS awareness programme		
Health and safety hazards	Minor - negative	Negligible - negative	Avoid health and safety hazards during operation	▪ As for construction. Implement traffic safety measures (speed limits etc.) ▪ Limit areas of travel for mining purposes, avoid areas occupied by communities and travel during daylight hours ▪ Prevent unauthorised access to the mine and maintain all roads ▪ Ensure community awareness and protection	Continue from construction Adapt to suit operational phase	Mine manager SHE manager
Disturbance caused by blasting	Minor - negative	Negligible - negative	Minimise disturbances during blasting	▪ Assess existing state of houses within blast radius (500m) of blast sites ▪ Develop monitoring procedure to assess disturbance of blasting ▪ Communicate blasting schedules to communities ▪ Ensure blasting takes place during pre-determined times and only during daylight hours	Communicate during construction. Maintained schedule through operation	Mine manager
Change in sense of place	Minor - negative	Minor - negative	Minimal change in sense of place and living standards	▪ Clear communication with communities on potential social changes ▪ Open channels of communication between communities and the mine ▪ Rehabilitation of the landscape to minimise visual intrusion of Project ▪ Provide guidance to any vulnerable persons	Initiate during construction, on-going throughout operation	Social manager Mine manager
Over-reliance on the Project for development and economic growth	Minor - negative	Negligible - negative	Realistic community expectations and active support of local government within surrounding communities	▪ Clear communication of the roles and responsibilities of the mine versus government ▪ Ensure mine responsibilities are aligned with local government integrated development plans ▪ Review the implementation of the commitments outlined in the SLP ▪ Ensure local government is aware of the implications following closure ▪ Create local economic opportunities to harness development of alternative forms of income	Initiate at construction and regular engagement throughout operation	Social manager
Decommissioning/closure phase						
Direct job creation – decommissioning/closure	Minor - positive	Minor - positive	Maximised local job creation at closure	▪ Maximise local employment, particularly unskilled positions	Recruitment at start closure	HR manager
Loss of local employment	Moderate - negative	Minor - negative	Suitable transition following closure Usable skills for future employment	▪ Development of a mine closure plan focussed on transition following closure ▪ Partner with local organisations to assist with post-closure opportunities ▪ Assist employees during operations (prior to retrenchment) with retraining portable skills ▪ Offer financial planning advice and professional support to employees	Initiate during operation and continue skills development	Mine manager HR manager
Loss of local economic development and decline in local economy	Minor - negative	Minor - negative	Economic transition into alternative businesses and enterprises	▪ Regular communication with stakeholders regarding mine closure. Ensure suitable plans are in place to address short term shortfall in revenues ▪ Ensuring enterprises developed though CSI programme will be profitable after mine closure	Implement during operation and maintain throughout until closure	Mine manager Social manager

12.3 MINE CLOSURE

Please see Knowledge Gaps and Future Commitments.

13 REGULATION 51(B)

(b) an outline of the implementation programme which must include -

(i) a description of the appropriate technical and management options chosen for each environmental impact, socio-economic condition and historical and cultural aspects for each phase of the mining operation;

(ii) action plans to achieve the objectives and specific goals contemplated in paragraph (a) which must include a time schedule of actions to be undertaken to implement mitigatory measures for the prevention, management and remediation of each environmental impact, socio-economic condition and historical and cultural aspects for each phase of the mining operation;

(iii) procedures for environmental related emergencies and remediation ;

(iv) planned monitoring and environmental management programme performance assessment;

(v) financial provision in relation to the execution of the environmental management programme which must include-

(aa) the determination of the quantum of the financial provision contemplated in regulation 54; and

(bb) details of the method providing for financial provision contemplated in regulation 53;

(vi) an environmental awareness plan contemplated in section 39(3)(c) of the Act;

(vii) all supporting information and specialist reports that must be attached as appendices to the environmental management programme; and

(viii) an undertaking by the applicant to comply with the provisions of the Act and regulations thereto.

13.1 Performance Assessment

Performance assessments will be conducted by professional consultants on an annual basis throughout the life of mine, to monitor the EIA and EMP process and the rehabilitation process and advice on any mitigation measures which need to be added to the existing programmes.

A report will be submitted to mine management annually covering all aspects investigated during the audit, and providing suggestions and recommendations as to how the rehabilitation programme is progressing, and any improvements which could be made.

An assessment of compliance to applicable legislation will be included in the assessment and will take into consideration the management principals and strategies stated in the

Environmental Management Programme, and assess whether this strategy is providing the required results. Any flaws found in the rehabilitation process will be included in the report along with the recommended mitigation measures.

A report will be compiled on an annual basis to mine management, who may then decide the appropriate actions to be taken, along with an updated financial provision

13.2 Environmental Awareness & Training Plan

The objectives of the plan:

- To promote internal awareness of environmental and social issues with all mine personal and third party contractors;
- To train personnel on the requirements of the environmental and social management plans in order to actively improve environmental performance of the mine; and
- To instil in all employees, an understanding of the potential consequences of not following the requirements of the social, health and environmental management plans.

These objectives will be achieved through the implementation of two campaigns, namely the environmental training programme and environmental awareness campaign. Aquarius will implement an Environmental Awareness Plan as well as introduce Environmental training in order to inform all employees and contractors of the risks associated with their work.

