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ENVIRONMENTAL PLANNING IMPACT ASSESSMENTS AND MANAGEMENT SYSTEMS

PROPOSED RIVIERA TUNGSTEN OPEN-CAST MINING PROJECT

Bongani Minerals (Pty) Ltd.

FINAL SCOPING REPORT

**REPORT CONDUCTED IN TERMS OF REGULATION 49 (2) OF THE
MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002
(ACT 28 OF 2002) FOR THE MINING OF TUNGSTEN ORE AND
MOLYBDENUM ORE ON PORTIONS 1, 6, 13 OF THE FARM
NAMAQUASFONTEIN NO. 76 AND PORTION 1 OF FARM NO. 297,
PIKETBERG**

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LIST OF ABBREVIATIONS

Articulated Dump-Trucks	ADTs
Ammonium Paratungstate	APT
Biochemical Oxygen Demand	BOD
Dissolved Oxygen	DO
Conservation of Agricultural Resources Act	CARA
Department of Environmental Affairs and Development Planning	DEAandDP
Department of Minerals and Energy	DME
Department of Water Affairs and Forestry	DWAF
Draft Scoping Report	DSR
Environment Conservation Act 73 of 1989	ECA
Environmental Control Officer	ECO
Environmental Impact Assessment	EIA
Environmental Management Plan	EMP
Environmental Assessment Practitioner	EAP
Final Scoping Report	FSR
Heritage Impact Assessment	HIA
Heritage Resources Act (25 of 1999)	NHRA
Heritage Western Cape	HWC
Interested and Affected Parties	IAPs
Land Use Planning Ordinance, 1985 (Ordinance 15 of 1985)	LUPO
Life of the Mine	LoM
National Environmental Management Act, 1998 (Act 107 of 1998)	NEMA
Mineral and Petroleum Resources Act, 2002 (Act 28 of 2002)	MPRDA
Record of Decision	ROD
Site Development Plan	SDP
South African Heritage Resources Agency	SAHRA
South African Manual for Outdoor Advertising Control (1998)	SAMOAC
Traffic Impact Assessment	TIA
Visual Impact Assessment	VIA
Wildlife and Environmental Society of South Africa	WESSA
Withers Environmental Consultants	WEC

EXECUTIVE SUMMARY

This report describes the proposed mining of the tungsten/molybdenum deposits within the Krom Antonies River valley some 24km northwest of Piketberg.

This report is compiled on behalf of Bongani Minerals (Pty) Ltd. in terms of regulation 49(2) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). A Mining Right has been applied for by Bongani Minerals (Pty) Ltd. in terms of section 22 of MPRDA to mine tungsten ore and molybdenum ore on Portions 1, 6 and 13 of the Farm Namaquasfontein No. 76 and Portion 1 of Farm No. 297, Piketberg.

The Department of Minerals and Energy (DME) accepted the application for a Mining Right on the 25th of March 2009.

DME requested in their acceptance of the Application for a Mining Right that a Scoping and Environmental Impact Assessment Process be undertaken for the proposed development. In terms of regulation 49(2) of the MPRDA, the scoping report must be submitted to the office of the regional manager where the application was lodged within 30 days from the date of the acceptance. The EIA report must be submitted within 180 days. A request from Bongani Minerals for an extension of time to lodge the Scoping Report was granted by the DME on April 2009. The Scoping Report was submitted to DME on 4 May 2009. The DME sent a letter to Bongani Minerals on 24 June 2009 providing them with the key issues that required further input. Amongst others, Bongani Minerals were requested to submit a Final Scoping Report (FSR) (that includes all the comments/objections from IAPs and their responses to such comments) to IAPs before or on 20 July 2009 to provide comment on. IAPs will be given 30 days, i.e. until 21 August 2009, to provide any written comments on the FSR to WEC.

Bongani Minerals (Pty) Ltd. appointed Withers Environmental Consultants (WEC), an independent environmental consulting company, to conduct the Environmental Impact Assessment (EIA) and compile a Scoping Report and Environmental Management Plan (EMP) for the proposed mining of the tungsten-molybdenum deposit in terms of MPRDA. Should regulatory approval be obtained, Bongani Minerals (Pty) Ltd. proposes to start mining the resources in approximately 2011.

THE PROPOSED RIVIERA TUNGSTEN OPEN-CAST MINING PROJECT

Bongani Minerals are considering the only technically viable (open-cast) mine design to extract the low grade but commercially viable tungsten-molybdenum deposit present on Portions 1, 6 and 13 of the Farm Namaquasfontein No. 76 and Portion 1 of Farm No. 297, Piketberg.

Open-Cast mining, also known as, open-pit mining, open-cut mining, and strip mining, refers to a method of extracting rock or minerals from the earth by their removal from an open-pit or borrow pit.

The term is used to differentiate this form of mining from extractive methods that require tunnelling into the earth. Open-pit mines are used when deposits of commercially useful minerals or rock are found near the surface; that is, where the *overburden* (surface material covering the valuable deposit) is relatively thin or the material of interest is structurally unsuitable for tunnelling (as would be the case for sand, clay, gravel or highly weathered rock). For minerals that occur deep below the surface, where the overburden is thick or the mineral occurs as veins in hard rock, underground mining methods are employed to extract the valued material.

Venmyn Rand (Pty) Ltd. were contracted to conduct a conceptual open-pit mine design and scheduling study for the Proposed Riviera Open-Cast Mining Project and an Order of Magnitude Process Evaluation, Conceptual Sizing, Cost and Layout for 3mtpa and for 0.7mtpa. Using Whittle

Software Venmyn Rand (Pty) Ltd. determined optimal conceptual pit shells from which pit designs could be prepared. Venmyn Rand (Pty) Ltd. then used the optimal pit designs to determine the conceptual mining schedules and the projected operational periods of the mine, using three different production profiles. They arrived at a Life of Mine (LoM) of just over 18 years.

The Riviera deposit is a Greenfield Project (a project which lacks any constraints imposed by prior work i.e. there is no need to remodel or demolish an existing structure). The intent is to adopt an open-pit mining method using conventional truck and shovel to extract the deposit.

The Riviera orebody consists almost entirely of scheelite (CaWO₄) and according to Venmyn Rand (Pty) Ltd. the deposit is known to extend to a depth of -115mRL (over 225 m below surface), with the first ore at approximately 60m below surface which is considered too shallow for underground mining.

ALTERNATIVES

There is no viable mining project alternative since Bongani Minerals are considering the only technically viable (open-cast) mine design to extract the low grade but commercially viable tungsten-molybdenum deposit.

The following design alternatives are however amongst those which will be considered by Bongani Minerals (Pty) Ltd. and their appointed consulting engineers:

- Alternative boxcut (secure and safe portals/accesses to the open-cast mine) positions and direction of mining for opencast mining operations;
- alternative location of boxcut soil and spoil stockpiles for opencast mining operations;
- whether to construct a river diversion for the opencast mining operations;
- alternative conveyor alignments;
- alternative conveyor technology to solve environmental problems (e.g. noise; river crossings);
- alternative slime dam locations;
- alternative tip locations;
- alternative alignments of access roads and haul roads to tips;
- alternative locations for mine infrastructure, including the locations of offices, workshops and; change houses, refuelling bays, stores, magazines and hardparks; processing plant/s; and
- alternative water sources for mining.

The **no-go** alternative will also be considered, in which the status quo for the area will remain, viz. that of agriculture and livestock farming. The economic and social impacts of mining on the current and future agricultural activities will also be considered.

PUBLIC CONSULTATION PROCESS

Public Participation Process

The Scoping Report was made available for public review from Thursday 23rd of April 2009. Copies of the Scoping Report were made available for review purposes at the library in Piketberg and at the Karookop Primary School. A hard copy of the report was also provided to Dr. B. van der Merwe, a Director of Little Swift Investments 56 (Pty) Ltd., which owns the Farm Moutons Hoek (Farm 297/1). Many registered IAPs were also provided with electronic copies of the DSR.

Advertisements were placed in the local *Die Weslander* Newspaper on 22 April 2009 and in Die Burger Newspaper on 23 April 2009, giving notice of the proposed Mining Right application and the availability of the Draft Scoping Report.

The public meeting was held to discuss the proposed Riviera Tungsten Mining Right application on 30 April 2009 at the Karookop Primary School was also advertised in the above newspapers. The meeting was relocated to a large shed on the Karookop Farm to accommodate all the IAPs who attended the meeting. Notes recorded at the meeting were provided to all the registered IAPs.

Written comments on the Draft Scoping Report were to be forwarded to Withers Environmental Consultants by 25 May 2009. Some IAPs requested additional time for providing their written comments. An extension of time for providing written comments was extended to 1 June 2009.

Written comments received by WEC have been included in this Final Scoping Report. The comments received from IAPs (verbal and written) and the respective responses provided by WEC have been tabulated in **Table 6**.

The DME sent a letter to Bongani Minerals on 24 June 2009 providing them with the key issues that required further input. Amongst others, Bongani Minerals were requested to submit a FSR (that includes all the comments/objections and their responses) to IAPs before or on 20 July 2009 to comment on. IAPs will be given 30 days, i.e. until 21 August 2009, to provide any written comments on the FSR to WEC.

SUMMARY OF ISSUES RAISED BY IAPs DURING SCOPING PHASE OF THE MINING RIGHT APPLICATION

The IAPs raised the following issues relating to the Proposed Riviera Open-Cast Mining Project:

Biophysical Issues

- Impact of proposed Mining on Ecology and Biodiversity
- Impact of Proposed Mining on Water Resources of Verlorenvlei and Surrounds
- Impact of polluted groundwater
- Impact of proposed mine on surface water salinities
- Impact of the proposed mine on river diversion
- Current water use and impacts on water quality
- Impact of the Proposed Mining on Agricultural Land
- Impact of noise and air pollution from Mining
- Issue regarding alien and invasive species
- Impact of the Proposed Mining on Verlorenvlei, a Registered Ramsar Site
- Impact of Climate Change and Water Use on Available Water Reserves
- The impact of blasting and mine design on the instability of the Piketberg Mountain to the east of the mine.
- Impact of the proposed mining on the Greater Cederberg Biodiversity Corridor
- Impact of slime dams on environment

Alternative Development Options

- Alternative Development Options to be Considered, which encompass the status quo, i.e. agriculture, and mining. Various alternatives regarding layout of the mine infrastructures are also considered.

Engineering issues

- Impact on Infrastructure
- Traffic Impact of Mining on Road Infrastructure and N7 Road
- Issue of waste management
- Concerns about the proposed design of the open cast mining project
- Processing of Tungsten

Socio-economic Issues

- Impact of Proposed Mining on Existing Jobs

- Impact of Dust on Fruit Industry
- Impact of Falling Tungsten Prices on Mining in Krom Antonies Valley
- Impact of mine on the value of affected property
- Impact of Proposed mining on the Karookop School
- Vulnerable people and social development support
- Impact of the proposed mine on the way of life and the sense of the place
- Impact of the proposed mining on housing in the district
- Impact of Proposed Mining on Tourism
- Impact of Mining and Infrastructure on Cultural Landscape
- Economic Impact on Mining on agricultural economy in the valley
- Impacts of mining on economic input and jobs at a local level and on social welfare
- Concerns about the Social and Labour Plan
- Visual Impact
- Light Pollution

Environmental Authorisation Process

- Impacts of the Previous Prospecting Right Application on the Present Mining Right Application
- The Legal Process Regarding Public Participation
- Mineral Rights Approval
- National Water Act Implications
- Lack of Contact with Authorities, especially DEA&DP and DEAT
- Controlling Authority for Mining Operation
- Controlling Authority for Land Use
- Non- compliance with the Mineral and Petroleum Resources Development Act (MPRDA) Regulations

Legal Issues

- Issues regarding the EMP
- NEMA and the EIA process
- National Environmental Management Biodiversity Act (NEMBA)
- National Environmental Management: Air Quality Act (NEM:AQA)
- National Environmental Management: Waste Management Act (NEM:WMA)
- Environment Conservation Act (ECA)
- Land Use Planning Ordinance (LUPO)
- Ramsar International Convention on Wetlands
- National Water Act, 1998 (Act 36 of 1998)
- Heritage and Rehabilitation Issues
- Impacts of the proposed mine on heritage resources
- Palaeo Ecology
- Rehabilitation and surety

PLAN OF STUDY FOR EIA AND EMP

Scope of Studies

The full plan of study for the EIA and EMP is set out in the Scoping Report.

The level of information required from specialist consultants to develop adequate, practical management and mitigation measures for predicted environmental impacts was determined by WEC and the appointed specialist consultants in their environmental evaluation of the site. The environmental evaluation was augmented by preliminary reports written by the appointed specialist consulting scientists following a combined visit to the general area conducted in October 2008

(access was not allowed onto the affected properties and therefore most of the results contained in this Scoping Report have been obtained from desk top research of secondary sources of information and various modelling). Issues raised by IAPs have been taken into consideration in determining the terms of reference for carrying out specialist studies.

Information on the following environmental aspects has thus far been obtained (by the EAP and, where listed, by the appointed specialist consultants) from existing information sources and from the first round of a cursory baseline information study conducted, viz.

- climate;
- topography;
- fauna;
- vegetation – Dr Charlie Boucher;
- freshwater ecosystems – Dr. Liz Day, the Freshwater Consulting Group;
- water quality – Mr. Nico Rossouw, Ninham Shand;
- impact on groundwater resources – Mr Des Visser, SRK;
- hydrology – Mr Howard, Ninham Shand.

The preliminary reports conducted thus far will however require detailed study and re-working during the EIA phase in order to predict impacts for the purposes of a qualitative impact analysis (the expected severity of impacts and the level of confidence required in their prediction), which will guide the planning of the Proposed Riviera Open-Cast Mining Project, should it be approved.

The following outstanding studies and processes will also need to be conducted during the EIA phase through collation of existing information, field surveys, drilling, geotechnical sampling and mapping with various impact assessment scenario's being undertaken.

- hydrogeology – Mr. Des Visser, SRK Consulting
- visual impact assessment;
- agricultural soil potential;
- archaeological and heritage impact assessments;
- socio-economic impact assessment (including an agricultural potential impact assessment);
- air quality;
- land use;
- noise;
- town planning (site development plan and LUPO application);
- architectural guidelines;
- landscaping architectural guidelines and rehabilitation guidelines;
- detailed civil engineering report;
- land surveying; and
- detailed climatic specialist study (wind, humidity, sun shine days, rainfall).

CONCLUSION

The key environmental impacts and issues raised by IAPs, officials and specialist consultants that need to be addressed have been noted. To address such issues, various specialist consultants need to be appointed to undertake the necessary detailed specialist studies to assess the significance of the potential impacts that may develop as a result of both the operational phase of the mine and its closure. Such specialists must also provide mitigation measures to reduce the significance of the impacts. The terms of reference of the specialist studies have been suggested in the Plan of Study for EIA.

All written comment received from IAPs and Government Officials have been assessed and responses provided (**Table 6**).

It is concluded that it will be in the best interests of the land owners, who are resisting access of the specialists to their land, to allow the above specialists studies to be undertaken without interference. It is only with the results of these specialist studies that informed decisions can be made as to the significance of the potential impacts assessed. The assessment of the significance of the impacts will guide the approval process by DME and other Government Departments whether to approve the Mining Right or not.

Once the final comments have been received from registered IAPs, the FSR, together with any additional comments received, will be submitted to DME for their acceptance to move into the EIA Phase of the project.

1. INTRODUCTION

1.1 Background to the History of the Discovery of Tungsten Mineralization in the Krom Antonies River Valley

During the 1970s, Union Carbide Corporation was a major producer and supplier of tungsten and derivative products to end-user manufacturing industries. The corporation owned and managed two mines in the USA and one in Brazil, but by 1975 the three mines were ageing, with short life-reserves and high production costs. The world market for tungsten was buoyant and prices had risen steadily over the past 15 years. It was against this backdrop that a decision was made to explore for tungsten in North America, South Africa, Australia and Brazil (Walker 1994).

In 1975, fifty grains of scheelite were recorded (against a regional background of 0 grains) in a single sample taken from the Krom Antonies River some 24 km north of the town of Piketberg, some 170km to the north of Cape Town (**Figure 1**). In 1979 Union Carbide, entered into a joint venture agreement with Anglo American, which culminated in the utilization of a combination rotary/diamond drill rig to test for alluvial scheelite and to obtain samples of the underlying bedrock. In October 1979, the twelfth hole intersected a highly altered granite with visible grains of interstitial scheelite, molybdenite, pyrite, pyrrhoite and chalcopyrite. The scheelite grains fluoresced from pale blue to yellow with some zoned grains, which indicate the substitution of molybdenum for tungsten in the scheelite lattice. By January 1980 five shallow bedrock identification holes had outlined the suboutcropping extent of the granite over an area of 1km² and confirmed that mineralization was pervasive (Walker 1994). Walker (1994) regarded the combination of greisen, skarn and extensive hydrothermal alteration and mineralization at Riviera as unique.

The tungsten Mineralization or ore body occurs as a concentrate associated with the granite and as a disseminated body associated with ancient alluvial deposits. The whole ore body is located on the following properties within the Krom Antonies River Valley: Portions 1, 6, 13 of the Farm Namaquasfontein No. 76 and Portion 1 of Farm No. 297, Piketberg (**Figure 2**). The core area of the tungsten mineralization is located on Portion 1 of the Farm 291, directly beneath a circular field irrigated by a large centre pivot (**Figure 3**). These farms (hereafter referred to as *the site*) are situated in the southwestern sector of the Krom Antonies River Valley at an altitude of approximately 105m in the Piketberg Magisterial District of the Western Cape Province. The nearest town is Piketberg, which is approximately 53km from the site by road (**Figure 1**).

A Mining Right has been applied for by Bongani Minerals (Pty) Ltd. in terms of section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) to mine tungsten ore and molybdenum ore on Portions 1, 6 and 13 of the Farm Namaquasfontein No. 76 and Portion 1 of Farm No. 297, Piketberg. The Department of Minerals and Energy (DME) accepted the application on the 25th of March 2009 (**Appendix 1**).

DME requested that the Scoping Report must be submitted to them on 18 April 2009 (this was less than the statutory 30 days provided for in the MPRDA). An application for an extension of time to submit the Scoping Report was requested, as it would be impossible to conduct a public meeting within the time frame allowed. DME provided an extension of time to 4 May 2009 to submit the Scoping Report (**Appendix 2**).

Bongani Minerals (Pty) Ltd. subsequently appointed Withers Environmental Consultants (WEC), an independent environmental consulting company, to conduct the Environmental Impact Assessment (EIA) in terms of section 39(1) of the MPRDA i.e., to compile a Scoping Report, Environmental Management Plan and Environmental Impact Assessment (EIA) report as required by the MPRDA for the granting of a Mining Right for the tungsten-molybdenum deposit.

In addition, since the proposed mining of the mineral deposit will trigger a number of listed activities noted in Regulations R386 and R387 of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998), a full EIA in terms of Regulation R385 is required. A second environmental impact assessment process is also, therefore, required in terms of NEMA. This EIA process will be run separately to the MPRDA process.

Given the ore body characteristics, including the depth of the ore body, Bongani Minerals are considering an open-cast mine as the only technically viable mine design to extract the low grade but commercially viable (under current market conditions) tungsten-molybdenum deposit, which amounts to ± 10,860 Million tonnes of ore at an average grade of 0.30% WO₃ (tungsten oxide).