The purpose of an Environmental Awareness Plan (EAP) is to outline the methodology that will be used to inform the mine's employees of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment. The awareness plan is primarily a tool to introduce and describe the requirements of the range of environmental and social plans to the construction and operational personnel.

On arrival on site, all site staff and their managers will undergo environmental awareness training. Refresher courses will be held at suitable intervals. New contract staff and new employees on site will be required to undergo the training.

The training will incorporate the following components:

- A description of the social and environmental context within which the Everest North Mine will be implemented;
- An identification of the key issues and mitigation measures;
- A description of the relevant procedures and protocols to be followed; and
- A definition of roles and responsibilities.

Contractors will be responsible for training of, and skills transfer to local labour, and will be expected to present training plans to management, who will be responsible for ensuring that the plans are adequate, and who will monitor the effectiveness of the training.

Training will be site and job specific and based on legal requirements, required productivity outputs and safe working behaviour, all based on best practice and international standards.

13.2.1 Communication strategy

The communication of the environmental risks for each phase of the project will take place for the management, administrative and mine worker sectors of the mine.

There must be open communication with adjacent land owners at all times. Communication regarding environmental issues and blasting times must be undertaken at all times. A grievance log book should be established for any person who would like to place a grievance regarding the mines activities. These grievances must be responded to by the mine management.

Communication is a vital component of the EAP. The communication of the environmental risks for each phase of the project will take place at local training centres with personnel from both the administrative and professional worker sectors of the mine.

Methods of communication for training include:

- One Day Workshops: Each environmental and social aspect and impact will be described as well as their significance. Risks associated with each aspect will be discussed to ensure that an understanding of how each action of the project may impact on the environment. The mitigation of the environmental risk will be elaborated on. It is important that each person understands these management strategies as it ensures that the impact on the environment is kept to a minimum. Data collection regarding each aspect will also be explained to ensure that each aspect is monitored according to those protocols specified by the EMP. Along with data collection the reporting of findings will be discussed.
- Full Day (or few days if required) Induction Course: To ensure that each person is aware of the environmental risks associated with the project. This induction will form part of the health and safety induction. This induction course will explain and describe the relevant phases of the project as well as those environmental risks that may occur during these phases.
- Interactive Workshops: As a method of gaining an understanding of the relevant risks, a play or industrial theatre will be performed to explain lay issues and the employees will be encouraged to rehearse and act out a play of their own. These workshops will be conducted in English as well as the local language and translators will be provided where necessary. The course will take place prior to construction, thus ensuring an understanding of the mines and power plant workings and risks.

13.2.2 Evaluation of the environmental awareness plan

The evaluation of the Environmental Awareness Plan will be conducted by the management of the mine. This evaluation will entail the auditing of the operation in both the construction and operation phase once activity has commenced.

The Environmental Awareness Plan described above is sufficient to make all those involved with the project aware of those risks that may occur as well as the necessary mitigation required to minimise these risks. This awareness plan displays that Aquarius is serious about the environment's well-being, empowerment of the local people and returning the land to the appropriate use in the future. Environmental issues will be highlighted at monthly meeting scheduled at the mine

13.3 Emergency response plan

The environmental management programme and associated management options are intended to minimise environmental risk as far as possible. Should, however, circumstances lead to unacceptable risks, emergency systems and procedures have been designed and will be implemented in the case of an emergency to prevent or minimise the consequential environmental damage. The environmental emergency contingency plan addresses any reasonably anticipated failure (most probable risk) for the entire mining area and focuses on incidents that could cause environmental emergencies.

The most crucial aspect of the emergency system is the identification and communication of the emergency to the appropriate persons. Consequently, the names of the appropriate contact person together with their contact numbers would be prominently displayed around the facility. The contact details will be updated on a regular basis. First-party employees (such as security, safety superintendents, mine overseers, environmental officers) will be trained to respond to the responsible personnel in the event of an emergency.

Each person's responsibility would be cleared with him/her beforehand and a copy of the emergency contingency plan would be distributed to each person, including the responsible and/or affected persons not associated with the mine:

- Disaster management and fire fighting agencies,
- Downstream water supply authorities,
- Downstream users that could be affected in the case of an emergency such as neighbouring mines, farmers and local communities;
- Relevant government authorities such as the Department of Water Affairs and the Department of Mineral Resources; and
- Approved professional person (engineer).

It must be ensured that operating and supervisory staff is familiar with the emergency plan, and that the content thereof is understood and familiar to them. The emergency procedures will therefore be included in the induction programme of the mine. Regular training sessions in this regard on a more business-specific basis will be performed.

The emergency response plan will be updated as circumstances change or operating procedures are amended, and as a minimum in the event of:

- Any additional recommendations made by a professional engineer (annual safety inspections) or environmental auditors;

- Any change in operational procedures and/or management of the mining activity;
- The identification of any issues of concern or additional risks as a result of regular inspections and/or monitoring results; and
- Any unplanned or unforeseen emergency situation.

13.3.1 Objectives

Emergencies and risks that have been listed here include: accidents, fires, hydrocarbon spillages and flooding.

If the emergency has potential to affect surrounding communities, they will be alerted via alarm signals or contacted in person. The surrounding community will be informed prior to mining taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.