1.2 Description of the Proposed Riviera Tungsten Mine

The Riviera deposit is a Greenfield Project (a project which lacks any constraints imposed by prior work i.e. there is no need to remodel or demolish an existing structure). The intent is to adopt an open-pit mining method using conventional truck and shovel to extract the deposit.

The Riviera orebody consists almost entirely of scheelite (CaWO₄) and according to Venmyn Rand (Pty) Ltd. the deposit is known to extend to a depth of -115mRL (over 225 m below surface), with the first ore at approximately 60m below surface which is considered too shallow for underground mining.

1.3 Property Components of the Mine Lease Area

To be able to mine the ore body by way of an open-cast mine and provide the necessary infrastructure required to mine, various portions of a number of land entities will be required in the Krom Antonies River Valley. The proposed mine lease area comprised approximately 555ha and is made up of the following properties (**Figure 2**):

Portion 1 of Farm No. 297

Area = 175.3816 ha

Owner: Little Swift Investments 56 (Pty) Ltd. c/o Dr. Bennie van Der Merwe

Part of Portion 1 of Farm Namaquasfontein No. 76

Area = 134.3552 ha

Owner: Mr. Danie Smit

Part of Portion 6 of Farm Namaquasfontein No. 76

Area = 227.0548 ha

Owner: Mr. Johannes Coetzee

Part of Portion 13 of Farm Namaquasfontein No. 76

Area = 18.3763 ha

Owner: Mr. Hermanus E Coetzee

TOTAL EXTENT : 555.1679 ha

The 21 digit codes for the properties are respectively as follows:

C0580000000002970001;
C0580000000007600013

C0580000000007600001;

C0580000000007600006;

1.4 Legal and Policy Framework Applicable to the Proposed Riviera Tungsten Mine

Some of the more important legislation applicable to the Proposed Riviera Tungsten Open-Cast Mine and the compliance of this project with the legislation are provided below. While it is not a complete list, it does provide an overview of essential legal, developmental and planning focuses.

1.4.1 The South African Constitution

The “*environmental guarantee*’ clause in the Bill of Rights section of the Constitution of South Africa, Section 24, states that *every person shall have the right to the following*:

- (a) *An environment that is not harmful to their health nor well being; and*
- (b) *To have that environment protected for the benefit of present and future generations, through reasonable legislative and other measures, which:*
 - *prevents pollution and ecological degradation;*
 - *promotes conservation; and*
 - *secures justifiable economic and social development and use of natural resources while promoting justifiable economic and social development.*

The proposed Open-Cast mining development strives towards upholding this clause of the Constitution.

1.4.2 National Environmental Management Policy for South Africa

South Africa has developed its national environmental policy through a comprehensive participatory process known as the Consultative National Environmental Policy Process (CONNEPP). CONNEPP’s purpose was to give all stakeholders in South Africa the chance to contribute to developing the new environmental policy.

The Draft White Paper on Environmental Management Policy for South Africa was submitted to Cabinet and Parliament in June and July 1997 and published in the Government Gazette on 28 July 1997 (No. 18164) for public comment. The final White Paper was published in the Government Gazette on 15 May 1998 (No. 18894) and the National Environmental Management Act (NEMA), 107 of 1998 (refer to section 7.3 below) was published in the Government Gazette on 27 November 1998 (No. 19519). NEMA was then amended by the National Environmental Management Amendment Act, 2008 (Act No. 62 of 2008), which was published in the Government Gazette on 9 January 2009 (No. 31789) and which came into effect on 1 May 2009.

The vision of this environmental management policy is one of a society in harmony with its environment. It emphasizes that integrated and sustainable management of the environment, now and in the future, is the essential basis of sustainable development in all areas of human activity. Department policies, plans, programmes and activities in all sectors that do not address environmental concerns, cannot claim to be sustainable.

The Government’s goal is to lay the foundations for sustainable development based on integrated and holistic environmental management practices and processes between 1999 and 2005. To this end government commits itself to:

- (a) use government resources in the most effective way to implement policy; and
- (b) integrate and co-ordinate its approach to environmental management in all government agencies in all spheres.

The environmental legislation described below encapsulates this commitment of government.

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

In terms of the MPRDA, mining operations on the Riviera tungsten and molybdenum resources can only commence once Bongani Minerals (Pty) Ltd. has received authorisation from the Department of Minerals and Energy (DME) in terms of their Mining Right application. An Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the Proposed Riviera Open-Cast Mining Project, as required in terms of section 39(1) of the MPRDA, are required as part of the application for a Mining Right.

The following regulations contained in the Act have particular relevance to the Proposed Riviera Tungsten Open-Cast Mining Project:

107. (1) The Minister may, by notice in the Gazette, make regulations regarding-
- (a) (i) the conservation of the environment at or in the vicinity of any mine or works;
 - (ii) the management of the impact of any mining operations on the environment at or in the vicinity of any mine or works;
 - (iii) the rehabilitation of disturbances of the surface of land where such disturbances are connected to prospecting or mining operations;
 - (iv) the prevention, control and combating of pollution of the air, land, sea or other water, including ground water, where such pollution is connected to prospecting or mining operations;
 - (v) pecuniary provision by the holder of any right, permit or permission for the carrying out of an environmental management programme;
 - (vi) the establishment of accounts in connection with the carrying out of an environmental management programme and the control of such accounts by the Department;
 - (vii) the assumption by the State of responsibility or co-responsibility for obligations originating from regulations made under subparagraphs (i), (ii), (iii) and (iv,) of this paragraph; and
 - (viii) the monitoring and auditing of environmental management programmes;
 - (b) the exploitation, processing, utilization or use of or the disposal of any mineral;
 - (c) procedures in respect of appeals lodged under this Act;
 - (d) fees payable in relation to any right, permit or permission issued or granted in terms of this Act;
 - (e) fees payable in relation to any appeal contemplated in this Act;
 - (f) the form of any application which may or have to be done in terms of this Act and of any consent or document required to be submitted with such application, and the information or details which must accompany any such application;
 - (g) the form, conditions, issuing, renewal, abandonment, suspension or cancellation of any environmental management programme, permit, licence, certificate, permission, receipt or other document which may or have to be issued, granted, approved, required or renewed in terms of this Act;
 - (h) the form of any register, record, notice, sketch plan or information which may or shall be kept, given, published or submitted in terms of or for the purposes of this Act;
 - (i) the prohibition on the disposal of any mineral or the use thereof for any specified purpose or in any specified manner or for any other purpose or in any other manner than a specified purpose or manner;
 - (j) the restriction or regulation in respect of the disposal or use of any mineral in general;
 - (k) any matter which may or must be prescribed for in terms of this Act; and

(l) any other matter the regulation of which may be necessary or expedient in order to achieve the objects of this Act.

The following regulations contained in Government Notice R. 527 Mineral and Petroleum Resources Development Act (28/2002): Mineral and Petroleum Resources Development Regulations have particular relevance to the contents of scoping reports:

49. (1) A scoping report, in relation to a proposed mining operation, must-
- (a) describe the methodology applied to conduct scoping;
 - (b) describe the existing status of the environment prior to the mining operation;
 - (c) identify and describe the anticipated environmental, social and cultural impacts, including the cumulative effects, where applicable;
 - (d) identify and describe reasonable land use or development alternatives to the proposed operation, alternative means of carrying out the proposed operation and the consequences of not proceeding with the proposed operation;
 - (e) describe the most appropriate procedure to plan and develop the proposed mining operation;
 - (f) describe the process of engagement of identified interested and affected persons, including their views and concerns; and
 - (g) describe the nature and extent of further investigations required in the environmental impact assessment report.
- (2) The scoping report must be submitted to the office of the Regional Manager where the application was lodged, within 30 days from the date of the notification contemplated in section 39(1) of the Act.
- (3) The Regional Manager must evaluate the scoping report and request the relevant Government departments and organs of State, as the case may be, to submit written comments on the scoping report within 30 days from the date of the request.
- (4) The Regional Manager may request the applicant to forward specific and additional information or to conduct further investigations regarding the scoping report submitted in terms of subregulation (2).
- (5) The Regional Manager must collate and forward all comments contemplated in subregulation (3) to the applicant who must address and incorporate such comments in the environmental impact assessment report and environmental management programme.
- (6) The applicant contemplated in subregulation (5) must compile the environmental management programme based on the environmental impact assessment report.

1.4.4 National Environmental Management Act, 1998 (Act 107 of 1998)

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), provides for co-operative environmental governance by establishing principles for decision making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state; and to provide for matters connected therewith.

On the 21 April 2006 the Minister of Environmental Affairs promulgated Regulations (Government Notices R385, R386, R387) in terms of Section 24(5) read with Section 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The NEMA EIA regulations came into effect on 3 July 2006 to repeal the Environment Conservation Act, 1989 (Act No. 73 of 1989) (ECA) and also introduced new provisions regarding environmental impact assessments.

The principles set out in NEMA, Section 2, having relevance to the Proposed Riviera Tungsten Open-Cast Mining Project, include the following:

- 2(2) *Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.*
- 2(3) *Development must be socially, environmentally and economically sustainable.*
- 2(4)(a) *Sustainable development requires the consideration of all relevant factors including the following:*
- (i) that the disturbance of ecosystems and loss of biodiversity are avoided or, where they cannot be altogether avoided, are minimised and remedied;*
 - (ii) that pollution and degradation of the environment are avoided, or where they cannot be altogether avoided, are minimised and remedied;*
 - (iii) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;*
 - (iv) that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions;*
 - (v) that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied;*
 - (vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;*
 - (vii) that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and*
 - (viii) that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.*
- 2(4)(b) *Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.*
- 2(4)(c) *Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.*
- 2(4)(d) *Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.*
- 2(4)(e) *Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.*
- 2(4)(f) *The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured.*
- 2(4)(g) *Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge.*

- 2(4)(h) *Community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.*
- 2(4)(i) *The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.*
- 2(4)(k) *Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.*
- 2(4)(l) *There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.*
- 2(4)(m) *Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.*
- 2(4)(n) *Global and international responsibilities relating to the environment must be discharged in the national interest.*
- 2(4)(o) *The environment is held in public trust for the people. the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.*
- 2(4)(p) *The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.*
- 2(4)(r) *Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.*

In terms of mining the ore body, a number of activities listed in the NEMA Regulations, namely R386 and R387, will be triggered and therefore a full EIA will be required in terms of NEMA. Approval by the competent authority in this regard will be required. The competent authority in the Western Cape is the Department of Environmental Affairs and Development Planning (DEAandDP).

However in terms of the NEMA R386 and R387 Regulations the Minister of Minerals and Energy is the competent authority where the activity constitutes reconnaissance, exploration, production or mining as provided for in the MPRDA.

1.4.5 National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)

The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004), provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith.

In terms of Chapter 4 of the Above Act:

52. (1) (a) *The Minister may, by notice in the Gazette, publish a national list of ecosystems that are threatened and in need of protection.*
- (b) *An MEC for environmental affairs in a province may, by notice in the Gazette, publish a provincial list of ecosystems in the province that are threatened and in need of protection.*
- (2) *The following categories of ecosystems may be listed in terms of subsection:*
- (a) *critically endangered ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;*
- (b) *endangered ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;*
- (c) *vulnerable ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and*
- (d) *protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed in terms of paragraphs (a), (b) or (c).*
- (3) *A list referred to in subsection (1) must describe in sufficient detail the location of each ecosystem on the list.*
- 53 (1) *The Minister may, by notice in the Gazette, identify any process or activity in a listed ecosystem as a threatening process.*
- (2) *A threatening process, identified in terms of subsection (1) must be regarded as a specified activity contemplated in section 24(2)(b) of the National Environmental Management Act and a listed ecosystem must be regarded as an area identified for the purpose of that section.*

It is not expected that the footprint of the proposed Open-Cast mine will impact on any nationally protected vegetation types. However, secondary effects of mining on dewatering, pollution of surface and groundwater, dust pollution, etc. may well have an impact on the surrounding environment. Potential impacts on other aspects of the natural environment are to be assessed by a number of specialist studies to be undertaken. Such specialists will need to recommend various mitigation measures to reduce the significance of such potential impacts. Such impacts will be managed/mitigated according to directives contained in two EMPs, which are to be produced in terms of section 39(1) of the MPRDA and in terms of section 34 of Government Notice R385, in order to ensure the conservation of the natural environment.

1.4.6 National Heritage Resources Act, 1999 (Act 25 of 1999)

The National Heritage Resources Act, 2005 (Act 25 of 1999), provides for the management of national heritage resources, to set norms and maintain national standards for the management of heritage resources in South Africa, and to protect heritage resources of national significance, so that heritage resources may be bequeathed to future generations.

In terms of the above Act, Section 34 (1), refers to Structures and states:

No person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the South African Heritage Resource Agency (SAHRA).

Section 35 (4) relates to archaeology, palaeontology and meteorites, and states that: no person may, without a permit issued by SAHRA,

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate or remove from its original position, collect or own any archaeological material or palaeontological material or object or meteorite;*
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object,*
- (d) bring onto or use any equipment which assists in the detection or recovery of metals or archaeological and palaeontological material or objects*

Section 38 (1) stipulates that subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

- a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;*
- b) the construction of a bridge or similar structure exceeding 50 m in length;*
- c) any development or other activity which will change the character of a site--

 - i) exceeding 5 000 m² in extent; or*
 - ii) involving three or more existing erven or subdivisions thereof; or*
 - iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;**
- d) the re-zoning of a site exceeding 10 000 m² in extent; or*
- e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,*

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

An Archaeological and Heritage Impact Assessment will be undertaken during the EIA phase and will be submitted to Heritage Western Cape (HWC) for approval.

1.4.7 The National Water Act, 1998 (Act 36 of 1998) and the Department of Water Affairs and Forestry Best Practice Guideline Series (2007)

National Water Act (NWA), 1998 (Act 36 of 1998) is the primary statute providing the legal basis for water management in South Africa and has to ensure ecological integrity, economic growth and social equity when managing and using water. Use of water for mining and related activities is also regulated through regulations that were updated after the promulgation of the NWA (Government Notice No. GN704 dated 4 June 1999).

Water uses identified in terms of Section 21 of the NWA include:

- 21(a) taking water from a water resource;
- 21(b) storing water;
- 21(c) impeding or diverting the flow of water in a watercourse;

- 21(d) engaging in a streamflow reduction activity contemplated in Section 36 of the Act;
- 21(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- 21(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- 21(g) disposing of waste in a manner which may detrimentally impact on a water resource;
- 21(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- 21(i) altering the bed, banks, course or characteristics of a watercourse;
- 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;
- 21(k) using water for recreational purposes.

Section 36 of the Act - streamflow reduction activities identified:

- The use of land for afforestation which has been or is being established for commercial purposes;
- An activity, which has been, declared as such under section 36 (2) of the Act.

Controlled activities in terms of Section 37(1) of the Act:

- Irrigation of any land with waste or water containing waste generated through any industrial activity or by a waterwork;
- An activity aimed at the modification of atmospheric precipitation;
- A power generation activity which alters the flow regime of a water resource;
- Intentional recharging of an aquifer with any waste or water containing waste;
- An activity which has been declared as such under section 38 of the Act.

If an applicant contemplates any of the preceding water uses, an application must be lodged with the Department of Water Affairs and Forestry in order to obtain the necessary water license prior to the commencement of the said activity. The level of detail required for the said application would depend on the location of the activity (e.g. sensitivity of the site) and the extent of the proposed development.

The NWA introduced the concept of Integrated Water Resource Management (IWRM), comprising all aspects of the water resource, including water quality, water quantity and the aquatic ecosystem quality (quality of the aquatic biota and in-stream and riparian habitat). The IWRM approach provides for both resource directed and source directed measures. Resource directed measures aim to protect and manage the receiving environment. Examples of resource directed actions are the formulation of resource quality objectives and the development of associated strategies to ensure ongoing attainment of these objectives; catchment management strategies and the establishment of catchment management agencies (CMAs) to implement these strategies.

On the other hand, source directed measures aim to control the impacts at source through the identification and implementation of pollution prevention, water reuse and water treatment mechanisms.

The integration of resource and source directed measures forms the basis of the hierarchy of decision-taking aimed at protecting the resource from waste impacts. This hierarchy is based on a precautionary approach and the following order of priority for mine water and waste management decisions and/or actions is applicable:

- Step 1: Pollution Prevention;
- Step 2: Minimisation of Impacts (including water reuse and reclamation and water treatment); and

- Step 3: Discharge or disposal of waste and/or waste water (incorporating the site specific risk based approach and the polluter pays principle).

The overall Resource Protection and Waste Management Policy sets out the interpretation of policy and legal principles as well as functional and organisational arrangements for resource protection and waste management in South Africa. Operational policies describe the rules applicable to different categories and aspects relating to waste discharge and disposal activities. Such activities from the mining sector are categorised and classified, based on their potential risks to the water environment. Operational Guidelines contain the requirements for specific documents e.g. licence application reports while Best Practice Guidelines (BPG's) define and document best practices for water and waste management.

To this effect the DWAF has developed a series of Best Practice Guidelines (BPGs) for mines in line with International Principles and Approaches towards sustainability. The series of BPGs have been grouped as outlined below:

BEST PRACTICE GUIDELINES dealing with aspects of DWAF's water management HIERARCHY are prefaced with the letter H. The topics that are covered in these guidelines include:

- H1 Integrated Mine Water Management
- H2 Pollution Prevention and Minimisation of Impacts
- H3 Water Reuse and Reclamation
- H4 Water Treatment

BEST PRACTICE GUIDELINES dealing with GENERAL water management strategies, techniques and tools, which could be applied cross-sectoral and always prefaced by the letter G. The topics that are covered in these guidelines include:

- G1 Storm Water Management
- G2 Water and Salt Balances
- G3 Water Monitoring Systems
- G4 Impact Prediction

BEST PRACTICE GUIDELINES dealing with specific mining ACTIVITIES or ASPECTS and always prefaced by the letter A. These guidelines address the prevention and management of impacts from:

- A1 Small-scale Mining
- A2 Water Management for Mine Residue Deposits
- A3 Water Management in Hydrometallurgical Plants
- A4 Pollution Control Dams
- A5 Water Management for Surface Mines
- A6 Water Management for Underground Mines

The BPGs will perform the following functions within the hierarchy of decision making as applicable to the Proposed Riviera Tungsten Open-Cast Mining Project:

- BPGs will be utilised as input for compiling water use licence applications (and other legally required documents such as EMPs, EIAs, closure plans, etc.);
- they will serve as a uniform basis for negotiations through the licensing process prescribed by the NWA.
- They will be used specifically by DWAF personnel as a basis for negotiation with the mining industry, and likewise by the mining industry as guidelines as to what the DWAF considers as best practice in resource protection and waste management; and

- They will help to inform IAPs regarding good practice at mines.

In keeping with the requirements of the NWA an application will be lodged with DWAF during the EIA phase for the use and release of water as for the water loss from evaporation. Other applications may also need to be made once the full impact of the proposed mining is fully understood and researched by specialist studies.

1.4.8 Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)

The mission of this Act is to provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.

The objects of this Act are to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants.