Communication is vital in an emergency and thus communication devices, such as mobile phones, radios, pagers or telephones, must be available around the mine. A checklist of emergency response participants must be consulted and the relevant units notified.

The checklist includes:

- fire department;
- police;
- emergency health services such as ambulances, paramedic teams, poisons centres;
- hospitals, both local and for evacuation for specialist care;
- public health authorities;
- environmental agencies, especially those responsible for air, water and waste issues;
- other industrial facilities in the locality with emergency response facilities;
- public works and highway departments, port and airport authorities; and
- public information authorities and media organisations.

The conceptual emergency response plan will be only implemented once the mine becomes operational. Therefore, it will be of paramount importance that the plan be reviewed after an incident or accident to ensure that the necessary measures are in place to protect the environment and protect the mine against liability claims that could result. In addition, a yearly review of the emergency response plan will be carried out, irrespective of whether an incident occurred during that year.

13.3.2 Emergency Situations

The following is a list of potential emergencies that could occur:

13.3.2.1 Accidents

In the case of a medical accident or problem, a first aid kit will be available on the mine.

A checklist of emergency response participants must be consulted and the relevant units notified. In this case, many of the emergency services will be sourced from the nearest main town.

13.3.2.2 Fire

Veld fires and fires resulting from other sources must be handled with extreme caution. Fire extinguishers will be placed around the mine.

Procedure:

- The alarm will be activated to alert occupants of the mine in the event of a fire;
- In the event of a small fire the fire extinguishers placed around the mine should be used to contain and extinguish the fire;
- In the event of a large fire, the local area council's fire department will be consulted; and
- All staff will receive training in response to a fire emergency on site.

13.3.2.3 Hydrocarbon spillage

Hydrocarbons such as diesel, petrol, and oil will be kept on site as fuel for the mine machinery. In the event of a spillage, procedures must be put into place to ensure that there are minimal impacts to the surrounding environment.

Procedure:

- In the event of a small spillage, the soil will be excavated and treated;
- In the event of a large spillage, adequate emergency equipment for spill containment or collection such as additional supplies of booms and absorbent materials will be available and if required, a specialised clean-up crew will be called in to decontaminate the area; and
- After a major spill water quality samples of any water sources utilised within 500m from the spill will be monitored for hydrocarbons for the next three months on a monthly basis and further remediation recommended based on the results thereof.

13.3.2.4 Flooding

There is potential for flooding during the rainy season, but particularly November to January when severe thunderstorms can occur. This could result in a large volume of water flowing downstream and could cause major damage to equipment and endanger the lives of employees on site. Heavy rainfall could also cause the pollution control dam to overflow and could flood mine workings. If this water leaves the sites is will enter water resources on site and cause contamination. Procedures must be put in place to ensure that there is a quick response to these events and damage is kept to a minimum.

Procedure:

- DWA's flood warning system should be reviewed annually;
- The use of emergency pumps will occur if the water floods the pits, where it may be exposed to contamination; and
- Mine management should be made aware of any such event so they can take appropriate action to ensure production losses are kept to a minimum.

13.3.3 Implementation

All emergency response procedures will be implemented on the initiation of the construction stage. All employees of the Everest North Mine mining operation will be trained in these procedures as part of the mine induction process. Aquarius will ensure that all emergency numbers are located in various locations around the site and these locations are known to all employees for easy accessibility in the event of an emergency.

13.4 Quantum of financial provision

The financial provision has been based on the Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine compiled by the then Department of Minerals and Energy (DME), now the Department of Mineral Resources (DMR).

13.4.1 Overall Closure Objectives

The overall closure objectives are as follows:

- Return impacted land, to a sustainable land use in agreement with the current landowner or next landowner or user;
- Remove mining infrastructure that cannot be used by a subsequent land owner or a third party. Where buildings can be used by a third party, arrangements must be made to ensure their long-term sustainable use;
- Ensure that as little water as possible seeps out of the various sections of the mine and where this is unavoidable, to ensure that the water is contained or treated if it does not meet statutory water quality requirements;
- Follow a process of closure that is progressive and integrated into the short and long-term plans and that will assess the closure impacts proactively at regular intervals throughout project life;
- Implement progressive rehabilitation measures, beginning during the construction phase wherever possible;
- Leave a safe and stable environment for both humans and animals and make their condition sustainable;
- To prevent soil and surface/groundwater contamination by managing water on site;

- Comply with national closure and rehabilitation regulatory requirements;
- Form active partnerships with local communities to take management of the land after the project has ceased, where possible; and
- To maintain and monitor all rehabilitated areas following re-vegetation for the prescribed period. If monitoring shows that the objectives have been met, an application for closure can be made.

13.4.2 Soil Stripping

This section explains the correct measures that should be followed during the stripping of soil. This activity is a key rehabilitation activity because it takes many years for soils to regenerate once it has been lost.

Correct stripping of soils will firstly ensure that enough soils are available for rehabilitation and secondly that soils are of good quality to support vegetation growth, thus ensuring successful rehabilitation.

The steps that should be taken during soil striping are as follows:

- A detailed soil plan of the areas to be stripped must be available;
- Always strip a suitable distance ahead of mining (50 m – 100 m) to avoid loss and contamination of soil;
- Demarcate the boundaries of the different soil types;
- Define the cut-off horizons in simple terms that the stripping operator can understand;
- Topsoil and subsoil should be stockpiled separately, otherwise mixed stockpiles dilute nutrients and carbon content;
- Stripping should be supervised to ensure the soils are not mixed;
- Soils should only be stripped when the moisture content will minimise the compaction risk (i.e. when they are dry);
- Where possible, soils should be stripped and replaced in one action; and
- Truck and shovel should preferably be used as the means of moving soil.

Some of the points listed above are discussed in more detail below (Tanner *et. al*, 2007).

13.4.2.1 Soil stripping guideline

The soil physical, biological, and chemical data should be used together to generate the soil stripping guideline. Variables to be monitored are Na, P, K, Ca, Mg and Zn. The boundaries of the different soil types should be demarcated and each soil horizon within each soil type's suitability for rehabilitation should be defined. If possible, the stripped soils should be replaced immediately in a similar location in the topographical slope to their natural location.

After harvesting, soil types need to be pegged out accurately. No pegging is allowed before environmental authorisation or without permission from authorities as pegging is construed as a construction activity by environmental law.

Topsoils and subsoils should be stripped separately since the organic material and natural carbon content is retained in the topsoil. In addition the stripping of the topsoil should include existing vegetation to uphold the delicate integrity of the soil. Deeper rooted vegetation may prove problematic while stripping, thus it is recommended that these shrubs and trees be chipped and be incorporated into the soil to support the integrity of the soil.

13.4.2.2 Stripping ahead of mining

Soil should be stripped far enough ahead of mining to prevent soil being contaminated by overburden material. Care should be taken not to strip too far ahead of mining since soils could then be subject to wind and water erosion and other negative impacts resulting in soil loss.

Stripping should be kept within three to nine months of mining or between 50-100 meters ahead of the active mining face.

13.4.2.3 Supervision

A very important aspect is the supervision and monitoring during the stripping process. Close supervision will ensure that soils are being stripped from the correct areas and to the correct depths. Monitoring requires an assessment of the depth of the soil, the degree of mixing of soil materials and the volumes of soils that are being replaced directly or being placed on stockpiles.

Contracts for the stripping of soils should not only be awarded on the volumes being stripped but also on the quality of the soil moving activity.

13.4.2.4 Moisture content

Soils are most susceptible to compaction when the moisture content is high. The dry winter months are thus more suited for the stripping and replacement of soils. If soils have to be moved during wet months then special care should be taken to not compact soils by applying methods that causes minimum compaction.

13.4.2.5 Stripping method

Soils should be stripped and replaced using the truck and shovel method as far as possible. This method will limit the compaction of soils.

13.4.3 Soil Stockpiling

This section explains the correct measures that should be followed during the stockpiling of soil. Stockpiling should be minimised as far as possible as it increases compaction and decreases the viability of the seed bank.

The steps that should be taken during soil stockpiling are as follows:

- Locate stockpiles to ensure re-handling is minimised.
- Ensure the location is free draining to minimise erosion loss and waterlogging.
- Minimise compaction during stockpile creation. The soils should be kept loose by preferably end-tipping and limit the stockpile height to prevent internal compaction.
- Re-vegetate to avoid soil loss to erosion.
- Ensure that the stockpiled soil is only used for the intended purposes.

Some of the points listed above are discussed in more detail below (Tanner *et. al*, 2007).

13.4.4 Infrastructure Removal

Once the project has ceased production all relevant infrastructure must be removed to meet the requirements of the post-closure land use. It must be noted that some offices and buildings may be gainfully used by the subsequent land-user. Once these structures have been identified the remaining structures need to removed or demolished. It is recommended that an agreement be drafted between the mining right holder and the subsequent land-user which stipulates that the liability of certain structures would be transferred to the user.

Removing and demolishing structures poses safety risks to those involved, thus, attention must be given to managing these risks carefully. An outline of steps to be followed during the removal and demolition of structures has been given below (Tanner, 2007).

13.4.4.1 Identifying structures post-closure

All structures on site should be assessed in conjunction with the ultimate land users and authorities to determine which items could be used in future. Care should be taken when this assessment is undertaken to ensure that the infrastructure left behind will not become abandoned due to unsuccessful enterprises.

All infrastructure planned for removal and demolition will need to be assessed for their viable re-use or recycling opportunity. Structures destined for demolition or recycling need to be separated.

13.4.4.2 Removal of Infrastructure

All infrastructure not destined for future use will be demolished and/or removed. Concrete and brick structures are to be demolished along with their associated concrete foundations to the standard depth of 1 metre below surface. Inert demolished rubble may be disposed of at a registered landfill site. All foundations must be removed to a depth of 1 metre below surface. It is recommended that where extreme compacted soils occur, for example hard compacted roads, these be ripped to a depth of one metre and vegetated (DME, 2005).

In cases where the foundations of the structures are impractical to remove, the foundations should be covered with a combination of soft overburden and a layer of topsoil. The placement of topsoil is dependent upon the availability of topsoil. Undisturbed topsoil must not be stripped for placement in disturbed areas.

13.4.5 Final Landform

Once the site has been cleared of all infrastructure and rubble, the exposed underlying materials should be reshaped to create a gently sloping, free-draining topography where possible. Any topsoil that was removed should be replaced, fertilised and vegetated. Those areas underlying topsoil dumps used for rehabilitation or those gravel roads requiring rehabilitation should be ripped and vegetated so that indigenous vegetation can re-establish itself as quickly as possible.