In order to achieve the objects of this Act the Minister may prescribe control measures which shall be complied with by land users to whom they apply. Such control measures (possibly having relevance to the Proposed Riviera Tungsten Open-Cast Mining Project) may relate to:

- a) *the cultivation of virgin soil;*
- b) *the utilization and protection of land which is cultivated;*
- c) *the irrigation of land;*
- d) *the prevention or control of waterlogging or salination of land;*
- e) *the utilization and protection of vleis, marshes, water sponges, water courses and water sources;*
- f) *the regulating of the flow pattern of run-off water;*
- g) *the utilization and protection of the vegetation;*
- j) *the prevention and control of veld fires;*
- l) *the control of weeds and invader plants;*
- m) *the restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;*
- n) *the protection of water sources against pollution on account of farming practices;*
- o) *the construction, maintenance, alteration or removal of soil conservation works or other structures on land; and*
- p) *any other matter which the Minister may deem necessary or expedient in order that the objects of this Act may be achieved, and the generality of this provision shall not be limited by the preceding paragraphs of this subsection.*

1.4.9 Subdivision of Agricultural Land Act, 1970 (Act No. 70 of 1970)

This Act controls the subdivision of, and in connection therewith the use of agricultural land. Section 3 of the Act describes prohibition of certain actions regarding agricultural land :

- (a) *agricultural land shall not be subdivided;*
- b) *no undivided share in agricultural land not already held by any person, shall vest in any person;*

- (c) *no part of any undivided share in agricultural land shall vest in any person, if such part is not already held by any person;*
- (d) *no lease in respect of a portion of agricultural land of which the period is 10 years or longer, or is the natural life of the lessee or any other person mentioned in the lease, or which is renewable from time to time at the will of the lessee, either by the continuation of the original lease or by entering into a new lease, indefinitely or for periods which together with the first period of the lease amount in all to not less than 10 years, shall be entered into;*
- (e) (i) *no portion of agricultural land, whether surveyed or not, and whether there is any building thereon or not, shall be sold or advertised for sale, except for the purposes of a mine as defined in section 1 of the Mines and Works Act, 1956 (Act 27 of 1956); and*
- (ii) *no right to such portion shall be sold or granted for a period of more than 10 years or for the natural life of any person or to the same person for periods aggregating more than 10 years, or advertised for sale or with a view to any such granting, except for the purposes of a mine as defined in section 1 of the Mines and Works Act, 1956;*
- (f) *no area of jurisdiction, local area, development area, peri-urban area or other area referred to in paragraph (a) or (b) of the definition of 'agricultural land' in section 1, shall be established on, or enlarged so as to include, any land which is agricultural land;*
- (g) *no public notice to the effect that a scheme relating to agricultural land or any portion thereof has been prepared or submitted under the ordinance in question, shall be given, unless the Minister has consented in writing.*

The (temporary) subdivision and rezoning of the properties making up the Riviera Tungsten project will be subject to the provisions of, and an application process in terms of this Act.

1.4.10 Convention on Wetlands of International Importance Especially as Waterfowl Habitat

Adopted at Ramsar on 2 February 1971

The Contracting Parties

Recognizing the interdependence of man and his environment;

Considering the fundamental ecological functions of wetlands as regulations of water regimes and as habitats supporting a characteristic flora and fauna, especially waterfowl;

Being convinced that wetlands constitute a resource of great economic, cultural, scientific and recreational value, the loss of which would be irreparable;

Desiring to stem the progressive encroachment on and loss of wetlands now and in the future;

Recognizing that waterfowl in their seasonal migrations may transcend frontiers and so should be regarded as an international resource;

Being confident that the conservation of wetlands and their flora and fauna can be ensured by combining far-sighted national policies with co-ordinated international action.

Verlorenvlei has been listed as RAMSAR site No. 525; Wetlands International Site Reference No.: 1ZA009 (**Appendix 15a**). The Articles pertaining to the Ramsar Convention are described in full in **Appendix 15b**.

The Riviera Tungsten Mine must not cause any impacts on Verlorenvlei and its associated wetlands in contravention of the Ramsar Convention's agreement or that brings the Verlorenvlei into question in terms of the Ramsar Convention.

1.4.11 Other Legislation

A number of other Acts, legally binding documents and guideline documents that may also have a bearing on the Riviera Tungsten Project, include:

- Environment Conservation Act, 1989 (Act 73 of 1989);
- Government Notice R. 149 Environment Conservation Act (Act 73 of 1989): Waste Tyre Regulations, 2008;
- National Environmental Management Waste Act, 2008 (Act 59 of 2008);
- Cape Nature and Environmental Conservation Ordinance, 1974 (Ordinance No. 19 of 1974);
- National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004);
- Atmospheric Pollution Prevention Act, 1965 (Act 45 of 1965);
- Mine Health and Safety Act, 1996 (Act 29 of 1996);
- Health Act, 1977 (Act 63 of 1977);
- Hazardous Substances Act, 1973 (Act 15 of 1973);
- Agricultural Pests Act, 1983 (Act 36 of 1983);
- Cape Roads Ordinance, 1976 (Ordinance 19 of 1976);
- Road Transportation Act 1977, (Act 14 of 1977);
- South African National Roads Agency Limited and National Roads Act, 1998 (Act 7 of 1998);
- South African Manual for Outdoor Advertising Control (1998) (SAMOAC);
- Government Notice No. 704, National Water Act, 1998 (Act 36 of 1998), Regulations on use of Water for Mining and Related Activities Aimed at the Protection of Water Resources;
- Chamber of Mines of South Africa. 1981. Handbook of Guidelines for Environmental Protection, Volume 3/1981. The Rehabilitation of Land Disturbed by Surface Coal Mining in South Africa;
- Policy guidelines contained in the Berg River Municipal Spatial Development Framework; and
- Local bylaws.

While the above paragraphs do not necessarily constitute a complete list, they do provide an overview of essential legal, developmental and planning focuses.

1.5 Legal Process Followed to Date for Obtaining the Mining Rights

The prospecting originally done in the 1970s and early 1980s by Union Carbide Corporation and Anglo American (Walker 1994) was followed by an application for a New Order Prospecting Right (submitted on 08 August 2006 in terms of MPRDA) for Portions 1 and 6 of the Farm Namaqasfontein No. 76 and Portion 1 of Farm 297 in the Magisterial District of Piketberg by Bongani Minerals (Pty) Ltd.

The application for a Prospecting Right was accepted by the DME on the 23rd of August 2006, wherein Bongani Minerals (Pty) Ltd. was requested to submit supporting documentation in terms of section 16(4) of the MPRDA in order for a Prospecting Right to be granted.

Bongani Minerals (Pty) Ltd. subsequently submitted an Environmental Management Plan (for prospecting) on the 18th of October 2006. That EMP included documentation relating to the public participation process, which had been undertaken in terms of regulation 52(2)(g) of the MPRDA, which states that “a record of public participation undertaken and the results thereof” must be submitted.

The Prospecting Right for Portions 1 and 6 of the Farm Namaqasfontein No. 76 and Portion 1 of Farm 297 in the Magisterial District of Piketberg was granted by the Department of Minerals and Energy on the 3rd of April 2007 (File number WC30/5/1/1/3/2/238PR). The EMP, which had been submitted on the 18th of October 2006, was also approved on the 3rd of April 2007.

The DME decision was taken on judicial review by no less than twenty (20) applicants, all claiming that they are interested and affected parties. The applicants, however, only lodged their application in the High Court in Pretoria during April 2008, a year after the right was granted. There were six (6) respondents comprising of Bongani, the Minister, the Deputy Director General and Regional Manager of DME and the Minister of Transport and the Head of the Department of Transport. The application was vigorously opposed by the Respondents.

Bongani Minerals were faced other legal challenges by property owners in the Krom Antonies River Valley for example during 2008 the farm owners refused Bongani's consultants to enter their properties to undertake certain studies, which incidentally would have had no or very little impact on their farming activities. Bongani was also threatened by court interdicts should they proceed with the drilling of 3 (three) holes on the shoulder of a road, as approved by the DME. The Judicial Review was not heard, as the applicants decided to withdraw their case as the matter was set down by the judge president for the 24th of April 2009, three (3) weeks after the prospecting right expired.

While the prospecting right expired on the 2nd of April 2009 without any prospecting (supplementary to that undertaken by Union Carbide Corporation and Anglo American during the 1970s) having been undertaken, Bongani Minerals (Pty) Ltd. applied for a Mining Right in terms of section 22 of the MPRA. The DME accepted the application for a Mining Right on the 25th of March 2009 (**Appendix 1**).

Bongani Minerals (Pty) Ltd. subsequently appointed Withers Environmental Consultants (WEC), an independent environmental consulting company, to conduct the Environmental Impact Assessment (EIA) in terms of section 39(1) of the MPRDA i.e., to compile a Scoping Report, Environmental Management Plan and EIA report as required by the MPRDA for the granting of a Mining Right for the tungsten-molybdenum deposit. In addition WEC were also appointed to undertake an EIA process in terms of NEMA for those activities triggered by the mining of tungsten and molybdenum.

The potential significant environmental, social and cultural impacts of the Proposed Riviera Open-Cast Mining Project (including the cumulative effects) necessitates the undertaking of additional specialist studies, to determine the significance of the potential impacts and put forward mitigation to reduce such potential impacts. Some of these preliminary studies have already been completed and their results have been included into this Scoping Report. These specific specialist studies were undertaken in order to guide the Environmental Impact Assessment (EIA) process required in terms of section 39(1) of the MPRDA, which will in so-doing ensure the most appropriate procedure to plan and develop the proposed mining operation.

The Draft Scoping Report was advertised for public comment (as required in terms of regulation 49(f) of the MPRDA) (on 22 April 2009 in the local *Die Weslander* newspaper [English and Afrikaans] and on 23 April 2009 in the regional *Die Burger* newspaper [Afrikaans]) in order to include the views and concerns of IAPs.

A public meeting to be held at the Karookop Primary School on 30 April 2009 was also advertised on 22 and 23 April 2009. Because of the large number of IAPs, the meeting was moved to a large shed on the adjoining farm. Notes recorded at the meeting (**Appendix 13a**) were sent to all IAPs who attended the meeting (**Appendix 13b**).

The Draft Scoping Report was revised to include the verbal and some written comments already received by IAPs. The Final Scoping Report (FSR) was submitted to DME on 4 May 2009. To conform to regulation 3(4)(a) of GN No. 527 of 23 April 2004 of the MPRDA Regulations, the IAPs were given 30 days from the date of advertisement to provide their written comments, i.e. by 25 May 2009.

DME were informed that any written comments received by 25 May 2009 would be submitted to them under separate cover to be considered together with the FSR. Since a few IAPs requested an extension of time, the cut-off for providing comments was set for 1 June 2009. All the written comments were collated into a comments/response table (**Table 6**). Comments were categorised into key environmental categories, which in turn were divided into key issues. All the key issues were responded to by WEC.

DME consulted the DSR with other Government Departments in terms of Regulation 49(3) of GN No. R 527 of 23 April 2004, under section 107(1) of MPRDA, and requested for these organs of state to provide written comment, namely:

- DEAandDP;
- CapeNature;
- Department of Agriculture;
- Local Authority (Berg River Municipality); and
- Heritage Western Cape

Because of the large number of objections from IAPs against the Mining Right Application to mine the Riviera Tungsten Deposit, DME (Regional Manager) referred the matter to the Regional Mining Development and Environmental Committee (RMDEC), in terms of section 10(2) of the MPRDA, to consider the objections and to advise the Minister thereon.

The RMDEC meeting was held on 12 June 2009 at the offices of the DME. A large contingent of objectors firstly discussed their concerns with the committee followed by Bongani Minerals, who were represented by WEC.

The DME sent a letter to Bongani Minerals on 24 June 2009 (**Appendix 2b**) providing them with the key issues that required further input. Amongst others, Bongani Minerals were requested to submit a FSR (that includes all the comments/objections and their responses) to IAPs before or on 20 July 2009 to comment on. IAPs will be given 30 days, i.e. until 21 August 2009, to provide any written comments on the FSR to WEC.

The DME also specifically requested that the Terms of Reference of the required Socio-Economic Impact Assessment be made available to them and all other authorities before or on 20 July 2009.

All registered IAPs were informed either by email or by post on 20 July 2009 of the availability of the FSR for their review purposes. A copy of the FSR was provided to:

The Verlorenvlei Coalition;
 Affected landowners;
 Hotel in Elands Bay;
 Library in Piketberg;
 Reference Library in Cape Town; and
 Berg river office in Redelinghuis.

An electronic copy of the FSR, together with **Table 6** will be sent to all registered IAPs who have email addresses.

2. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

2.1 Role and Competence of the EAP

The role of the EAP is to manage the application for a Mining Right on behalf of the applicant. The EAP must adhere to all relevant legislation and guidelines, ensuring that the reports contain all the necessary and relevant information required by the competent authority to make a decision (GN No. R527 of 2004, Part III: Environmental Regulations for Mineral Development, Petroleum Exploration and Production). It is the responsibility of the EAP to perform all work relating to the Mining Right Application in an objective, appropriate and responsible manner.

Aubrey Withers, the director of Withers Environmental Consultants, completed his Bachelor of Science in Geology (Honours) at the University of Port Elizabeth in 1978. Mr. Withers is a registered natural scientist with the South African Council for Natural Scientific Professions. He is also a member of professional bodies such as the Geological Society of South Africa, the International Association for Impact Assessments of South Africa and the Groundwater Division of the Geological Society of South Africa.

2.1.1 Role within Integrated Specialist Fields

Withers Environmental Consultants is a professional environmental consultancy providing a wide range of specialist expertise in the integrated¹ environmental field to the land use and development planning, civil engineering and environmental fraternity, and local and government authorities. The consultancy offers a wide range of experience in all aspects of environmental concern:

- The use of Bioregional Planning Principles in environmental planning for Spatial Planning projects (such as Spatial Development Frameworks for local Municipal areas and Regional Planning for large District Municipalities);
- Policy guidelines on spatial development and conservation issues for ensuring that the environmental opportunities and constraints offered by the applicable planning area will foster long term sustainable development proposals;
- Environmental planning input at the local level at the inception of proposed development projects, to ensure that anticipated environmental impacts are minimised. Many of these regionally-based policy formulation and detailed development projects rely on facilitating extensive public participation programmes to ensure that public sentiments are taken into consideration in an objective and transparent manner;
- Environmental impact assessments of development projects are conducted in accordance with the Integrated Environmental Management procedure for obtaining the relevant authorisation in terms of the Regulations of the National Environmental Management Act (Act 107 of 1998) and in terms of the Mineral and Petroleum Resources Act, 2002 (Act 28 of 2002).

¹ The term "*integrated*" implies that it pulls together social, economic, biophysical, spatial, cultural and political concerns into a single set of processes, in which the relationship between these concerns is considered.

2.1.2 Experience as Environmental Practitioner

Mr. Withers has 12 years experience in lecturing, minerals exploration, groundwater development (specifically in Namibia, Northern Province, North West Province and Western Cape Province), and geotechnical geology, civil engineering and building construction, and 20 years in professional practice as an Environmental Practitioner, undertaking such tasks as:

- Environmental planning for the compilation of Spatial Development Frameworks (Structure Plans);
- paving the way for the formation of potential Biosphere Reserves, i.e. bioregional planning;
- environmental impacts of a host of development projects from large housing projects, resort developments, engineering projects of all facets to large and small nature reserves and mining projects;
- compiling environmental management plans for such projects and supervising the implementation of such projects as the environmental control officer (ECO).

Four professional staff members who respectively have a Masters Degree in Botany, a Masters Degree in Environmental Management, an Honours Degree in Environmental Science as well as a Masters Degree in Town and Regional Planning support Mr. Withers.

WEC is also supported by specialists in the field of natural sciences, social sciences and the economic fields.

2.2 Terms of Reference

The following Terms of Reference were presented by Bongani Minerals (Pty) Ltd. to the independent environmental consultant: Withers Environmental Consultants (Pty) Ltd.

As the appointed environmental consultant, the following Terms of Reference should be carried out:

- a) **Undertake an environmental evaluation** of the site to get an understanding of its biophysical characteristics and natural processes prevailing on it and assess the Proposed Riviera Open-Cast Mining Project in terms of environmental characteristics (constraints and opportunities) of the site and of the surrounding area. Put forward any anticipated impacts that might be considered at this early stage of the EIA process. Suggest any specialist studies that may be required to provide additional information on the significance of these impacts and mitigation that may be necessary to reduce negative impacts and enhance positive impacts of the Proposed Riviera Open-Cast Mining Project.
- b) Identify and describe the **anticipated environmental, social and cultural impacts** of the Proposed Riviera Open-Cast Mining Project, including cumulative effects, where applicable.
- c) **Co-ordinate the early start of the recommended specialist studies** with the view to the compilation of a Scoping Report to be used to guide the EIA process and to guide development of the Layout and Procedure Plan for the Proposed Riviera Open-Cast Mining Project.

- d) Together with the Specialist Consultants, assist the appointed consulting Planners and Engineers with the **development of the optimum layout and procedure plan** that will have the least impact on the environment (both biophysical and social environments). The initial environmental opportunities and constraints identified should be used to develop the SDP. It is understood that as more detailed information is provided by the various specialist studies that the environmental opportunities and constraints plan may need revision, and similarly, the SDP may need to be adapted accordingly.
- e) **Undertake the applicable EIA Scoping Process** in terms of the Regulations of the MPRDA (Act 28 of 2002) to provide the relevant information for the Department of Minerals and Energy (DME), and any other government departments, to be able to make informed decisions whether as to grant a Mining Right and/or to provide comments and/or Records of Decision/s (ROD/s).
- f) As part of the EIA Scoping Process, a **public participation process in terms of regulation 49(1)(f) of the MPRDA** must be entered into. This process is to provide all the relevant information to the affected property owners, public, NGO's, CBO's and government officials, and to allow for adequate time for the public to respond to such information. The views and concerns raised by IAPs must be included into the Scoping Report.
- g) In terms of the EIA Scoping Process, it will be necessary to put forward and assess **alternative open cast mining layouts and procedure plans** for the site in order to reduce any significant impacts that may arise. The necessary mitigation to enhance any positive impacts and reduce any negative impacts that may arise as a result of the Proposed Riviera Open-Cast Mining Project, must be suggested.
- h) **Identify and facilitate any additional specialist studies** that may be required to assist with the planning and future management of the proposed open cast mine, on behalf of Bongani Minerals (Pty) Ltd.
- i) **Make the necessary environmental management recommendations** (mitigation/enhancement) for the construction and the operational phases of the Proposed Riviera Open-Cast Mining Project, to ensure its sustainable operation.

3. GEOLOGICAL SETTING OF THE RIVIERA TUNGSTEN DEPOSIT

Bongani Minerals is considering the only technically viable (open-cast) mine design, as determined by the regional geology and the geology of the deposit (characteristics of the ore body and the alluvial and colluvial overburden material).

3.1 Geological History of the Namaqua-Natal Metamorphic Province²

During the late Precambrian period, the Pan-African orogeny (± 800 Ma) was associated with the formation of a 3 000-km-long chain of geosynclines around the southern and western Cape, and up into Namibia. Into these geosynclinal basins the Gariep Supergroup and the Malmesbury, Kango, Kaaimans, Gamtoos, Nama and Vanrhynsdorp Groups were deposited; however, no economically significant mineralization, except for limestone, has yet been discovered in the thick, largely sedimentary deposits.

Emplacement of the Cape Granite Suite took place between 600 and 500 Ma, and these granites are only sparsely mineralised (the **Riviera tungsten deposit being one of the more important deposits**). Where weathered, they do however also yield valuable kaolin clay in places.

3.2 Piketberg Regional Geology

Folded and faulted sediments of the Cambrian Malmesbury Group are widespread in the Western Cape north of Cape Town, where they are known to be intruded at a large number of localities by stocks of Pre-Cambrian Cape Granite, and to contain significant thicknesses of carbonate, to the point of being commercially exploitable, e.g. limestone at Piketberg (PPC cement factory).