13.4.6 Landform Recreation

Successful replacement of materials starts with planning the final landform during the early stages of the project. This will ensure that final rehabilitation costs are minimised as well as ensuring that the final landform accounts for free-draining areas and minimal slopes, thereby minimising risks of erosion.

Changes in the project plan during the life of the project should be controlled and the effects that these changes might have on the final landform should be predicted and countered.

The steps that should be taken during the reshaping of the project area are as follows:

- Develop the post-project landform concept during the planning stage of the project;
- Prior to the project commencing, the land capability classes i.e. areas with certain land capabilities, should be recreated while also meeting the water management requirements;
- Drainage channels and water ways should be used in areas where the slope length is excessive in order to reduce erosion risk;
- The project plan on the final landform should be updated as and when changes occur to the mine plan (recommended every two years);
- Major modifications to the final landform will result in changes to the Environmental Impact Assessment / Environmental Management Plan (EIA/EMP) report; and
- An integrated approach should be followed to ensure that the optimal balance between conflicting final requirements is achieved (Tanner, 2007).

13.4.7 Waste Rock Dump

Topsoil and subsoil from the proposed waste rock footprint should be stripped and stockpiled with the initial purpose of delimiting the perimeter of the dump prior to placing the waste rock on site. It has been assumed that approximately 36% of the waste rock material (assumed to be inert material) excavated for the opencast pit will be used for the construction of the terrace. Rehabilitation should follow by placing stripped subsoil and topsoil onto the dump and vegetating it. This will minimise the potential for erosion on the side slopes of the dump. To further limit the erosion potential of the soils, indigenous vegetation should be seeded prior to the onset of the wet season.

Should any other waste rock dumps be created then it is recommended that that during the deposition of the waste rock a minimum slope of 1:3 slope be constructed. The slopes of the waste rock should also be terraced or benched to minimise the erosion potential.

Maintenance of the vegetation and topsoil on the waste rock dump must take place after closure with the areas of erosion being rehabilitated and re-vegetated.

13.4.8 Pit

The environmental objective for the pits is to ensure that they are safe for humans and animals at closure and to ensure the highest land capability is achieved. This can be achieved by:

- Performing concurrent rehabilitation whilst mining the opencast areas, with exception of the boxcut which will remain open to allow for access via decline shaft to the underground operation;
- Upon cessation of underground mining via decline shaft, the shaft should be sealed by concrete cap and the remaining waste rock material should be placed back into the boxcut.
- Rehabilitation of the site should consist of the placement of subsoil and topsoil followed by vegetation on the affected area.
- In the event that premature closure of the mine occurs within the first year of mining, it is recommended that all waste rock material be placed back into the open pit, with exception of the terrace waste rock material. Based on preliminary calculations with a bulking factor of 25%, the pit will have a shortfall of waste rock material of 11%.

13.4.9 Pollution Control Dam

The rehabilitation of the pollution control dam will involve the dozing and flattening of the earth walls. Upon reinstating the original topography the site will be rehabilitated by vegetating the disturbed area.

13.4.10 Soil Replacement

The replacement of soils, pending the availability of topsoils, should only start once the final land form has been created. Care should also be taken not to compact the soils during the replacement process since this will result in soil structure destruction. The soil horizons should also be replaced in the same order in which they are removed originally.

The steps that should be taken during the replacement of soils are as follows:

- Soils should be replaced according to a pre-existing plan (assuming soils were stripped according to form);
- A soil reserve should be retained to repair localised surface subsidence areas;
- Appropriate equipment should be used to minimise the compaction of soils and the replacement of soils should be done to the greatest possible thickness in single lifts;

- Soils should be moved when it is dry to minimise compaction. Truck and shovel methods should be used if soils have to be moved when they are wet;
- Where multi-layer soil profiles are re-created, running over the lower layers with heavy equipment should be minimised;
- Dozers instead of graders should be used to smooth the replaced soils (to prevent compaction);
- After soils have been replaced they should be ripped to full rooting depth; and
- In areas where natural vegetation is not possible the soils should be tilled to produce a seed-bed suitable for the plant species that were selected for seeding.

Some of the points listed above are discussed in more detail below.

13.4.10.1 Placement of soils back to similar locations on re-created slope

Soils should be replaced in similar locations on the re-created slope to those that they occupied in the original slope. Soils should be replaced in this way so that soils encounter the moisture conditions that are similar to their natural physical conditions.

13.4.10.2 Soil reserve

A stockpile of soil material should be reserved for use when depressions caused by secondary subsidence and if differential settlement of the rehabilitated profile occurs, and need to be filled. These depressions form where significant thicknesses of overburden materials have been removed and replaced without overburden compaction, resulting in a reshaped land with zones of differing void spaces. Over time the materials will settle as they become wet or weathered, resulting in depressed patches that become waterlogged.

13.4.10.3 Compaction and equipment

Compaction limits the effectiveness of replaced soils. The equipment used during the replacement of the soils has a major impact on the compaction levels. Ideally heavy machinery should not be used to spread and level soils during replacement. The truck and shovel method should be used since it causes less compaction.