The predominant sediments of the Malmesbury Group on a regional scale are phyllites, with higher-grade schist locally developed, such as at Riviera. Granite intrusion was accompanied by contact metamorphism, including metasomatism of the invaded sediments. Following a period of erosion of the geosynclinal assemblage, sediments of the Cape Supergroup, comprising mainly quartzitic sandstones, which can be assumed to have blanketed the entire region. Subsequent break-up of Gondwana saw erosion along, and inland from, the newly formed coastline and the older rocks were re-exposed on the coastal flats thus formed. Accumulation of colluvial and fluvial sediments along scree slopes and river courses was a parallel process, so that reburial of exhumed surfaces was widespread, as, for example, at Riviera.

3.3 Prospecting Activities

The discovery and subsequent description of the Riviera Tungsten-molybdenum deposit was the direct result of a regional stream sediment survey conducted by Union Carbide in 1975 - 1977. The target selection was tungsten in skarns, in an area where the sediments of the Cambrian Malmesbury Group, carrying a significant thickness of carbonates, are intruded on a regional scale by granite known to carry tin mineralization, a common associate of tungsten.

Stream sediment sampling located an anomaly centred on the farm known as Riviera, (which was then) a portion of the farm Wilgenhoutdrift No. 48, where fifty grains of scheelite were recorded

² M. G. C. Wilson: A Brief Overview of the Economic Geology of South Africa:
http://www.geoscience.org.za/index.php?option=com_content&task=view&id=454&Itemid=406.
 Accessed 15 July 2009.

(against a regional background of 0 grains) in a single sample taken from the Krom Antonies River some 24 km north of the town of Piketberg and some 170km to the north of Cape Town (**Figure 1**).

Magnetic and gravity surveys carried out were moderately successful in delineating the suboutcropping granite, and in suggesting that the granite cupda, as well as the mineralization in it, are asymmetric with axes plunging to the southeast.

In 1979 Anglo American Corporation was brought in as a joint venture partner, the company assumed project management in 1982. The partnership remained in force until exploration (and resultant description of the ore body and the alluvial and colluvial overburden) was terminated in 1984.

In 1979 systematic scout-drilling of blind targets by Anglo American Prospecting Services commenced (utilizing a combination rotary/diamond drill rig), after surface geochemistry failed to penetrate the colluvial and alluvial material which blanket the mineralized area.

In October 1979, the twelfth hole intersected a highly altered granite with visible grains of interstitial scheelite, molybdenite, pyrite, pyrrhoite and chalcopyrite. The scheelite grains fluoresced from pale blue to yellow with some zoned grains, which indicate the substitution of molybdenum for tungsten in the scheelite lattice. By January 1980 five shallow bedrock identification holes had outlined the suboutcropping extent of the granite over an area of 1km² and confirmed that mineralization was pervasive (Walker 1994). Walker (1994) regarded the combination of greisen, skarn and extensive hydrothermal alteration and mineralization at Riviera as unique.

A total of 106 boreholes and one deflection were drilled. Scout boreholes for bedrock identification totalled 775 metres in 22 boreholes while 14 511 metres of core were drilled in 71 boreholes. For the most part the boreholes were drilled vertically on a 100 m grid, with earlier boreholes located off the grid and a small minority of the boreholes inclined at 60 degrees from vertical.

Routine metallurgical testwork was carried out on the tungsten and molybdenum recovered from the ore throughout the joint venture investigation. Low-cost pre-concentration of the ore was always a primary goal of the testwork. Tests were conducted on gravity concentration, photometric sorting, ultraviolet sorting, flotation and pressure leaching.

3.4 The Geology and Characteristics of the Alluvial and Colluvial Overburden and of the Ore Body

A thickness of 10m to 30 m of unconsolidated alluvium, ranging from sand to gravel with colluvial boulders and clay deposits, covers the entire Riviera mineralized body, which is deeply weathered in its upper part. The bottom clay layer varies in thickness from ~3 to ~25 m whilst the overlying layer of alluvial sandy soil, pebbles and boulders varies in thickness from ~3 to ~12 m (see Figure 7 in SRK Consulting's Preliminary Groundwater Impact assessment, **Appendix 6**).

The tungsten ore body occurs as a concentrate associated with the granite and as a disseminated body associated with ancient alluvial deposits. Although some scheelite has been leaked into the enveloping schist, the mineralization is to all intents and purposes granite-hosted, located near the top of the cupola. The mineralogy of the granite is such that it is referred to as monzonite, and its suboutcrop is ellipsoid, with a northeast-aligned axis of 700 m and the complementary axis 300 m.

Geophysics and drilling show that the northwest contact of the stock is almost vertical compared to a flatter contact elsewhere, so that its plunge, together with that of the mineralization, is southeasterly.

Hydrothermal alteration of the granite is pervasive in its upper parts and intense in places, comprising sericitization and argillization. Quartz and quartz-calcite veins from millimetric to a maximum of 50 cm are common in a variety of directions, and are attributed to a second phase of granite emplacement, dated at 370 Ma, compared to the original intrusion at 550 Ma to 500 Ma.

It is not clear to what extent stoping of the roof rocks occurred during granite emplacement, the so-called endoskarn pods occurring within the granite are probably remnants of stoped-off carbonate, which have been digested by the granite.

3.5 Mineralization of the Ore Body

The mineralization is associated with a cupola of Cape granite intrusive into schistose carbonate-rich sediments and volcanic rocks of the Malmesbury Group.

The mineralised zone varies in thickness from 10 to 60 m and dips approximately 30° to the southeast. The predominant hydrothermal alteration is sericitization of feldspars and secondary argillic alteration of plagioclase to kaolinite or dickite. The granite was dated at 505 ± 20 Ma and the sericite at 372 ± 13 Ma. Four distinct types of mineralization have been recognized, viz:

- Greisen: disseminated scheelite and minor molybdenite in siliceous, pyritic, sometimes altered granite in a zone about 50 m thick below the upper contact.
- Endoskarn: disseminated scheelite and molybdenite associated with pyrrhotite-rich endoskarn in amorphous bodies with diffuse boundaries.
- Vein: scheelite and molybdenite associated with quartz and quartz / calcite veins. Best mineralized veins are near vertical, 0,5 to 5 cm thick with a density of between 1 and 10 veins per metre.
- Exoskarn: scheelite in coarse granoblastic layers of calcite, grossular garnet, zoisite and vesuvianite occurring in tactite skams at the granite contact.

The scheelite-molybdenite mineralization is accompanied by pyrrhotite and pyrite, with minor amounts of chalcopyrite, bismuthinite, sphalerite and galena.

Both the scheelite (tungsten) and molybdenite mineralization is associated with the roof zone of the pluton as well as the Ca-rich wall rocks in close proximity to the granite contact. The richest ore zone occurs along the eastern edge of the Riviera granite dome (Rozendaal et al, 1994 in SRK Consulting's Preliminary Groundwater Impact Assessment, **Appendix 6**).

Anglo American proposed that the mineralization at Riviera is the result of two separate phases, viz:

- Phase I: Associated with the emplacement of the 500 Ma granite into a structurally weak zone. The intrusion resulted in the formation of a scheelite-rich greisen capping, the mineralized endoskarn pods and limited exoskarns where the granite was in contact with carbonate-rich country rocks
- Phase II: The emplacement of a second granite at around 370 Ma at the same structural locus. This granite was considerably richer in molybdenum and gave rise to hydrothermal alteration and quartz veining typical of a porphyry deposit. Most of the scheelite and molybdenite are associated with these quartz veins.

Anglo American estimated that the deposit contains 46 million tons of mineralized rock at 0.216% WO_3 and 0.02% molybdenum.

The whole ore body is located on the following properties within the Krom Antonies River Valley: Portions 1, 6, 13 of the Farm Namaquasfontein No. 76 and Portion 1 of Farm No. 297, Piketberg (**Figure 2**). The core area of the tungsten mineralization is located on Portion 1 of the Farm 291, directly beneath a circular field irrigated by a large centre pivot (**Figure 3**). These farms (hereafter referred to as the site) are situated in the southwestern sector of the Krom Antonies River Valley at an altitude of approximately 105m in the Piketberg Magisterial District of the Western Cape Province. The nearest town is Piketberg, which is approximately 53km from the site by road (**Figure 1**).

4. THE PROPOSED RIVIERA TUNGSTEN OPEN CAST MINE

The Riviera deposit is a Greenfield Project (a project which lacks any constraints imposed by prior work i.e. there is no need to remodel or demolish an existing structure). The intent is to adopt an open-pit mining method using conventional truck and shovel to extract the deposit. Blasting will be needed to remove the bedrock overburden and the ore.

The Riviera orebody consists almost entirely of scheelite ($CaWO_4$) and according to Venmyn Rand (Pty) Ltd. the deposit is known to extend to a depth of -115mRL (over 225 m below surface), with the first ore at approximately 60m below surface which is considered too shallow for underground mining, especially given the unconsolidated alluvium, clay and the degree of weathering of the granite host rock.

4.1 The Proposed Layout and Pit Designs

Venmyn Rand (Pty) Ltd. were contracted to conduct a conceptual open-pit mine design and scheduling study for the Proposed Riviera Open-Cast Mining Project (**Appendix 17**).

The conceptual size, shape and location of the planned excavation was based on prospecting operations conducted to date by Union Carbide and Anglo American Corporation between 1971 and 1979; on input parameters supplied by the applicant; and on a high level block model (in a csv file format), which was used to generate the geological block model as the basis of the open pit design and scheduling.

Using Whittle Software and incorporating the above-mentioned input parameters Venmyn Rand (Pty) Ltd. determined optimal conceptual pit shells, from which pit designs could be prepared. Venmyn Rand (Pty) Ltd. also determined that the final pit depth will be approximately 200m at an approximate level of -110mRL. The ore will be mined from the pit and transported directly to the processing plant, which will be constructed close to the pit.

The mining schedule for Riviera is based on Venmyn Rand's (Pty) Ltd. conceptual production profiles A, B and C, generated by Whittle Software. The production profiles generated indicate that $\pm 348,385$ tonnes of ore will be mined and processed in the second year of operation and increasing to $\pm 700,000$ tonnes per annum throughout the life of the mine (LoM). A LoM of between 18 and 19 years is anticipated at the stated mining rate.

Based on the discussed approach, Venmyn Rand's (Pty) Ltd. unqualified Mining Inventory estimate for Riviera is 10,860,167 million tonnes of ore (Mt) at an average grade of between 0.28% and 0.31% WO_3 (tungsten oxide).

Open-Cast mining, also known as open-pit mining, open-cut mining, and strip mining, refers to a method of extracting rock or minerals, in this case tungsten ore and molybdenum ore, from the earth by their removal from an open-pit.

The walls of the pit are dug on an angle less than vertical, to prevent and minimise damage and danger from rock falls. The final angle will be determined by specialist geotechnical studies by SRK Consulting (how weathered the rocks are, and the type of rock, and also how many structural weaknesses occur within the rocks, such as a fault, shears, joints or foliations) during the EIA phase of this project. Venmyn Rand (Pty) Ltd., however, arrived at an angle of 39° in their conceptual optimal pit design for the mine (**Figure 4**).

The walls of an open-cast mine are stepped. The inclined section of the wall is known as the batter, and the flat part of the step is known as the bench or berm. The steps in the walls help prevent rock falls continuing down the entire face of the wall. In some instances additional ground support is required and rock bolts, cable bolts and shotcrete could be used.

The benches thus describe vertical levels of the open-pit. Venmyn Rand (Pty) Ltd. determined that the benches will be ± 10m apart when sinking the pit through the topsoil and alluvium/colluvium and ± 5m apart when extracting the ore, in order to have a good handle on grade control.

A haul road is situated at the side of the pit, forming a ramp up which CAT785C and CAT777 articulated dump-trucks (ADTs) can drive, carrying ore and waste rock. Venmyn Rand (Pty) Ltd. determined that double-lane 20m wide haul roads of a 1:10 slope would safely accommodate CAT785C ADTs.

The waste rock (rough tailings), the colluvial and alluvial overburden and the topsoil will be separately stockpiled at the surface, near the edge of the open-pit (the specific locations still need to be determined by specialist studies to be undertaken in the EIA phase) (**Figure 5**). These stockpiles are also known as waste / rough tailings dumps. The rough tailings dumps will be tiered and stepped, to minimise degradation (erosion). Soil stockpiles will be seeded with an appropriate indigenous grass species to prevent wind erosion. A rehabilitation specialist will provide the details of the rehabilitation programme in the EIA phase.

Ore which has been processed in the metallurgical plant produces waste known as slimes, and is generally a slurry. This is pumped to a slimes dam or settling pond, where the water evaporates. Slimes dams can often be toxic due to the presence of unextracted sulfide minerals and/or toxic minerals in the gangue (sand, rock, and other impurities surrounding the mineral of interest in an ore). Specific management of the slimes will be included in the EMP and EIA reports to ensure that there are no long-term negative effects, especially on groundwater quality (groundwater plays a strong role in maintaining the quality of surface water in the Kruis River / Verlorenvlei river system) (**Figure 5**).

SRK Consulting will undertake a specialist geotechnical study of the mine which will include the construction and rehabilitation of the waste rock, clay and alluvium waste heaps, and the slimes dam. The prevention of wind (dust) and stormwater erosion and the pollution of the groundwater of the primary aquifer system will be uppermost in their designs and rehabilitation of such dumps. The recycling of water back to the mine workings will also be taken into account in such designs.

4.2 Waste Rock: Topsoil, Alluvial and Colluvial Overburden and Rough Tailings

4.2.1 Chemistry and Composition of the Topsoil, Alluvial and Colluvial Overburden and Rough Tailings

The Riviera deposit is a Greenfield project currently in resource definition stage. Detailed information regarding the composition and chemistry of the alluvial and colluvial overburden and rough tailings will be provided by means of a core sampling and an analysis programme (Geotechnical and Geochemical Assessments) to be conducted during the EIA phase of the project. These assessments will determine exactly what the chemistry of the rough tailings will be.

The soil types (and agricultural soil potentials) covering the entire mine lease area will be determined and mapped on a detailed grid during the EIA phase.

4.2.2 Volumes Produced

The mining schedule for Riviera is based on Venmyn Rand's (Pty) Ltd. conceptual production profiles A, B and C, generated by Whittle Software. The production profiles generated indicate that $\pm 10,000,000$ tonnes of "waste rock" will be mined in the first and second years of operation increasing to $\pm 13,911,295$ tonnes in year 3; $\pm 15,906,736$ tonnes in year 4; $\pm 17,052,215$ tonnes in year 5; $\pm 17,321,764$ tonnes in year 6 and then dropping to $\pm 7,038,944$ tonnes in year 7 and $\pm 5,309,347$ tonnes in year 8. The amount of "waste rock" mined should stabilize after year 8 as topsoil and overburden will then no longer constitute parts thereof.

Venmyn Rand's (Pty) Ltd. predicted total amount of rock to be mined, as determined by Whittle Software = $\pm 106,189,200$ tonnes, of which $\pm 11,515,139$ tonnes is predicted to be ore while $\pm 94,674,061$ tonnes is predicted to be "waste rock".

4.2.3 Waste Rock Stockpile Locations, Size and Management

The "waste" rock mined will initially be separated into four different stockpile-types, viz. topsoil, alluvial and colluvial overburden, clay and rough tailings.

Topsoil stockpiles will be limited to 6m in height and will be seeded with suitable indigenous plant species to prevent wind and water erosion. The topsoil will be used as a final covering to other stockpiles to assist the growth of plants and grasses.

Each alluvial and colluvial stockpile will be covered with a layer of topsoil ± 0.2 m thick and seeded with suitable indigenous plant species to prevent wind and water erosion.

Each alluvial and colluvial overburden and rough tailings stockpile will be placed on a bed of mined in-situ clay (the potential use of which will be determined as part of the Geotechnical Assessment to be conducted during the EIA phase).

The rough tailings stockpiles will be covered with a layer of clay once they have reached full size (optimum dimensions to be determined). Clay linings will function as engineered hydraulic barriers to the movement of water and leachate from the rough tailings stockpiles into the surrounding environment (the potential composition of the leachate is to be determined during the EIA phase). The rough tailings stockpiles will then also be covered with a layer of alluvial/colluvial overburden followed by a layer of topsoil. The rough tailings stockpiles will then be seeded with suitable indigenous plant species.

SRK Consulting have also recommended in their Preliminary Groundwater Impact Assessment (**Appendix 6**) that in order to minimise the contamination impact of the waste rock dump on groundwater it is recommended that any water leaving the dump be intercepted by cut-off trenches or similar engineered solutions. Monitoring boreholes should be drilled downstream of the dump in order to monitor whether any pollution of the primary aquifer is taking place.

Further management directives pertaining to design and construction of the stockpiles will be included in the EMP which is to be drawn up for this project .

The optimal location and sizes of the stockpiles will be determined during the EIA phase and will be determined after considering the results of a suite of planned specialist studies including but not limited to the Botanical Assessment; Freshwater Ecosystems study Hydrological Assessment (surface and groundwater) and the Geotechnical Assessment. Also to be considered will be the appointed Mine Engineer's report, which will include the alignment of internal haul and service roads and will consider, amongst other factors, transport distances from the edge of the pit.

SRK Consulting have however indicated (**Appendix 6**) that the "waste rock" stockpiles should be located as far as practically possible from sensitive receptors e.g. the 1:100 year floodplain of the Krom Antonies River, other drainage features and wetlands, but should be located within the expected zone of drawdown so that any contamination is contained in the "sink" caused by the pit dewatering.

4.3 Slimes

4.3.1 Chemistry and Composition of Slimes (Flotation Tailings)

Detailed information regarding the composition and chemistry of the slimes produced will only become available once the exact composition and chemistry of the ore body has been determined (Geotechnical Report to be conducted during the EIA phase will contain this information).

The composition of the slimes will furthermore be determined by the choice of end-product. The mine will have the option to produce low grade flotation/gravity concentrate at 30% WO₃; leached flotation/gravity concentrate (60-65% WO₃); or APT (ammonium paratungstate) at 96.8% WO₃.

Mill, float and gravity operations are utilized to generate molybdenum sulphide and tungsten oxide (Scheelite) concentrates while APT is produced via either a soda ash leach route involving crystallisation or an alkali caustic soda leach route involving either solvent extraction or ion exchange.

4.3.2 Volumes of Slimes Produced

Venmyn Rand (Pty) Ltd. has determined that based on a predicted crusher feed of ± 546 dry tonnes per hour that (after completion of the molybdenum and tungsten circuits) 957 m³/hr of water containing flotation tailings will then be processed in the gravity concentration process.

Of this amount ± 274 m³ per hour (tailings thickener underflow i.e. slime tails) will be directed to the slimes dams while ± 683 m³/hr (tailings thickener overflow) may be re-cycled (70%) as process water or added to the slimes. It is the intention of the mining company to recycle as much of the water used as possible.

4.3.3 Slimes Dam Location, Size and Management

The optimal location and sizes of the slimes dam/s will be determined during the EIA phase and will be determined after considering the results of a suite of planned specialist studies including but not limited to the Botanical Assessment; Freshwater Ecosystems study Hydrological Assessment (surface and groundwater) and Geotechnical Assessment. Also to be considered will be the appointed Mine Engineer's report, which will include detailed plans pertaining to the layout of the mine infrastructure.

SRK Consulting have however indicated in their Preliminary Groundwater Impact Assessment (**Appendix 6**) that the slimes dam should be located as far as practically possible from sensitive receptors e.g. the 1:100 year floodplain of the Krom Antonies River, other drainage features and wetlands, but should be located within the expected zone of drawdown so that any contamination is contained in the "sink" caused by the pit dewatering.

The slimes dam/s will be lined with a layer of mined in-situ clay. The side walls of the dams will also be periodically covered with layers of clay once the water has evaporated from the slime tailings. These clay linings will function as engineered hydraulic barriers to the movement of rainwater and leachate from the slimes dams into the surrounding environment (the potential composition of the leachate is to be determined during the EIA phase).

SRK Consulting have also recommended the following: "*In order to minimise the contamination impact of the tailings dam on groundwater it is recommended that cut off trenches, infiltration galleries or similar engineered solutions be installed. Monitoring boreholes should be drilled downstream of the dam to monitor the situation. These boreholes could also be used as remediation boreholes if required. The tailings dam should be located within the pit dewatering zone of drawdown so that any contaminants that might bypass the remediation system can be contained by the pit dewatering scheme*". Directives for monitoring will form part of the EMP.

4.4 Water Released Into the Environment from Dewatering – Volume, Quality and Management

According to SRK Consulting's Preliminary Groundwater Impact Assessment (**Appendix 6**) good quality groundwater, with EC <80 mS/m, occurs in the predominantly arenaceous sandstone and minor shale Table Mountain Group (TMG) rocks, while EC in the Cape Granite ranges between 150 and 300 mS/m. Groundwater in the Malmesbury rocks is generally brackish, with ECs commonly ranging from 300 to 800 mS/m, and in places exceeding 1 000 mS/m.

This groundwater will have to be abstracted at a rate of 2700 m³/d from the starter pit and 10,550 m³/d from the final pit. This will result in water levels being drawn-down locally in both the primary and secondary aquifers. The extent of the zone of impact of the starter pit is estimated to be ~1.8 km whilst that for the final pit is ~3 km. Based on the numerical flow model it is estimated that the river could lose ~0.07 m³/d of water for every metre of river front in the zone of dewatering. The confidence in this scenario is low due to the lack of test boreholes and on-site data on aquifer parameters. If it is assumed that ~66% of the zone of impact extends to the river front, the total volume of water that potentially could be lost from the Krom Antonies River amounts to ~83 m³/d (~30 300 m³/a) for the starter pit and ~140 m³/d (~51 000 m³/a) for the final pit. These figures equate to ~0.7% and 1.2%, respectively, of the 4.29 m³/a mean annual runoff estimated for the upper Krom Antonies River Catchment.

The above figures are to be corroborated by SRK Consulting during the EIA phase when a number of shallow and deep boreholes will be drilled and pump tested.

4.5 The Proposed Metallurgical Plant

4.3.2 Design and Layout

The proposed metallurgical plant will be located on site within a 125m by 325m area. The complex will include infrastructure and/or equipment allowing for crushing and stockpiling, flotation, gravity concentration, thickening and water storage, filtering, reagent make-up and storage, concentrates treatment plant, final products dispatch, stores, engineering workshops, outside lay-down area, security and offices (**Figure 6**)

The layout is depicted in the Site Development Plan (SDP) (**Figure 5**). The SDP may well change according to the results of the specialist studies in order to reduce anticipated impacts, e.g. the position of the slimes dam, rock and soil dumps and the processing plant.

4.5.2 Process

The proposed metallurgical plant will be divided into two operations according to Venmyn Rand (Pty) Ltd.:

- The Concentrator plant, utilising mill, float and gravity operations to generate molybdenum sulphide and tungsten oxide (Scheelite) concentrates; and
- a Concentrates Treatment plant to produce ammonium paratungstate (APT) via either a soda ash leach route involving crystallisation or an alkali caustic soda leach route involving either solvent extraction or ion exchange.

The Riviera operation will thus have the option to produce and sell either a low grade flotation/gravity concentrate at 30% WO_3 ; a leached flotation/gravity concentrate which would be of usual marketable grade (60-65% WO_3); or APT (ammonium paratungstate) at 96.8% WO_3 .

The Riviera orebody consists almost entirely of scheelite ($CaWO_4$) which is a friable mineral and therefore liberates quite readily at 250-300 μ m, thus only coarse milling is required to 80% -200 μ m or 45% -75 μ m. Scheelite is more friable than Wolframite and tends to naturally slime. Tests showed that 12.9% WO_3 concentrated in the -37 μ m fraction in 10.3% by mass, and 27.9% WO_3 in the -37 μ m fraction in 21.2% by mass. Since scheelite is non-magnetic its recovery circuit excludes magnetic separation. Although not specifically tested, gravity concentration will probably be required to treat flotation tailings to scavenge any remaining Scheelite and Wolframite ($(Fe,Mn)WO_4$). The scheelite is often finely disseminated in the orebody and therefore suffers high recovery loss when attempting to produce a marketable concentrate grade of +65% WO_3 . Recovery is best maximised by producing a lower grade of final concentrate and leaching this to produce the required marketable grade.

Tungsten is not refined by smelting or in a manner similar to many other metals due to the fact that it has the highest melting point of any metal (3 422°C). Tungsten is therefore extracted chemically to a partially refined state of APT $[(NH_4)_{10}W_{12}O_{41}.5H_2O]$ which is the main tungsten raw material traded in the market as a powder. APT is usually calcined to yellow or blue oxide (WO_3 or $W_{20}O_{58}$).

Tungsten concentrate assaying 60-65% WO_3 may be further processed by either one of two routes to produce APT namely;

- a) An alkali soda ash in which tungstic acid (H_2WO_4) is formed followed by ammonical dissolution and crystallization; or

- b) An alkali caustic soda leach route involving either solvent extraction or ion exchange and crystallisation.

Little information is available regarding these processes. However, it is understood that both involve dilute solutions with the result that the number and size of equipment will be large relative to the solids feed tonnage.

Details regarding the volume and type and concentration of each chemical to be used and released by all the different processes in the Concentrates Treatment Plant will only become available once the exact composition and chemistry of the ore body has been determined (Geotechnical and Metallurgical Reports to be conducted during the EIA phase will contain this information).

The chemicals used will as a matter of course be determined by the choice of end-product i.e. low grade flotation/gravity concentrate (30% WO_3); leached flotation/gravity concentrate (60-65% WO_3); or APT (ammonium paratungstate) at 96.8% WO_3 . Choice of end-product will only be made once the detailed analysis of the ore (and Bongani Mineral's subsequent detailed economic feasibility analyses) have been completed.

The total water demand for the processing plant is estimated by the metallurgist 3500m³/day. Of this amount it is estimated roughly 70% could be recycled. The total water to be used for dust suppression in the mine and at the crushing plant and irrigation of the rehabilitated rock dumps and slimes dams will be determined by specialist civil engineers appointed to the project.

4.6 Electricity Demand for the Project

Venmyn Rand (Pty) Ltd. have estimated that 14,945 kW will be absorbed during the establishment of the Concentrator Plant, Tailings Treatment Works, Tailings Dam(s) and Offices and that 801 kW will be absorbed during the establishment of the Concentrates Treatment Plant.

Venmyn Rand (Pty) Ltd. have also estimated that a Maximum Demand of 16,000 kW will be absorbed per annum during the operational phase of the Concentrator Plant, Concentrates Treatment Plant Tailings Treatment Works, Tailings Dam(s) and Offices.

These estimates will however be verified by the appointed Civil Engineer for the project during the EIA phase (see also paragraph 10.1.1 in this report viz. Terms of Reference for Specialist Studies). The civil engineers will also determine what electricity upgrades are necessary and the alignment of the overhead cables. Eskom will be notified and their capacity for the grid for this region will be determined.

4.7 Engineering Services for the Project

Civil, Geotechnical and Mining Engineers will provide the necessary details with respect to the civil engineering requirements of the proposed open-cast mine during the EIA phase, including but not limited to (see also paragraph 10.1.1 in this report viz. Terms of Reference for Specialist Studies): Estimates already provided during the scoping phase will be verified by the appointed Civil, Geotechnical and Mining Engineers during the EIA phase.

Information pertaining to civil engineering requirements during the EIA phase should thus include:

- A detailed stormwater management plan is needed for the site, including specific measures to reduce the rate of runoff into freshwater ecosystems, and to manage the quality of runoff;
- details of all built and constructed aspects of the proposed mining works are required;

- the electricity demand and provision for the total project (construction and operational phases) needs to be determined;
- details are required pertaining to additional infrastructure supporting the proposed mining operation – for example, new and/or upgraded roads, sewage treatment and disposal, water pipelines, electricity pylons or substations;
- details of proposed management / disposal of both on- and off-site sewage and other solid waste [including the volumes of waste to be produced and the design of a sewage treatment plant with a capacity for all staff members];
- details of the depth of excavation, as well as the maximum anticipated footprint are needed;
- detailed measures for dewatering are needed, including estimates of water volume to be abstracted, management thereof and impacts on the ground and surface water;
- detailed designs and layouts of water reservoirs and dams (for storage of water generated by dewatering of the pit);
- details pertaining to the volume of water to be used by the plant, people (potable water) and dust suppression and the proposed source thereof;
- potable water provision;
- details of the chemical and physical processes that are part of the proposed mining operation are required so that their potential impacts on downstream and adjacent aquatic ecosystems can be elucidated;
- details regarding areas for the storage or disposal of spoil generated from the Mining operation (rough tailings and slimes) are required.
- volumes and methods of fuel storage,
- details regarding the predicted noise and dust emissions and management thereof. Dust and noise baseline studies will be undertaken by specialists. Monitoring of both dust and noise will be included in the EMP for the duration of mining. Dust monitoring after mine closure will continue until the baseline background dust levels have been reached;
- details pertaining to internal roads, conveyers and pipeline routes; and
- the predicted volume and weight of traffic into and out of the valley and consult the appropriate roads authority regarding the access road (i.e. undertake a full Traffic Impact Assessment).

The engineers will need to ensure that the maps produced are drawn up by a surveyor and with a suitable scale to define impacts. These maps must include the sizes, slopes and location of the excavation, dumps and infrastructure and be used to describe the mining phases, explain proposed mitigation measures and allow for the monitoring of compliance.

The engineers will also need to ensure that bulk infrastructure is planned and available accordingly (i.e. consult with the applicable local authorities [e.g. Berg River Municipality] and obtain confirmation of services availability from them e.g. solid waste disposal other than mine rock wastes).

The optimal locations and sizes of housing and offices will be determined as part of the Socio-Economic Impact assessment (EIA phase). Bongani Minerals have been approached by a development company who wish to develop an all inclusionary housing estate in Piketberg. Bongani Minerals will either provide housing for staff or they will be provided with a housing subsidy. The number and type of houses can only be determined once recruitment of staff takes place. Note that no housing will be built on the site of the Riviera Tungsten Mine.

4.8 Feasibility and Sensitivity Assessment

Venmyn Rand (Pty) Ltd. conducted an assessment on the sizing, cost and feasibility of the plant (**Table 9**) and determined the following:

- For a nameplate capacity of 3mtpa + 10% (415t/hr), the total cost of a Concentrator inclusive of infrastructure and tailings dam is R909.5m. The Concentrates Treatment plant (treating 1.2t/hr) is estimated to cost an additional R92m.
- Total operating costs per month (Concentrator only @ 3.0 mtpa) = 13.68 Rm/month or R54.7/t milled.
- Total operating costs per month (Concentrator and Concentrates Treatment Plant @ 3.0 mtpa) = 20.51 Rm/month or R82.1/t milled.
- Major costs for the Concentrator are consumables (R26.63/t, including water at R2.25/t) and power at R13.74/t.

Both capital and operating costs were benchmarked against other producers and their relationships with throughput were determined.

Venmyn Rand (Pty) Ltd. determined that the Riviera Project is viable based on the open pit design. The planned mine schedule was used to calculate NPV of ZAR 1.3bn, which does take into account initial capital expenditure and does not include cost escalations, commodity prices escalations, inflation and selling costs.

The project is more sensitive to the commodity prices than the discount rate. One of the constraints on cashflow is the high upfront stripping of almost 20 Mt that has to be mined before exposing ore. Operationally this can be capitalised in order to promote the project. The second cut back has equally high tonnages of waste stripping that have to be mined as soon as the starter cut is exposed for mining. Venmyn Rand (Pty) Ltd. recommended that the pre strip benches be mined in a double benching fashion to increase the waste sink rate. Venmyn Rand (Pty) Ltd. added that once ore is intercepted it then becomes critical to revert back to a single 5 metre bench in order to improve grade control sink rate.

Venmyn Rand (Pty) Ltd. concluded that Riviera deposit can be exploited profitably using open pit mining methods, based on the estimated grade, tonnages and the nature of mineralization. Venmyn is of the opinion that an open pit mining is the best way of exploiting this deposit to maximise the value of the project, given the ore body characteristics.

The confirmatory and additional core sampling exploration programme must however be carefully planned before the final investment decision is made and should systematically lead the company to the eventual preparation of a pre-feasibility or feasibility study and the confirmation and classification of SAMREC Code compliant tungsten mineral resources.

Table 9: An Extract of the Financial Model Base Case on the Optimised Riviera Open Pit

Mining cost	Total Unit cost R/ton mined	R 28.00	280,000,000	289,754,792	409,116,269	464,988,612	497,062,011	504,609,394	216,690,429	168,261,710	113,006,786	46,724,603	33,660,841	29,064,207	26,109,194
	Escalation %	0%	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Processing cost	Total Unit cost R/ton Ore Processed	R 122.50	-	42,677,217	85,750,000	85,750,000	85,750,000	85,750,000	85,750,000	85,750,000	85,750,000	85,750,000	85,750,000	85,750,000	85,750,000
	Escalation %	0%	122.50	122.50	122.50	122.50	122.50	122.50	122.50	122.50	122.50	122.50	122.50	122.50	122.50
			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total cost	Total Unit cost R/ton Ore Processed		280,000,000	332,432,009	494,866,269	550,738,612	582,812,011	590,359,394	302,440,429	254,011,710	198,756,786	132,474,603	119,410,841	114,814,207	111,859,194
			-	954	707	787	833	843	432	363	284	189	171	164	160
Revenue	WO3 MTU ----- R/ MTU	\$250.00	-	213,005,596	439,704,485	455,592,295	471,475,262	468,179,204	451,551,048	458,923,749	442,302,938	443,679,407	437,438,756	431,862,110	428,723,102
Exchange Rate	R : US\$	R 10.00													
	Total	R	-	213,005,596	439,704,485	455,592,295	471,475,262	468,179,204	451,551,048	458,923,749	442,302,938	443,679,407	437,438,756	431,862,110	428,723,102
Royalty	Total Royalty cost	3%	-	6,390,168	13,191,135	13,667,769	14,144,258	14,045,376	13,546,531	13,767,712	13,269,088	13,310,382	13,123,163	12,955,863	12,861,693
Capital		R	500,000,000	-	-	-	-	-	-	-	-	-	-	-	-
Cashflow	Period	1,679,434,376	(780,000,000)	(125,816,581)	(68,352,918)	(108,814,085)	(125,481,007)	(136,225,566)	135,564,087	191,144,326	230,277,064	297,894,422	304,904,753	304,092,040	304,002,215
	Cumulative	R	(780,000,000)	(905,816,581)	(974,169,499)	(1,082,983,585)	(1,208,464,592)	(1,344,690,158)	(1,209,126,071)	(1,017,981,745)	(787,704,681)	(489,810,259)	(184,905,506)	119,186,533	423,188,748
Discounting															
Period number		18	-	2	3	4	5	6	7	8	9	10	11	12	13
Discount factor			-	0.11	0.17	0.22	0.28	0.33	0.39	0.44	0.50	0.56	0.61	0.67	0.72
Discount rate		17%													
Discounted cashflow - period		1,386,449,249	(780,000,000)	(123,640,762)	(66,587,506)	(105,083,058)	(120,126,128)	(129,279,601)	127,534,572	178,261,100	212,891,221	273,011,749	277,009,751	273,872,112	271,413,474
	Discounted cashflow - cumulative		(780,000,000)	(903,640,762)	(970,228,268)	(1,075,311,326)	(1,195,437,454)	(1,324,717,054)	(1,197,182,482)	(1,018,921,382)	(806,030,161)	(533,018,412)	(256,008,661)	17,863,450	289,276,924

4.9 Alternative Development Options

There is no viable mining project alternative since Bongani Minerals are considering the only technically and economically viable mine design (open-cast) to extract the low grade but commercially viable tungsten-molybdenum deposit.

Alternative Site Development Plans (SDPs) can only be determined after the civil, mining and geotechnical engineers have completed their studies and mapped the excavation, dumps and infrastructure necessary for the efficient operation of the mine.

The SDPs will then be evaluated and form part of the specialist studies that still need to be undertaken during the EIA phase. The “preferred alternative” SDP will then be amended according to the directives contained in the applicable specialist studies. For example:

- the prevailing winds will be used for siting the slimes dam and waste dumps to reduce dust pollution on downwind neighbours;
- the results of the hydrological and hydrogeological studies (to be conducted during the EIA phase) will also be used for the siting of such infrastructure to prevent any potential pollution of the rivers/streams by the slime dam. The hydrological study must *inter alia* determine the 1:100 year flood lines of all wetlands, rivers and drainage areas. The current layout of the slimes dams, “waste rock” dumps and infrastructure will then have to be amended so that no activities occur within these flood lines.
- The possible occurrence of endangered plant communities (e.g. Piketberg Quartz Succulent Shrubland Vegetation) and/or red data plant species that have been recorded in the vicinity will necessitate a detailed vegetation survey (including all-year sampling) to accurately pin-point the distribution of the remnant vegetation types (to describe and map the vegetation on the site). The detailed vegetation survey (to be conducted during the EIA phase) will thus also be a determining factor regarding the siting of the metallurgical plant, slimes dams, “waste rock” dumps and layout of internal roads and infrastructure.

The following design alternatives are amongst those which will be considered by Bongani Minerals (Pty) Ltd. and their appointed consulting engineers:

- Alternative boxcut (secure and safe portals/accesses to the open-cast mine) positions and direction of mining for opencast mining operations;
- alternative location of boxcut soil and spoil stockpiles for opencast mining operations;
- whether to construct a river diversion for the opencast mining operations;
- alternative conveyor alignments;
- alternative conveyor technology to solve environmental problems (e.g. noise; river crossings);
- alternative slime dam locations;
- alternative tip locations;
- alternative alignments of access roads and haul roads to tips;
- alternative locations for mine infrastructure, including the locations of offices, workshops and; change houses, refuelling bays, stores, magazines and hardparks; processing plant/s; and
- alternative water sources for mining.

The **no-go** alternative will also be considered, in which the status quo for the area will remain, viz. that of agriculture and livestock farming.

The cumulative pros and cons of the various alternatives (including the no-go alternative) can only be evaluated and compared once all the EIA-phase specialist studies have been completed. For

example, the Terms of Reference for the Social and Economic Impact Assessment supplemented by an Agriculture Land -use Study includes determination of the financial-economic viability of the potential land-use from soil classification by means of farm modelling and comparing this with the current land-use of all individual landowners on whose properties the proposed mining may take place. The Social and Economic Impact Assessment Terms of Reference also includes the directive to assess each farm and the impact of the mine in terms of (1) the loss of income from the land occupied by the mine and (2), the impact thereof on the viability of the remaining part of the farm (if applicable).

5. ENVIRONMENTAL EVALUATION OF THE KROM ANTONIES RIVER VALLEY

Withers Environmental Consultants (WEC) undertook an environmental evaluation to assess the environmental opportunities and constraints of the site.