When using trucks to deposit soils, the full thickness of the soil required can be placed in one lift. This does, however, require careful management to ensure that the correct volumes of soil are replaced. The soil piles deposited by the trucks will have to be smoothed before re-vegetating the area.

13.4.10.4 Multi-layer soil profiles

Replacing soils in the same sequence as how they occur in nature (and have been removed) would result in considerable benefits in the re-establishment of the natural soil fertility recycling processes since this will result in the organic-enriched, chemically fertile, soil zone being located in the zone of maximum plant root exploitation.

Multi-layer replacement of soils is not, however, ideal from a compaction point of view because each layer needs to be deposited and levelled before the next is replaced. Compaction of the re-created profile can be reduced, provided the correct equipment is used (lowest possible pressure – weight to tyre/track ratio). Soils should also be dry when it is replaced in layers. In any event, ripping through all layers of the re-created multi-layer profile will be essential.

13.4.10.5 Smoothing equipment

The soils that are deposited with trucks need to be smoothed before re-vegetation can take place. A dozer (rather than a grader) should preferably be used to smooth the soils since it exerts a lower bearing pressure and thus compacts less than wheeled systems. If a grader has to be used, care should be taken not to apply excessive down force on the soil through the blade and not to drive in the same tracks twice.

If the top-soils and sub-soils have been mixed during the stripping process then the seed-bed has been diluted excessively and the creation of a seed-bed for planting purposes will be required.

13.4.11 Soil Amelioration

The steps that should be taken during the amelioration of soils are as follows:

- The deposited soils must be ripped to ensure reduced compaction;
- An acceptable seed bed should be produced by surface tillage;
- Restore soil fertility;
- Incorporate the immobile fertilisers in to the plant rooting zone before ripping; and
- Apply maintenance dressing of fertilisers on an annual basis until the soil fertility cycle has been restored.

13.4.12 Vegetation Establishment

This section explains the procedure that should be followed during the re-vegetation of rehabilitated areas. The main aim when re-vegetating disturbed areas is to restore the area to its natural state, by incorporating indigenous species into the rehabilitated areas, thereby creating a self-sustaining nutrient cycle with an ecological succession initiated (Tanner, 2007).

The objectives for the re-vegetation of reshaped and top-soiled land are to:

- Prevent erosion;
- Restore the land to the agreed land capability;
- Re-establish eco-system processes to ensure that a sustainable land use can be established without requiring fertilizer additions; and
- Restore the biodiversity of the area as far as possible.

13.4.12.1 Re-vegetation steps

The following steps should be taken during the re-vegetation of disturbed areas:

- Ensure that the soils have been replaced correctly;
- All soils are to be ripped to full potential rooting depth to correct compaction;
- Analyse the topsoil to determine the lime and fertilizers requirements;
- Prepare the soil by adding lime and fertilizer and ploughing the area, followed by tillage to prepare the seed bed;
- Plant a grass seed mixture consisting of a range of indigenous or non-invasive naturalised species;
- Inspect the area after a good rainfall event;
- Eradicate weeds where necessary;
- Repeat the procedure for the next growing season;
- Define and establish the long-term land management system;
- Leave pasture to allow natural grasses to become re-established; and
- Conduct annual monitoring for monitoring period (repeatable demarcated transect surveys).

13.4.12.2 Species Selection

Some of the criteria that should be considered during the selection of the appropriate species for rehabilitation include:

- Use species which are perennial and well adapted to the area;
- The species should be tolerant of adverse soil conditions;
- Species should have a large biomass and prolific root system; and
- As areas of rehabilitation expand, maintenance costs increase, so species selected should be those with minimal maintenance cost, or with production and financial returns that exceed the cost.

13.4.12.3 Re-vegetation methods

In the event where soils are stripped and returned directly (i.e. no stockpiling) and the areas stripped have good vegetation cover with suitable species present, natural re-colonisation may occur and there will be no need for re-seeding. In this case, it may be best to simply replace the stripped soils, lightly level and rip thoroughly, and leave for one growing season to assess the extent and suitability of the natural re-vegetation. However this method is not suitable for any areas previously infested with alien invader species.

Mulching with locally cut grass will also enhance the seed bank and ecological succession.

13.4.12.4 Maintenance and monitoring of vegetation

Established vegetation requires regular maintenance. If the growth medium consists of low-fertility soils (i.e. topsoil and subsoil mixed) and overburden material, then regular application of plant food will be required until the natural fertility cycle has been restored. Fertiliser application should continue for three to five years or agreed monitoring period.

The grasses should be defoliated initially through grazing for the first three years and then mowing to prevent it from becoming dilapidated which will increase soil erosion risk. Mowing generally requires less supervision than grazing but this results in large quantities of plant nutrient (especially potassium) being removed through the hay. Larger dressing of fertiliser will have to be applied to maintain the soil fertility status quo. Grazing requires more management but it ensures nutrient recycling and that organic matter returns to the soil. Close supervision will be required for land that is hired out to ensure that overgrazing does not take place.

13.4.13 Post-Closure Management

The sites require management, maintenance and monitoring after the operation has ceased and its facilities have been demolished and rehabilitated.