The site is located at an altitude of approximately 105 metres within a north/south valley drained by the perennial Krom Antonies River, which flows along the western slopes of the Piketberg range of mountains. Access from Cape Town to the site is via the N7 National Road to the town of Piketberg and then via the R365 tarred road to an intersection with a gravel road, north of the site (± 45 km from Piketberg). Access to the site is by means of a gravel road, which runs for about 14km to the R365 tarred road.

The main railroad north from Cape Town passes within 15km of the site at Het Kruis. The export harbour of Saldanha is located approximately 80km to the west and is reachable by tarred road. An alternative would be the possible construction of a 40km rail link to the existing infrastructure.

The Environmental Evaluation has been limited to a desktop study due to the initial reluctance of landowners to allow access onto their properties. Visits were, however, undertaken by WEC to the general area during November 2007 and again in October 2008 to accompany the specialist team of consulting scientists, viz. JN Roussouw (water quality), Mr Gerald Howard (hydrology) of Ninham Shand Consulting Services (Pty) Ltd. (now Aurecon); Dr. Charlie Boucher (botanist); Dr. Liz Day of the Freshwater Consulting Group; and Mr Des Visser (hydrology) of SRK Consultancy.

A number of specialist studies were initially commissioned to assess the significance of the potential impacts (positive and negative) that could develop as a result of the proposed open-cast mine in the EIA phase.

In addition, the specialist studies undertaken to date have provided recommendations for mitigating potential negative impacts or enhancing positive impacts that have been anticipated by the specialist. In certain instances the monitoring of impacts to be encompassed into the proposed Environmental Management Plan (EMP) for the proposed construction and operational phases of the open-cast mine has also been put forward. The following specialist assessments have been undertaken:

- Dr. Charlie Boucher compiled a preliminary report entitled: "An introduction to the vegetation in the Riviera Tungsten Deposit Environs, Piketberg";
- JN Roussouw of Ninham Shand Consulting Services (Pty) Ltd. (now Aurecon) compiled a report on the Present Water Quality Status and Scoping Report;
- Mr Gerald Howard (Aurecon) compiled a report on the Hydrology of the Verlorenvlei Quaternary Catchment;
- Mr Des Visser of SRK Consulting compiled a report on the Preliminary Assessment of the Impact of the proposed Riviera Tungsten Mine on the Groundwater Resources;
- Dr. Liz Day of the Freshwater Consulting Group compiled a report on the Preliminary Comments on Freshwater Ecosystems that could Potentially be Affected by Mining Activities.

The preliminary results of these environmental assessments were used to assist with the description of the biophysical environment for the DSR and this Final Scoping Report. Further studies of weather (wind), dust, detailed hydrology, hydrogeological drilling and pump testing, geotechnical assessment of the subsurface rocks, fish, avifauna, agricultural soils potential, noise, visual impact assessment, rehabilitation, socio-economic and heritage and archaeological assessments will still need to be undertaken during the EIA phase of the project. The results of

hydrogeological, weather and geotechnical studies, together with existing studies, will be used to inform the placement of the proposed metallurgical plant, slimes/tailings dam and waste dumps.

The results of all specialist studies will also inform the EIA process and the content of the EMP which is to be produced in terms of section 39(1) of the MPRDA, to ensure the conservation of the biophysical and social environments of the Krom Antonies River Valley.

5.1 Biophysical Characteristics of the Property

Messrs Gerald Howard and Nico Roussouw of Ninham Shand Consulting Services (Pty) Ltd. (now Aurecon) were appointed by Bongani Minerals to assess the hydrology (**Appendix 3a**) and present water quality status of the rivers that could potentially be affected by mining activities in the area (**Appendix 3b**).

5.1.1 Topography

The gently undulating north/south valley-sides are well drained with streams that flow into the perennial Krom Antonies River in a trellis drainage pattern, indicating that the ground has a fairly uniform resistance to water.

5.1.2 Hydrology

The interim Hydrology report describes the first component of the study, namely a desktop analysis of the hydrology in the Verlorenvlei River catchment. The aim of the desktop analysis is twofold, namely to describe the hydrology of the Verlorenvlei River using existing data sources (WR90) and secondly to identify shortcomings in this hydrology and make recommendations on what is required to perform a more comprehensive hydrological analysis for the second component of the EIA process.

The proposed mining site is located in the Verlorenvlei River catchment. The study area includes several quaternary catchments that drain the major tributaries (**Figure 7**), namely:

- G30B The Kruis River
- G30C The Bergvallei River
- G30D The Krom Antonies River which contains the proposed development, and the Hol River
- G30E The Verlorenvlei River into which the above mentioned tributaries flow.

Significant amounts of runoff are generated in the Krom Antonies River catchment upstream of the proposed development. This small catchment produces a near natural MAR of 4.29 Mm³/annum (there is practically no abstractions upstream of the proposed development) (refer to **Table 1 below**).

Table 1. Quaternary catchment statistics.

Quaternary Catchment Number	Quaternary Catchment Area (km ²)	Quaternary Catchment MAP (mm/annum)	Incremental Quaternary Catchment Natural MAR (Mm ³ /annum)	Incremental Quaternary Catchment Natural Unit Runoff (mm)	Cumulative Quaternary Catchment Natural MAR (Mm ³ /annum)
G30B	658	394	18.85	28.7	18.85
G30C	351	410	11.27	32.1	30.12
G30D-above site	36.7	600	4.29	116.9	4.29
G30D-below site	497.3	350	7.62	15.4	42.03
G30E	352	249	1.88	5.4	43.91
TOTAL	1895	-	43.91	23.2	43.91

The flow in all the quaternary catchments, especially G30D and G30E is extreme seasonal with practically zero natural flow in the summer months. G30B and G30C do indicate a small but continuous low flow during the summer months (a mean monthly flow of 0.04 Mm³ and 0.02Mm³ for February and March respectively).

The irrigation demand in this catchment can clearly not be met from surface water runoff as mean annual demand is more than double the mean annual runoff (MAR). While the irrigation demand is likely to be an overestimate, the irrigation shortfall indicates the substantial amount of irrigation that is supplied by groundwater.

The Krom Antonies River at the Riviera Site has a relatively low firm yield associated with a relatively large capacity as a result of the seasonality of flow (large winter spills) and high evaporation.

The Daily Flow Analysis at the Verlorenvlei Estuary shows that midsummer flow is mostly nonexistent with zero flow occurring 90% of the time from February to April. The highest flows occur in August when 10 m³/s are exceeded 10% of the time.

RECOMMENDATIONS

Flows at the proposed development in the Upper Krom Antonies River

The WR90 monthly flow data is sufficient for a desktop assessment of flow on a quaternary catchment scale but is not suitable for investigations of smaller catchments, especially where the hydrological characteristics of the smaller catchment differ to the hydrological characteristics of the larger quaternary catchment. Quaternary catchment G30D contains a large, low rainfall catchment area (from the Hol River to Redlinghuys) and these hydrological characteristics are embedded in the pro-rated flows at the site of the proposed development in the high rainfall Krom Antonies River.

This problem may be rectified using one of two methods:

- Select more appropriate Pitman Model parameters
- Configure the ACRU model to generate daily flows

The Pitman Model method would require the use of an observed flow record with at least 10 years of data for calibration purposes. This flow record should reflect similar hydrological characteristics to those in the upper Krom Antonies River. As there is no suitable observed flow record, another alternative is to use the ACRU Model which can be configured to produce daily flow at the site of interest.

It is preferable but not essential that the ACRU is verified using observed daily flow data, but a single season of high and low flows are sufficient. It is recommended that a flow monitoring site (a rated section of river would suffice) be established in the upper Krom Antonies River before the onset of the 2009 rainy season.

Note. This record could also assist in improving the Pitman Model flow should the ACRU Model be too costly to use.

Irrigation water-use in the Verlorenvlei River catchment.

This desktop assessment makes several assumptions regarding irrigation water-use in the Verlorenvlei catchment. The accuracy of these assumptions has a direct bearing on the current day flow that is generated at the Verlorenvlei Estuary. It is critical that the irrigation abstractions and return flows are accurately modelled to develop a representative flow record at the estuary. Return flows from irrigation that uses groundwater must also be accounted for as these return flows may result in elevated low flows at the estuary.

It is recommended that a land-use survey for the entire Verlorenvlei River catchment be undertaken using remote sensing and verification by means of a field trip and if possible by communication with local farmers. Time series of either daily or monthly current day irrigation demands and return flows could then be generated and used with either the ACRU Model or the WR90 natural flows respectively.

Use of G3H001 for flow disaggregation at the Verlorenvlei Estuary

This desktop assessment uses the daily flow record at G3H001 on the Kruis River to disaggregate the current day monthly flows generated at the estuary to current day daily flow. This process assumes that flow characteristics (or the pattern of flow) at each location are similar. Should the flow at G3H001 not be representative of the flow at the estuary then the ACRU Model should be used to generate daily flows at the estuary

It is recommended that the observed flow record at G3H001 be carefully assessed to ascertain the accuracy of both low and high flow, and that flow measurement near the estuary be undertaken for a similar period of time to that in the upper Krom Antonies River for comparative purposes with the flow record at G3H001. This comparison will enable a decision to be made regarding model selection (ACRU or WR90).

CONCLUSION

The existing WR90 natural flows and the current day flows based on the National Land Cover 2000 coverage provides data that is acceptable for a desktop assessment except for low flows in the upper Krom Antonies River. It is recommended that the ACRU Model be used in the upper Krom Antonies River catchment to accurately describe the hydrological characteristics of this catchment.

Flow monitoring for the 2009 rainy season should commence at two sites:

- The upper Krom Antonies River for ACRU Model verification purposes.
- In the Verlorenrivier near the estuary to compare with flow recorded at G3H001.

The effect of future scenarios of water use by the proposed tungsten mine in the upper Krom Antonies River on both downstream irrigation water availability and at the estuary can be modelled using the "current day" SHELL configuration.

5.1.3 Water Quality

Mr Roussouw's interim report includes a desktop assessment of historical data and presents an assessment of current data, *in situ* measurements and visual observations that were made during a site visit on the 22nd of October 2008.

In-situ measurements taken at the following sites (**Figure 8**):

- Hol River upstream of the confluence with the Krom Antonies and Kruismans Rivers;
- Krom Antonies River just upstream of the confluence with the Kruismans River;
- Kruismans River just upstream of the confluence with the Krom Antonies and Hol Rivers;
- Small stream near the Riviera Tungsten deposit;
- Kromvlei stream downstream of the proposed Riviera mining site;
- Krom Antonies River near the Moutonshoek; and
- Hol River at defunct DWAf gauging site (G3H005).

Measurements included dissolved oxygen concentrations, salinity, and water temperatures. Water samples were collected in clean one litre bottles, which were stored in ice after the samples were collected. The samples were frozen upon return to Cape Town and the frozen samples submitted to the water laboratories of the CSIR on 28 October 2008. It was decided to do a comprehensive analysis of the water samples because these were the first samples collected as part of the baseline study (JN Roussouw recommended that based on the results certain analyses may be omitted from future water samples). Visual observations were also made of water clarity, the presence of water plants, and other stream characteristics of importance to water quality.

The following conclusions were drawn from the in-site measurements:

Water temperatures – The water temperatures measured in the system were within the range that could be expected for the region and the season. The lower water temperature measured in the Krom Antonies River (as compared to the Hol and Kruismans Rivers) was probably a reflection of the higher flows observed and perhaps of shading of the river.

Dissolved oxygen concentrations – The *in-situ* dissolved oxygen measurements indicated that dissolved oxygen was not a concern, except in the Hol River (near the confluence with the Krom Antonies and Kruismans Rivers). There a DO concentration of 3.8 mg/l was measured. Further upstream in the Hol River the concentration was 8.3 mg/l. JN Roussouw surmised that the low DO near the confluence could be the result of localised impacts. During the site visit it appeared as if effluent from a small piggery entered the Hol River wetland close to where the *in-situ* measurements were taken. Piggery effluent generally has a high biochemical oxygen demand (BOD), which may explain why the DO was lower at this site.

The following conclusions were drawn from the chemical analysis of the water samples:

Salinity – Salinity in the three key rivers appeared to be quite different. Salinity, measured as electrical conductivity and total dissolved solids, in the Hol River and Kruismans Rivers was about 4.5 and 5.5 times higher respectively than in the Krom Antonies River. This indicated that the Hol and Kruismans Rivers were more saline than the Krom Antonies River. Salinity in the Krom Antonies River also changed in a downstream direction. In the upper reaches of the river near Moutonshoek, the TDS concentration was 70 mg/l and just before the confluence it was 294 mg/l, a four-fold increase in salinity.

The elevated salinity in the Hol and Kruismans Rivers is probably due to the underlying geology (Malmesbury shales) of the region and due to the effects of irrigation return flows. The increase in salinity along the length of the Krom Antonies River is also possibly the result of irrigation return flow.

Despite this, the water quality of the Krom Antonies River would be classified as “ideal” for irrigation purposes and in the Hol and Kruismans River it would be classified as “acceptable” for irrigation purposes.

Inorganic salts - Salinity in the region is dominated by sodium chloride.

Nutrient concentrations - The phosphate concentrations (total and ortho-P), nitrate/nitrite nitrogen, and ammonia nitrogen concentrations were below the detection limits of the CSIR laboratory. Nutrient enrichment does not appear to be a serious concern in the system.

Trace metals – Most of the trace metals were below the detection limits of the CSIR laboratory and for those that measured greater than the detection limit, the concentrations were well within the guideline values for irrigation and domestic water supply use.

Total suspended solids – The suspended solids concentrations in the Hol and Kruismans Rivers were higher than those in the Krom Antonies River. There was also a slight decrease in the suspended solids concentrations in the Krom Antonies River along its length, indicating some settling of suspended material.

JN Roussouw emphasised the fact that surface and ground water drainage on the site could be seen as a constraint, especially since water quality in the Krom Antonies River (which bisects the south-western portion of the Mining Right Boundary) is generally of a better quality than the Hol or Kruismans Rivers, especially in terms of dissolved solids. JN Roussouw surmised that the Krom Antonies River is probably the river that controls the salinity in Verlorenvlei by diluting the salts brought in by the Hol and the Kruismans Rivers.

JN Roussouw added that every effort should therefore be made to maintain the river in at least its present state to prevent any further deterioration in quality in the ecologically sensitive Verlorenvlei.

According to JN Roussouw’s historical analysis pointed to the fact water quality monitoring is currently poor in the area that could be affected by the proposed development. JN Roussouw therefore stressed that it is imperative to implement a baseline water quality monitoring programme during the EIA phase, in order to determine the effects of mining on water quality during the Operational Phase.

He proposed that the monitoring network should include the upper, middle and lower reaches of the Krom Antonies River; the Hol and Kruismans Rivers upstream of the confluence with the Krom Antonies; the Verlorenvlei River downstream of the confluence with the Krom Antonies River; the old DWAF gauging site at G3H002, as well as the outflow from Verlorenvlei. The monitoring should start during the EIA phase, prior to any construction, and continue during the Construction and Operational Phases of the mine should it be approved.

5.1.4 Soils

Geological features of relevance to the characteristics of the vegetation found in the Riviera study area are summarized from the P.W.A Walker’s (1994) report: Riviera Tungsten – A Discovery Case History.

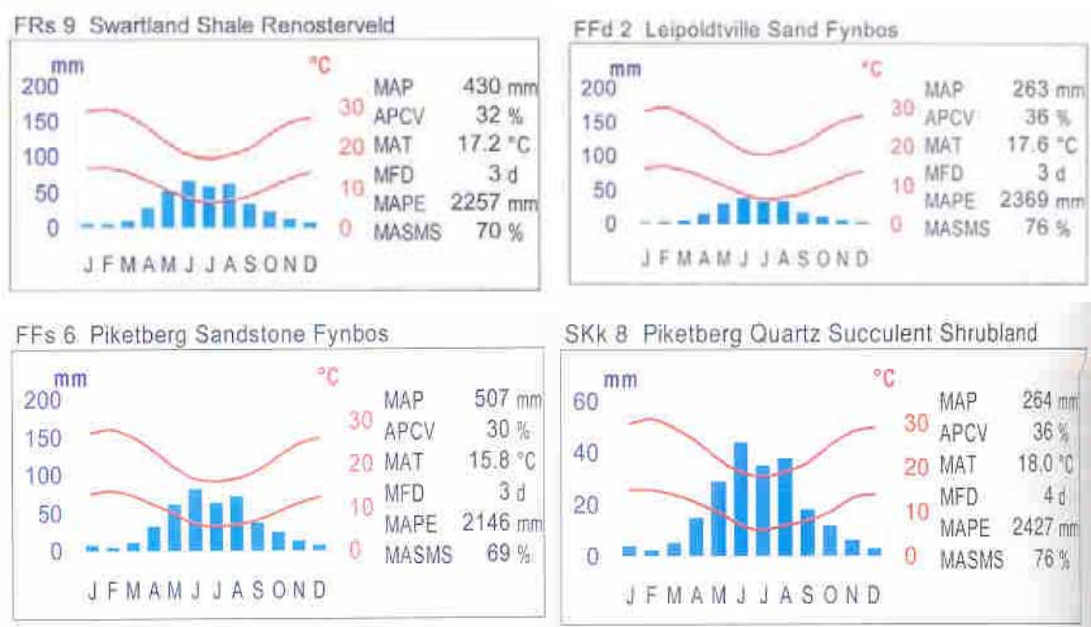
The soils comprise 5 m to 20 m deep recent sandy to conglomeritic alluvial soil deposits in which colluvial quartzitic boulders of Table Mountain Group origin (originating from the Piketberg Mountain complex) are found. These alluvial soils overly deeply weathered 1 m to 10 m of clay derived from *in situ* weathered Cape Granite which intruded metamorphosed Malmesbury Group substrate.

5.1.5 Climate

The West Coast is described by hot, dry summers, southerly winds and low rainfall. Strong southerly winds blow in spring and summer with strong northwesterly winds in winter.

The Piketberg Mountain however receives far more rain annually than the surrounding flats, although the flats alongside the Krom Antonies River, generally benefit from the precipitation runoff.

Piketberg Mountain is also generally a bit colder than the surrounding flats, while the soils on the mountain are also slightly less stressed for moisture over the year (refer to the climatic data below).



5.1.6 Fauna and Flora

Dr. Charlie Boucher was commissioned by Bongani Minerals (Pty) Ltd. to undertake a desktop study to collate baseline information about botanical features in the Krom-Antonies River valley. He compiled a preliminary report entitled: "An introduction to the vegetation in the Riviera Tungsten Deposit Environs, Piketberg" (**Appendix 4**).

The following vegetation types are recorded in the recent literature from the area or were observed during an initial inspection undertaken by Dr. Boucher of the surrounding area on 22 October 2008, namely, Swartland Shale Renosterveld, Leipoldtville Sand Fynbos, Piketberg Sandstone Fynbos, Piketberg Quartz Succulent Shrubland, Cape Lowland Alluvial Vegetation and Cape Lowland Freshwater Wetlands.

For the sake of brevity only key information regarding the identified vegetation types has been extracted. The reader is referred to Dr. Boucher's report (**Appendix 4**) for the full account.

Rare and threatened species are often recorded in the poorly documented Swartland Shale Renosterveld around the foothills of the Piketberg Mountain.

All Swartland Shale Renosterveld areas are however conservation priorities as they are “**Critically endangered**” nationally, but particularly important are the slopes around the northwest base of the Piketberg, which have produced a number of new species in the last few years.