Maintenance and aftercare must be planned for three years after the project has ceased. Maintenance will specifically need to focus on vegetation on generally rehabilitated areas and any alien vegetation will need to be controlled. Furthermore monitoring will have to take place for groundwater at the pit and underground mining areas. It has been recommended that the operation is monitored for at least a period of five years on a quarterly basis after closure.

The cost associated with post-closure management has been calculated using expected groundwater monitoring rates as well as rates for vegetation monitoring and maintenance. These costs have been included in the total for closure liability.

A contingency of 10% on all infrastructure costs has been allowed for. The DMR recommends that 13% be applied for closure plans etc. but Digby Wells is of the opinion that the demolition of surface infrastructure does not always need detailed engineering designs. A 12% allowance has been made for project management fees as the costs are below R100, 000, 000. The latter two figures have been applied to capital expenditure only.

13.4.14 Financial Provision

The closure cost assessment involves the quantification of mining and infrastructure components and applying rates to rehabilitate each component. The environmental liability is described in monetary terms in order for a financial provision to be set aside in a dedicated fund for closure and rehabilitation purposes. The provision can be calculated based on a planned versus unplanned closure scenario. A planned closure scenario considers what activities would need to take place upon closure of the mine after the ore body has been depleted. Unplanned closure determines what provision should be set aside in the event of

premature closure of the mine. In other words the liability is determined as and when the mine was to abruptly close.

For the purposes of this report the approach followed was an unplanned closure scenario within the first year of mining. In addition it is based on the mine plans available to date and should be used as a guide only in determining the quantum required for unplanned closure.

The dedicated trust fund or other mechanism ensures that funds are available for closure. Funds allocated, must be re-assessed on an annual basis to ensure that closure costs can be met for effective rehabilitation of the site. Funds should also be available for planned or unplanned closure at any phase of the mine's life.

It should be noted that the calculated amount excludes the costs to maintain accommodation and industrial facilities on site during the closure period and also excludes any costs associated with staff retrenchment. In addition the calculations do not account for any value recovered from the sale of the plant or other material.

13.4.15 Assumptions

The following assumptions have been made:

- Should premature closure of the mine occur within the first year, it has been assumed that all waste rock, with exception of the terrace, will be placed back into the opencast pit;
- That only 150mm of topsoil will be available to be placed back for rehabilitation purposes; and
- The proposed decline shaft will only be constructed after year one in accordance with the mining sequence.

13.4.16 Summary of Liability

The financial provision has been based on the 'Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine' compiled by the then Department of Minerals and Energy (DME), now the Department of Mineral Resources (DMR).

It is important to differentiate clearly between operational phase and environmental costs and decommissioning. Some rehabilitation has to take place during operation, but after the mine has ceased, activities will be seen as closure activities. A detailed environmental and social labour plan and other relevant environmental authorisations will be required well in advance of mine closure.

The closure liability costs were calculated by means of the Digby Wells and DMR method of calculation. A summary table of the liability cost for the first year of the operation has been included below.

Table 13-1: Liability costs after one year according to Digby Wells

Summary of Liability Costs		
No.	**Description**	**Amount**
1	Everest North Infrastructure[10]	R 2 407 161.69
2	Pollution Control Dam	R 1 174 962.06
3	Pit	R 6 959 084.30
	Subtotal	**R 10 541 208.05**
4	Groundwater Monitoring Costs	R 1 046 000.00
5	Vegetation Monitoring	R 15 490.00
6	Vegetation Maintenance	R 317 504.25
7	Project Management (12%)	R 1 264 944.97
8	Contingency (10%)	R 1 054 120.80
	Grand Total	**R 14 239 268.07**

No allowance has been made for Value Added Tax (VAT) in the above figures. This issue should be noted where appropriate and for the purposes of which the financial figures are used. The total includes costs for project management costs and contingency.

Table 13-2: Liability costs after one year according to DMR

Summary of Liability Costs		
No.	**Description**	**Amount**
1	**Demolition and rehabilitation cost**	**R 5 376 069.33**
2	Preliminary and general (12% of subtotal 1)	R 645 128
3	Contingency (10% of subtotal 1)	R 537 607
	Subtotal 2	**R 6 558 805**
4	Subtotal 2 (multiplied by 14% VAT)	R 918 232.64
	Grand Total	**R 7 477 037.22**

[10] Includes demolition and rehabilitation

14 RECOMMENDATIONS

This draft EIA and draft EMP was compiled in support of a mining right application for the Aquarius Everest North Platinum Mine. The aim of the EIA process and the related studies is to provide adequate information to the decision makers in order to make an informed decision on the way forward.

The necessary social and environmental studies were conducted in order assess the impacts on the physical, biological and social environments within the proposed mining area as well as those affecting the immediate surrounds. considering some studies are yet to be finalised. The impacts which mining is expected to have on these different environments have been assessed using a detailed quantitative impact assessment methodology.

Mitigation measures and monitoring programs were generated and are included to assist in minimising and avoiding the negative impacts and maximising the benefits of the proposed mining operation.

Due to the existing knowledge gaps, as contained in Section 7, it is recommended that the current knowledge gaps be investigated and once the commitments are fulfilled, an amended report be submitted to the DMR for consideration.

15 REFERENCES

ACOCKS, J.H.P, 1988. Veld types of South Africa. 3rd edn. Memoirs of the Botanical Survey of South Africa.