The Leipoldtville Sand Fynbos vegetation type is classified as “**Endangered**” nationally, primarily as a result of it being heavily targeted for agriculture, as the deep, acid sandy soils are ideal for rooibos and potato cultivation. This vegetation type is exceptionally rich in special species, which is one of the primary reasons for concern about the high rate of habitat loss in the area. Given the exceptional concentration of rare, threatened and localised species in this unit, the ongoing and rapid transformation of this habitat by agriculture (along with the associated effects such as a drop in the water table, which can result in the death of entire groundwater dependant ecosystems) is of major national conservation concern, made worse by the fact that no formal conservation areas protect this vegetation type.

Most of the extent of the primarily montane vegetation type, namely Piketberg Sandstone Fynbos occurs outside the study area. Although classified nationally as “**Least threatened**” none is included in statutory conservation areas while only 4% occurs in private nature reserves, because overall transformation is low (17%).

Piketberg Quartz Succulent Shrubland is described from the farm Draaihoek between Piketberg and Eendekuil (eastern foothills of the Piketberg Mountain, from near Het Kruis and Redelinghuys (north of Piketberg Mountain) and from near Sauer at the south-western foot of Piketberg Mountain. While none of this vegetation is located in a formal conservation area the owner of Draaihoek Farm has left it on his property undisturbed. This vegetation is structurally and ecologically like that found on the Knersvlakte, from which it is separated by a mountain range. This little known vegetation occupies amongst the smallest area of any vegetation type in South Africa. It should be classified nationally as “**Critically Endangered**” because it occupies such a small area, yet the threat classification does not include this element.

The Cape Lowland Alluvial vegetation lining the foothill reach of the Krom-Antonies River has suffered considerable damage through channel manipulation, which has led to heavy invasions by exotic invasive species. The Cape Lowland Alluvial vegetation is classified nationally as being a “**Critically endangered**” vegetation type. Every effort should be made to restore as much as possible of the transformed areas potentially supporting it.

Cape Lowland Freshwater Wetlands is a vegetation type found in a variety of different floodplain situations along major freshwater rivers (e.g. along the Verloren River). The topography is very flat, with silt-laden soils and occasional small depressions and flood channels, which may hold water into the dry season. It occurs above the level of tidal influence, and is usually seasonally inundated.

The lowland floodplains are not known to support many special plant species, but are of major importance for frogs and migratory birds. Verlorenvlei as a result has been listed as a Ramsar site. All wetland areas are furthermore protected by the National Environmental Management Act (Act No. 107 of 1998) and by the Conservation of Agricultural Resources Act (Act No. 43 of 1983).

Dr. Boucher highlighted the need for a detailed vegetation survey (including all-year sampling) in order to accurately pin-point the distribution of the remnant vegetation types and to provide a comprehensive inventory of all species, including the presence and distribution of threatened plants present on any site supporting indigenous vegetation in the highly disturbed Krom Antonies River Valley.

Dr. Boucher also emphasized that any mining, road building or widening and other associated activities must completely avoid the Piketberg Quartz Succulent Shrubland vegetation because of its extreme rarity and that river course modification without vegetation restoration is a recipe which encourages the dominance of alien invader species and causes dramatic movement of large volumes of sand during floods.

Reptiles such as angulate tortoises, sand snakes, grass snakes, mole snakes, Puff adders and even Cape cobras may however be present on or visit the site. Indeed, Atherton de Villiers of CapeNature recorded Skaapsteker, Namib sand snake and Cross-marked grass snake in the nearby Verlorenvlei area between 1972 and 1985 (see Sinclair SA, Lane SB and Grindley JR 1986, Estuaries of the Cape: Part II: Synopsis of available information individual systems. Rep no. 32 Verlorenvlei (CW13). Heydorn AEF and Morant PD (eds.). Stellenbosch. CSIR Research Rep. 431.).

Birds found in the area will probably include game birds (guinea fowls and pheasants) and small insectivorous species such as Layard's Titbabbler, Greybacked Cisticola, Karoo Prinia, Karoo Robin, Stonechat and Southern Grey Tit. European Bee-eaters are known to breed in the area while raptors such as Rock Kestrels, Jackal Buzzards, Steppe Buzzards and Lanner Falcons are likely to be seen utilizing the updrafts formed against the Piketberg Mountains. Verlorenvlei is the type locality for several bird species including the Hottentot Teal, collected by Sir Andrew Smith during two collecting trips undertaken in 1829 and 1832 (CSIR Research Rep. 431).

A 1981 survey by Stuart (in CSIR Research Rep. 431.) indicated the presence of the following mammals in the Verlorenvlei area: Bat-eared fox; Cape fox; Black-backed jackal; Striped polecat; Small-spotted genet; Suricate; Yellow mongoose; Cape grey mongoose; Water mongoose; Leopard; African wild cat and Caracal. Cape clawless otters occur in the vlei and other small animals including Striped field mice, Vlei rats, Pygmy mice and Cape gerbils probably occur in the area.

It may however be reasonably surmised that the number and diversity of animals breeding on the properties making up the site would be minimal. This may be attributed to the fact that, with the exception of suitable habitat along the Krom Antonies River, the area has been totally disturbed by farming activities and thus supports an extremely low floral biodiversity and limited breeding habitats.

5.1.7 Freshwater Ecosystems

Dr. Liz Day of the Freshwater Consulting Group compiled preliminary comments on freshwater ecosystems that could potentially be affected by mining activities (**Appendix 5**). Dr. Day emphasized the fact that the report should be seen as a broad scale sensitivity study, and that the comments included in the report would be subject to change in the light of more detailed information obtained later on (during the EIA phase) through detailed data collection.

Dr. Day found the Krom Antonies River to be of potentially high importance in terms of the ecological health or integrity of the downstream Verlorenvlei system and that water quality, including sediment, nutrient and dissolved solid loads and concentrations could all have implications for the downstream system.

Dr. Day however also highlighted that in its own right the Krom Antonies River is also a system that could potentially be of high conservation importance. The extent to which indigenous fish occur within the river is not yet known, and neither is the extent to which alien fish populations in the system may be having an impact on both indigenous fish and macroinvertebrate populations.

Dr. Day listed the kinds of impacts that would be likely to have a significant effect on freshwater ecosystems. She suggested that these impacts would need to be linked to specific activities at a later stage in the project design phase, in order for a proper assessment of their ecological implications to be carried out, and for effective mitigation measures, if possible, to be worked out. The potential impacts identified include:

- Increases in sedimentation of the Krom Antonies River system;
- increases in erosion within the Krom Antonies River or its associated tributaries;
- loss of extant wetland areas;
- encroachment into riverine buffer areas (riverine buffer areas of between 30 and 50m from the edge of each river bank should be anticipated);
- diversion of even minor tributaries of the Krom Antonies River, resulting in increased downstream velocities, loss of ecosystem processes that are considered beneficial in terms of water quality amelioration or management of sedimentation and/or erosion;
- abstraction of surface or groundwater flows; and
- changes in the salinity, pH, nutrient loading or loading and/or concentrations of heavy metals and/or other chemical constituents that might impact on freshwater ecosystems within the Krom Antonies River or on the Verlorevlei River downstream.

Dr. Day added that detailed descriptions of the following aspects of the proposed development would need to be provided (during the EIA phase) in order for a full freshwater ecosystem assessment to be undertaken, including:

- A detailed stormwater management plan for the site, including specific measures to reduce the rate of runoff into freshwater ecosystems, and to manage the quality of runoff;
- details of the depth of excavation, as well as the maximum anticipated footprint
- detailed measures for dewatering, including estimates of water volume;
- details of the chemical and physical processes that are part of the proposed mining operation, so that their potential impacts on downstream and adjacent aquatic ecosystems can be elucidated;
- detailed breakdown of groundwater quality, particularly if dewatering into surface systems is required;
- details regarding areas for the storage or disposal of spoil generated from the site, as well as details of all built and constructed aspects of the proposed mining works;
- details of dust suppression methods;
- details of additional infrastructure that would be required as part of the proposed mining operation – for example, new or upgraded roads, sewage and/or water pipelines, electricity pylons or substations;
- details of water supply requirements and proposed water sources; and
- details of proposed management / disposal of both on- and off-site sewage and other waste.

Dr. Day added that, based on the ecological importance of the Verlorevlei River and the Verlorevlei lake, and taking cognisance of the duty incumbent on South Africans at a national level to protect and conserve the wetlands associated with the Ramsar site included in the Verlorevlei lake, as well as the principle of best management practice, all new activities within the Krom Antonies River valley ought to result in active upgrading and rehabilitation of the riverine ecosystems.

She also noted that conversely, any activities that contribute to further degradation of this system, be they related to agricultural, mining or other activities, would be likely to be assessed as of potentially high negative significance.

Dr. Day's cursory assessment of the system suggests that rehabilitation priorities should focus on establishment of effective riverine and other wetland buffers or setback areas, establishment of corridors for the movement of fauna along the river, between the mountains and the Verlorevlei system downstream, management of alien fauna (fish) and flora and setting abstraction of surface and groundwater flows at sustainable levels.

According to Dr. Day the following aspects would need to be investigated as part of a detailed baseline study, informing the freshwater ecosystem component of the Environmental Impact Assessment of the proposed mining development:

- Surveys of fish populations both within the Krom Antonies River system, and in the Verlorevlei River system up- and downstream of the Krom Antonies River confluence;
- detailed surveys of macroinvertebrate fauna at strategic points along the Krom Antonies River system, to establish *inter alia* the possible presence of the endemic bivalve *Unio caffer* along the river, as well as to obtain a clearer understanding of changes in aquatic invertebrate community structure along the river, in relation to changes in habitat quality and structure and water quality;
- detailed assessment of the Krom Antonies River along its length, to allow an assessment of Habitat Integrity at a scale that will allow future monitoring of the impacts of the proposed mining activities, if approved; and
- collection of data relating to algal assemblages along the river.

Dr. Day added that the data gathered would need to be interpreted with reference to surface and groundwater water chemistry and flow data, as well as to botanical information.

Dr. Day suggested that the following sites be selected for the baseline study:

- Kruismans River just upstream of the confluence with the Krom Antonies and Hol Rivers; and
- a site between the confluence of the Krom Antonies River and the confluence of the Hol River.

Data gathered from these sites should then be compared to that collected from the Verlorevlei River, both upstream and downstream of the confluence of the Krom Antonies River system.

Dr. Day also suggested that a more suitable reference site (in terms of an ecological perspective) should also be selected in the Verlorenvlei catchment and proposed a site in the Bergvallei River.

Dr. Day proposed that baseline data should be collected on at least a three monthly basis, over a minimum period of one year (assuming that water quality and flow data are collected at more frequent intervals [i.e. at least monthly]).

5.1.8 Impacts on Groundwater

SRK Consulting were appointed by Bongani Minerals (Pty) Ltd in October 2008 to undertake a preliminary desktop study of the potential impact the proposed Riviera Tungsten Mine may have on the local groundwater resources (**Appendix 6**).

5.1.8.1 Project Approach

A three-phase approach to the groundwater studies was proposed, viz:

- Phase 1: Desk study, setting up of a conceptual and numerical flow model as well as a contaminant transport model and compiling a preliminary groundwater impact assessment report;

- Phase 2: Drilling and testing (yield, packer, downhole geophysics, chemistry, isotopes) of hydrogeological exploration boreholes;
- Phase 3: Analysis and reporting, including calibration of numerical flow and transport modelling and final groundwater impact assessment report.

-

This report covers Phase 1 of the investigation.

5.1.2.2 Drainage

The majority of the study area falls within the G30D Quaternary catchment. In the east the study area falls within the G30B Quaternary catchment, while the south-western portion of the study area falls within the G10K Quaternary catchment. The proposed mine is located in Quaternary catchment G30D, which has a mean annual runoff of approximately 22 mm/a (GRA2). The groundwater contribution to baseflow is estimated as ~2 mm/a (GRA2).

The study area is mainly drained by the north-westerly flowing perennial Krom Antonies River and its tributaries which include the perennial Kruismans River in the north and the Eselshoek River in the west. The Krom Antonies, Kruismans and Eselshoek Rivers merge in the north into the Verlorelei. In the south-west the G10K Quaternary catchment is drained by the perennial Boesmans River.

5.1.2.3 Conceptual Hydrogeological Model

The proposed mine area consists of two types of aquifers namely an unconfined primary or intergranular aquifer formed by the alluvial sediments in the valley and a semi-confined secondary or fractured-rock aquifer formed by secondary openings (fractures, joints and solution cavities) in the crystalline and hard-rock formations. The faulted contact zones of the Riviera Pluton are expected to represent a well developed fractured-rock aquifer, which may be capable of yielding large volumes of groundwater.

Based on the mine exploration drilling borehole logs the primary aquifer in the study area is inferred to vary in thickness from <5 near the flanks and upper reaches of the valley up to ~30 m or more in the centre of valley near the Krom Antonies River. In the area overlying the orebody and within a 2 km radius of it the primary aquifer is expected to vary in thickness from 10 to 30 m. No information could be obtained on thickness of the secondary aquifer. The secondary aquifer, however, is expected to extend from the top of the bedrock to well below the ore body and most probably more than 200 m.

As far as could be determined no borehole or aquifer tests have been carried out in the study area from which aquifer hydraulic properties can be derived. The hydraulic properties for the various rock formations, i.e. transmissivity (T), storativity (S) and hydraulic conductivity (K), have therefore been derived from published literature and SRK's experience for similar rock formations and aquifers. The surficial alluvial deposits of sand, pebbles and boulders are expected to have an average transmissivity of ~20 m²/d whilst the altered contact zone of the pluton as well as fractured fault contacts are expected to have an average transmissivity of ~150 m²/d. The overall transmissivity of the fractured-rock aquifer is assumed to be ~2 m²/d. The clay layer, which forms an aquitard, is expected to have a transmissivity of <1 m²/d. To obtain more accurate parameters for the local aquifers, suitable sited hydrogeological exploration boreholes will have to be drilled and test pumped.

The average depth to water level is 10.8 mbgl, with a minimum of 0.4 mbgl and a maximum of 44 mbgl. As groundwater levels generally follow topography it can be assumed that groundwater flow takes place under unconfined and semi-confined conditions. Groundwater flows from the high lying mountain ranges along the flanks of the valley to the valley floor and the Krom Antonie River and then in a north-westerly direction toward the Verlorelei.

The hydraulic gradient is expected to decrease from 0.48 beneath the steeper valley slopes to 0.08 beneath the flatter lying valley floor. It is estimated that the mean annual potential recharge (MAR) for this sub-catchment varies between 2.4 million m³ during wet periods and 1.6 million m³ during dry periods.

Good quality groundwater, with EC <80 mS/m occurs in the predominantly arenaceous TMG rocks, while EC in the Cape Granite ranges between 150 and 300 mS/m. Groundwater in the Malmesbury units is generally brackish, with EC's commonly ranging from 300 to 800 mS/m, and in places exceeding 1000 mS/m. It is envisaged that most of the landowners in the valley will use groundwater to some extent for domestic use, stock watering and irrigation. The exact amounts, however, are unknown at this stage.

It has been calculated that the mean annual potential recharge for this sub-catchment varies between 2.4 Mm³ during wet periods and 1.6 Mm³ during dry periods. Based on the results of the groundwater assessment, it is apparent that a detailed hydrocensus needs to be undertaken to determine current groundwater users and abstraction, borehole yields, groundwater levels and quality. This will allow for, *inter alia*, a comprehensive groundwater contour plan to be generated.

5.1.2.4 Preliminary Numerical Flow Model

Introduction

The numerical groundwater flow and mass transport model aims to address the following issues:

- Assess the amount of groundwater available for water supply for the mining operations;
- Determine the zone of depression and radius of influence as a result of mine dewatering;
- Determine rebound rates once mining operations have ceased;
- Determine potential decanting positions and rates;
- Assess any groundwater contamination related to mining activities.

Assumptions and Limitations

In order to develop a model of an aquifer system, certain assumptions have to be made. The following assumptions were made to develop the model:

- The aquifer system can be represented by a two-dimensional system with dominating horizontal flow. This is due to the large lateral extent of tens of kilometres if compared to the depth (or z) dimension. The model therefore initially consists of one layer.
- The system is initially in equilibrium and therefore in a steady state.
- The available information on the geology and hydrogeology are "correct".

It is important to note that a numerical groundwater model is a representation of the real system. It is therefore at most an approximation, and the level of accuracy depends on the quality of the data that are available. This implies that there are always errors associated with groundwater models due to uncertainty in the data and the capability of numerical methods to describe natural physical processes.

Numerical Mass Transport Model

Preamble

Mass transport modelling in this situation refers to the simulation of water contamination or pollution due to deteriorating water quality in response to man's disturbance of the natural environment (for example construction of tailings dams, waste rock dumps).

Input Concentrations of Contaminants

Input concentrations in the model were specified at cells over the areas where contamination is expected e.g. across the areas of the tailings dams, waste rock dumps and opencast pits. No contamination information was available therefore it was assumed that all contamination is 100 % at the source, in this case the source is the ore bodies as there was no information concerning other sources of information when writing this report.

Predictive scenarios

Scenario 1: Dewatering

This scenario is divided into two sections. The first part is the dewatering of the starter pit to a depth of 60 m. Thereafter, the entire pit is dewatered to a depth of 225 m. The zones of influence are shown in **Figure 9** and **Figure 10**, respectively. The expected inflows and extent of the zones of depression for the dewatering are listed in **Table 2**.