Bonner, P.L/. Esterhuysen, A.B., Schoeman, Swanepoel, N.J., and Wright, J.B., 2008. Introduction. In: Swanepoel, N., Esterhuysen, A. & Bonner, P. (Eds) Five Hundred Years Rediscovered: Southern African Precedents and Prospects: 1-19. Johannesburg: Wits University Press.

Bredenkamp, G., Granger, J.E., and Van Rooyen, J.E., 1996. Moist Sandy Highveld Grassland. In: Low, A.B. & Robelo, A.G. (eds) Vegetation of South Africa, Lesotho and Swaziland. Department of Environmental Affairs and Tourism, Pretoria.

Concession Creek Consulting cc, (2007), Aquarius Platinum – Everest North Mine Project Socio-Economic Impact Assessment Baseline Report

Daniel P, & Hopkinson M, (1989), The Geography of Settlement: Conceptual frameworks in geography, Oliver & Boyd

Ehlanzeni Disctict Municipality, (20101), Ehlanzeni District Municipality Integrated Development Plan (IDP), 2011/2012

Ehlanzeni Disctict Municipality, (20102), Ehlanzeni Disctict Municipality IDP 2010/2011 Framework Plan

Esterhuysen, A and Smith J. 2007. Chapter 2: Stories in Stone. In: Mpumalanga: History and Heritage (Eds) Peter Delius. University of Kwa-Zulu Natal Press: Durban.

Hall, M. 1987. The Changing Past: Farmers, Kings and Traders in Southern Africa 2000 – 1860. David Phillip Publishing: Cape Town.

Huffman, T.N. 2007. Handbook to the Iron Age: The Archaeology of Pre-Colonial Farming Societies in Southern Africa. Cape Town: University of KwaZulu-Natal Press

Huffman, T.N. and Schoeman, M.H. 2002. Archaeological Assessment of the Der Brochen Project, Mpumalanga. Archaeological Resource Management.

Klein, R. 1984. Later Stone Age Faunal Samples from Heuningneskrans Shelter (Transvaal) and Leopard's Hill Cave (Zambia). The South African Archaeological Bulletin 39 (140): 109 – 116.

Louw, A.H., 1969. Bushman Rock Shelter, Ohrigstad, Eastern Transvaal: A Preliminary Investigation, 1965. The South African Archaeological Bulletin 24 (94): 39-51.

Maggs, T. 1995. Neglected Rock Art: The Rock Engravings of Agriculturalist Communities in South Africa. The South African Archaeological Bulletin 50(162): 132-142.

Makhura, T. 2007 Chapter 4: Early Inhabitants. In: Mpumalanga: History and Heritage (Eds) Peter Delius. University of Kwa-Zulu Natal Press: Durban.

Mitchell, P. 2002. The Archaeology of Southern Africa. Cambridge University Press, Cambridge.

OBERHOLZER, B. 2005. Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Plug, I. 1982. Bone Tools and Shell, Bone and Ostrich Eggshell Beads from Bushman Rock Shelter (BRS) Eastern Transvaal. The South African Archaeological Bulletin 37(136): 57 – 62.

Pistorius, J.C.C. 2006. A Phase 1 Heritage Impact Assessment (HIA) Study for the Proposed New Everest North Platinum Mine in the Limpopo Province, South Africa.

Scientific Aquatic Services, 2009. Environmental Scoping Report for a proposed platinum mining operation (Vygenhoek Project).

Scientific Aquatic Services, (2009), Aquarius Platinum – Environmental Scoping Report for a Proposed Platinum Mining Operation (Vygenhoek Project)

Smith, K.W. 1969. The Fall of the Bapedi of the North-Eastern Transvaal. The Journal of African History 10(2): 237 – 252.

Smith, B and Ouzman, S. 2004. Taking Stock: Identifying Khoekhoen Herder Rock Art in Southern Africa. Current Anthropology 45(4): 499-526.

Smith, B and Zubieta, L.F. 2007. The Power of Ancient Art. In: Peter Delius (Eds) Mpumalanga History and Heritage. University of Kwa-Zulu Natal Press: Durban.

Statistics South Africa, (2001), Census 2001

Statistics South Africa, (20071), Community Survey 2007

Statistics South Africa, (20072), Community Survey 2007 Municipal data on household services Statistics

Tab- National Archives Repository (Public Records of former Transvaal Provinces and its predecessors as well as of magistrates and local authorities)

South African Genealogical Database

Thaba Chweu Local Municipality, (20091): Thaba Chweu Municipality Integrated Development Plan (IDP), 2010-2011

Thaba Chweu Local Municipality, (20092): Thaba Chweu Municipality Annual Report, 2009-2010

The province of Mpumalanga (2010), Provincial Gazette Extraordinary, No. 1815 Vol. 17 NELSPRUIT, 24 May, Notice 127 of 2010

The South African LED Network, (2010), Municipality: Ehlanzeni District Municipality, http://led.co.za/municipality/ehlanzeni-district-municipality, accessed 17 October 2011

Van der Walt, J and Fourie, W. 2007. Archaeological Impact Assessment: Mining Development on the Farm Mareesburg 8 JT, District Steelpoort. Matakoma Heritage Consultants.

Water Research Commission (WRC), 1994. Surface water resources of South Africa 1990. Report No.: 298/1.1/94.