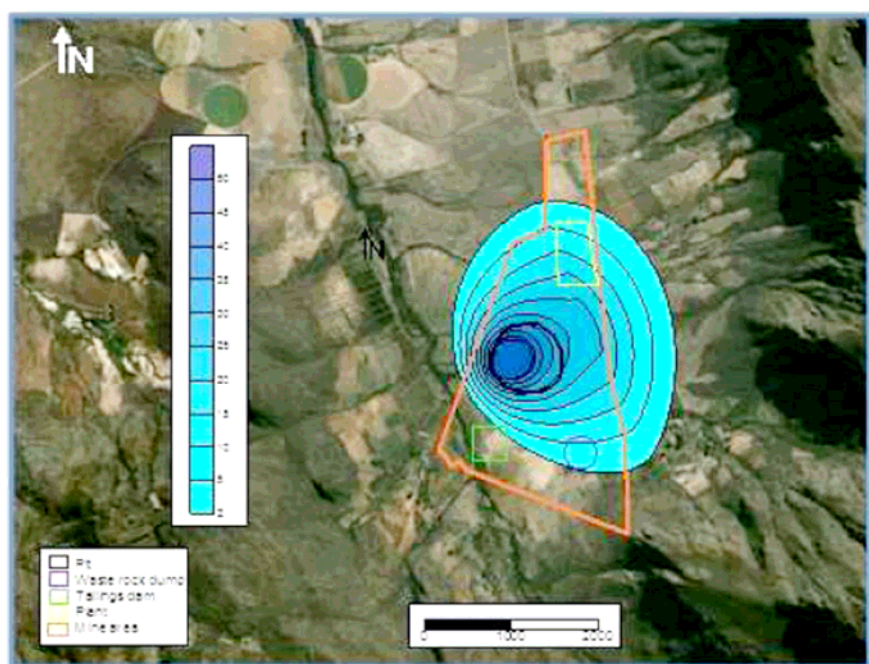


Figure 9: Zone of influence for starter pit (Pit 1)

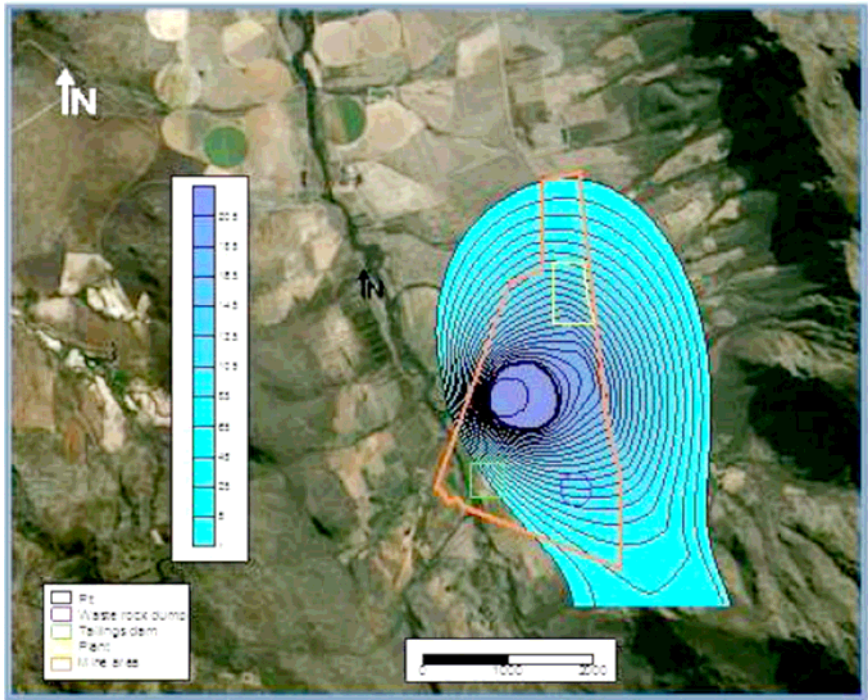


Figure 10: Zone of influence for Final Pit

Table 2: Expected inflows and extent of zone of influence

	Inflow (m ³ /d)	Extent (km)
Starter Pit (Pit 1)	2,600	1.8
Final Pit	10,000	3

Scenario 2: Rebound rates once mining operations have ceased

In this scenario it is assumed that the final pit is going to be backfilled. The increase in water levels with time are shown in **Figure 11**.

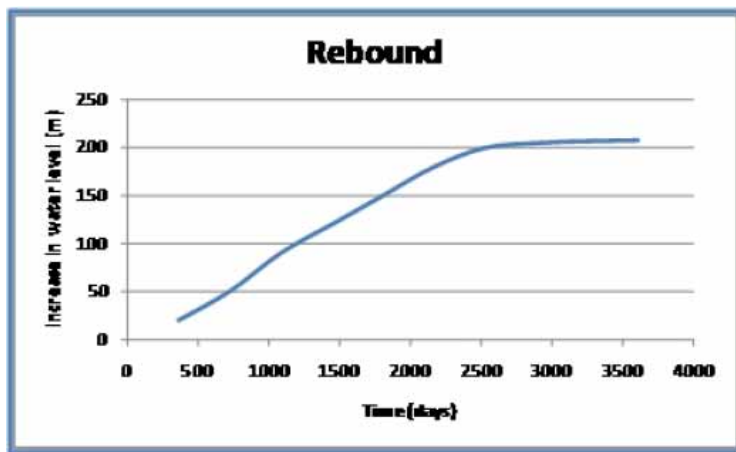


Figure 11: Increase in water levels

Scenario 3: Groundwater contamination related to mining activities

In this scenario contamination due to mining after 20 years is shown in **Figure 12**. It is assumed that mining will continue for that period of time. As no concentration values were available it was assumed that the pit, waste rock dump and tailings dam each have a concentration of 100%. The contamination plume in **Figure 12** is therefore expressed as percentages with a minimum of 5% and a maximum of 100% and an increment of 5%.

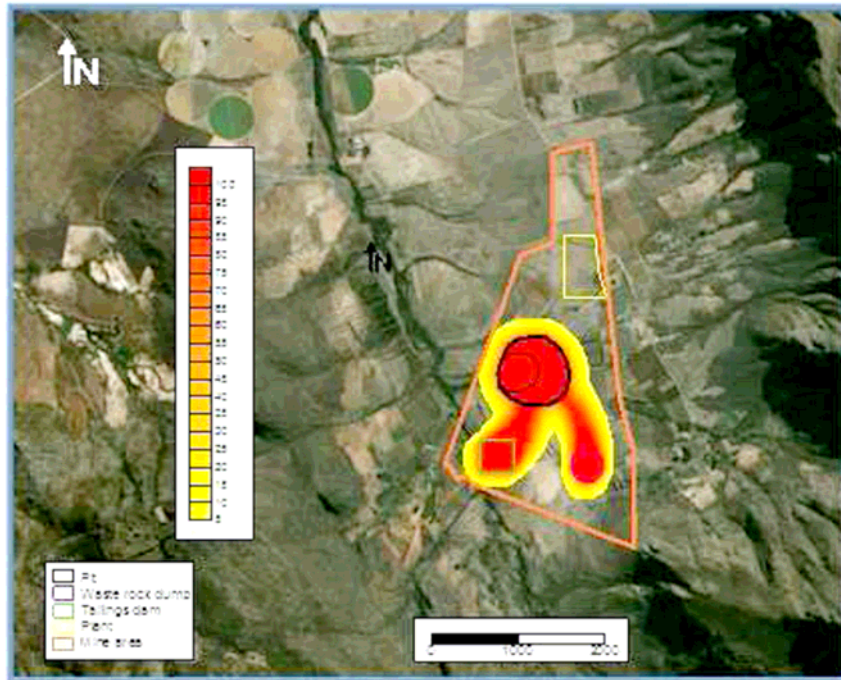


Figure 12 : Contamination after 20 years

5.1.2.5 Potential Impacts

For each of the two project phases (construction and operation), the potential impacts associated with the proposed mine have been assessed. From a groundwater viewpoint mining activities potentially could have an impact on the aquifers and natural river systems. Where the site is underlain by more permeable sand and gravel deposits a higher potential for groundwater contamination by accidental chemical and/or fuel spillages exists than where the site is underlain by a layer of less permeable compacted clay or sandy clay. **If prevented, contained and managed by good housekeeping and design, the groundwater contamination risk is deemed low.**

5.1.2.6 Mitigation Measures

The objective of implementing mitigation measures is to reduce potential negative impacts from the construction and operation of the planned mine plant, or to optimise positive impacts. Based on this, it is accepted that appropriate mitigation practises will form part of the construction and operation of the proposed mining project. The following measures must be implemented in order to reduce the significance rating of the potential impacts and to improve operation of the mine plant:

- Contamination of the soil and groundwater by accidental spills of chemicals, fuel, oil and / or grease must be kept to a minimum by applying a good 'housekeeping' approach. In the event of any such spillages, procedures must be in place to quickly and effectively repair any leakages and remove the contaminated soil. This soil must be collected and disposed of at a suitably licensed waste disposal facility.

- To obtain baseline information and monitor the impact of abstraction on the groundwater system a groundwater monitoring scheme must be set up. The monitoring holes should be equipped with digital water level and EC loggers. These boreholes must be installed and the monitoring initiated at least twelve months before construction and mining operations commence. Implementation of such a groundwater monitoring programme is essential, as it will provide information on groundwater quality and water level variation from which the extent of the impact of abstraction can be determined. It forms a legally defensible database against which any claims of surrounding land owners or the DWAF and mitigation measures can be gauged.
- It is envisaged that the clay material excavated during pit construction will be used for lining of areas where there is a contamination risk such as the plant and tailings (slimes) dam.
- Facilities which pose a contamination risk to the groundwater should be located as far as possible from highly transmissive fault structures to minimise the risk of contaminant propagation along these zones.
- Carry out the Phase 2 and 3 hydrogeological work in order to firm-up the preliminary conclusions reached from the Phase 1 work.

5.1.2.7 Conclusions and Recommendations

In conclusion, numerical models and groundwater assessments cannot simulate all the heterogeneities of a complex system such as the aquifer systems found on and around the site and can therefore only serve as an indication as to how the system functions and how much groundwater can be abstracted. In this case the inflows and the movement of contaminants are going to be dependent on the geological lineaments and their aquifer parameters. Lineaments can form conduits of preferential groundwater flow, which can cause sudden large inflows into mines. No aquifer parameters were available for such lineaments and fault zones for the preliminary modelling exercise.

It is therefore recommended that the following activities be carried out as part of Phase 2 and 3 studies:

- Site, drill and test suitable hydrogeological exploration boreholes to obtain aquifer hydraulic parameters for the various geological formations.
- A detailed hydrocensus of boreholes, springs and dug wells in the Krom Antonie River Valley to confirm existing borehole positions, groundwater use, groundwater levels and quality.
- A baseline monitoring system must be implemented and the numerical model recalibrated once this new information has been collected.
- Update the modelling scenarios with the new information.
- Carry out a full EIA specialist hydrogeological study.

5.2 Socio-Economic Environment

5.2.1 Social and Labour Plan for Bongani Minerals

A Social and Labour Plan for the proposed development of the Riviera Tungsten Project in Piketberg has been compiled by Prof. Jonathan Bloom of Umcebisi Business Advisers (Pty) Ltd in March 2009 (**Appendix 7**).

This Social and Labour Plan forms the basis for the implementation of programmes and projects as key activity drivers of the development and operation of the proposed Riviera Tungsten Project in Piketberg.

It offers the building blocks for future economic development and growth of the local area. The scope of the document offers the Riviera Tungsten Project a platform to engage in the development of the local economy and community through a basis of human resource development, economic delivery, business development and community participation. The nature of the document is therefore aimed at the widest possible comprehension and stimulation for inputs.

Introduction

The proposed mine intends offering employees opportunities to become functionally literate and numerate, learnerships; skills programme; portable skills and any other training as part of human resource development. In accordance with the required legislation, management will ensure adherence to various processes of skills development legislation including developing and submitting the workplace skills plans and annual training reporting; and paying and claiming of levies and grants from the SETA(s) with which the mine is registered.

Skills development plan

The Skills Development Plan is regarded as the strategic skills development framework for the Riviera Tungsten Project. This plan will act as a management guideline and will focus on critical skills areas, training initiatives as well as the legal context within which skills development takes place. Training initiatives and mechanisms, which will be addressed in the skills development plan, will include the following:

- ABET (Adult Basic Education and Training);
- Learnerships;
- Skills Programmes;
- Portable Skills;
- Other Training Initiatives;
- Workplace Skills Plan and Annual Training Report; and
- Skills Development Levies and Grants.

5.2.2 Local Economic Development Programme

Socio-economic and demographic perspective

The Project is located in the Bergrivier Municipal area, with Piketberg being the main centre. The assessment covers areas sub-divided into concentric zones that are based on specified sub-places. The sub-places within 20 km of the site proposed for the Project include Piketberg Non-urban (NU), Eendekuil, Goedverwacht and Piketberg Sub-Place (SP). Sub-places within 60 km of the site include those mentioned above together with Wittewater, Citrusdal, Clanwilliam NU, Koringberg, Moorreesburg, Porterville, Redelinghuys, among others.

An analysis based on the specified concentric zones suggests that 25,25% of the population in the Bergrivier Municipal Area reside within 20 km of the site live. The assessment indicates that 76,51% of the population within 60 km of the site reside in Piketberg, while 7,16% reside in Eendekuil. An assessment based on the population groups suggests that 81,61% of the population that reside within 20 km of the site are Coloured. The White population represents 16,43% of the total population residing within 20 km of the site.

In the zone 20 km from the site the tertiary sector employs 46,97% of the economically active population followed by the primary sector, which includes agriculture, with 36,72%.

The secondary sector accounts for 16,31% of the economically active population within 20 km from the site proposed for the Project. Indications are that almost one in three employed people residing within 20 km of the site work in the primary sector.

Key economic activities (sector analysis)

The “value” of the Bergrivier economy as measured by enterprise turnover was estimated at R1,4 billion for 2005/2006 (based on levies payable by enterprises operating in the area under the jurisdiction of the Bergrivier Municipality. The SDR levy system was discontinued in June 2006). This figure represents 6,14% of the turnover generated by levy paying firms in the West Coast District; 0,31% of total enterprise turnover in the Western Cape Province; and 0,04% of total enterprise turnover generated by levying paying businesses in South Africa (Statistics SA, 2006 and West Coast District Municipality, 2007). The Bergrivier economy is dominated by Agriculture, Forestry and Fishing (33,4%); Manufacturing (12,4%); Wholesale and Retail Trade, Catering and Accommodation (15,2%), and Finance and Business Services (11,2%). General government services also contribute a considerable proportion (13,2%) to the GRP of the municipal area. Together, these sectors contributed 85,4 per cent of the output generated by firms in the Bergrivier economy in 2004.

Developmental needs of Communities in the Bergrivier Municipal area

A need exists to align the development needs/priorities of communities with the social investment objectives of the Riviera Tungsten Project that emanate from the Local Economic Development Programme. A combination of the community needs applicable to the primary towns of Piketberg and Eendekuil within the Bergrivier Municipality, which are likely to provide a source of employment for the Riviera Tungsten Project, are summarised in **Table 3**.

Table 3: Assessment of needs expressed by different communities within approximately 30 km of the site proposed for the Riviera Tungsten Project

Need	Town	Impact	Nature of investment
Housing for farm workers	Piketberg	Medium	Active/ Physical
Job creation	Piketberg	High	Active Physical
Create a database for unemployed and facilitate training/work programmes	Piketberg Wittewater	High/ Medium	Active Physical/Abstract
Multi-purpose centre for job creation activities	Piketberg	Medium	Active Physical
Provision of infrastructure of low cost housing	Piketberg	Medium/Low	Active Physical
Programmes for food security (soup kitchens)	Piketberg/ Eendekuil	Medium	Active Physical
Youth development	Eendekuil	High	Active Physical/Abstract
Development programmes for small farmers	Eendekuil	High/ Medium	Active Abstract
Provision of sports facility (e.g. cricket)	Goedverwacht	Medium	Active Physical
Building an informal trading centre	Goedverwacht	Medium/high	Active Physical
Promote tourism	Goedverwacht	Medium/high	Passive Abstract
Library and computer facilities	Wittewater	Medium	Active Physical
Crèche	Wittewater	Medium	Active Physical

Note: The areas of Goedverwacht and Wittewater are close to Piketberg and although they may not be labour sending areas, they could be considered within acceptable radius to be considered as part of the local area, i.e. within 20-25km of the site proposed for the mine.

High impact refers to a sustainable venture with a multi-disciplinary focus and high developmental potential for both people and business.

Low impact refers to projects that have a narrow focus and although offering a benefit to the community is of significance to specific groups.

Medium impact refers to a sustainable contribution with a general focus on locality development and improvement in community upliftment, social development and poverty alleviation.

Source: Umcebisi Business Advisers, 2009 adapted from Bergrivier IDP (2008/2009)

The assessment suggests that the type of investment that should be considered by Management based on the prioritisation of community needs and the estimated impact level, include the following:

- a) Housing;
- b) Labour intensive development and training opportunities;
- c) Facilities and programmes for the youth and unemployed;
- d) Multi-Purpose centre and sports facilities;
- e) Food security.

5.3 Impact of the Tungsten Mine on the Area

The estimate of the employment required to establish the Tungsten Mine and erect associated facilities is approximately 320. **Table 4** provides a breakdown of the direct employment during the construction phase by skills level.

Table 4: A breakdown of direct employment during construction by skills level

Category of worker	Number of direct temporary employees
Skilled	13
Artisans (semi-skilled)	25
Semi-skilled Labour	74
Unskilled labour	149
Finishing specialists (semi-skilled)	59
TOTAL	320

Source: Umcebisi Business Advisers, 2009

The direct employment created during the establishment/construction phase of the Riviera Tungsten Project has the potential to make a positive contribution to the unemployment situation in the wider Bergrivier Municipal area, but specifically in Piketberg due to the proximity of the town to the Project and its status as a primary town in the municipal area. An estimate suggests that given an unemployment figure of 4 533 for 2013 (full scale mining will start after construction and establishment of the Project) and the use of 20% local labour, this would potentially translate into a 2,80% and 2,99% reduction in unemployment based on the projected “high” and “low” scenario, respectively, over the construction period.

If it is assumed that one unemployed person that now has a job was to provide for a family of five other people, it is estimated between 288 and 352 persons that previously lived in poverty could now be supported by breadwinners. These figures are based on a 20% take-up of local labour. An analysis of the job-creation for the operations phase suggests that the Riviera Tungsten Project could add an additional 407 direct new jobs to the workforce of the Bergrivier economy by the time the Project is fully operational.

Several indirect and induced jobs would also be created in the local area. Note that these figures do not include additional employment that will be created due to the outsourcing of services and opportunities created for SMMEs by the development of the Riviera Tungsten Project. The direct employment impact of the Riviera Tungsten Project per level of skill is indicated in **Table 5**. An analysis of the direct employment opportunities indicates that 10% would accrue to persons that are highly skilled, 37% to persons with the required skills and 53% to semi-skilled and un-skilled workers.

Table 5: Direct employment estimates per project component

Project component	Highly Skilled	Skilled	Semi Unskilled	Permanent	Seasonal	Total
Mining operation	42	150	213	405	0	405
Total	42	150	213	405	0	405

Source: Multi-Purpose Business Solutions

Given an unemployment figure of 10 717 for 2020, the use of 20% local labour would potentially translate into a 2,77% and 2,26% reduction in unemployment based on the projected “high” and “low” scenario, respectively, over a period of ten years.

Umcebisi Business Advisers (Pty) Ltd believes that agglomeration benefits associated with the Riviera Tungsten Project could be a catalyst for establishing linkages between businesses, growing existing businesses internally in the area and improving the social welfare of the community.

These linkages would further enhance the potential of businesses to generate additional revenue and employment for communities within the region of the Project and in the Western Cape by exploiting the inter-regional affects between the regions.

The socio-economic development activities of the Project, which include poverty alleviation, will be managed under the auspices of the Riviera Community Development Trust (RCDT), which will be formed to give effect to the social responsibility of the Project. The Riviera Tungsten Project will provide an initial direct investment into the local Bergrivier economy of between R1,2 and R1,5 billion over the first five years of operations.

Procurement plan for HDSA companies

In order to ensure a fair, equitable and transparent application of the social engagement, procedures are required to successfully address procurement from HDSA businesses, individuals and services providers. The procurement of a service provider will follow the procedures stipulated by a tender process, which culminates in a call for proposals and the appointment or non-appointment of a service provider to undertake the required scope of work. The BEE status will be assessed as a sifting requirement to ensure that under-represented businesses and individuals have an opportunity to engage in the procurement and ultimately have an opportunity to work on the Project. Notwithstanding, the BEE status will be required with proof from all businesses, large and small (proof of exemption is applicable), as part of the process. Local businesses will be favoured and these guidelines will form an essential component to ensure the key performance targets are met.

Housing and living conditions

The Project will require approximately 300 units should the employees prefer to make use of the housing provided by the Project and not opt for a subsidy. Housing will be provided by the Riviera Tungsten Project for its employees in Piketberg and/or Eendekuil. The Riviera Tungsten Project will procure land aimed for township development in either Piketberg or Eendekuil, which are close to the operations and in a manner that advance its initiative to provide for low- and middle-income housing for employees. In order to ensure sustainability of the housing development, the Riviera Tungsten Project will ensure that the township/settlement makes provision for tenure, investment and access to public facilities. The Riviera housing strategy that encourages home ownership, will ultimately involve selling houses previously owned by the company to employees. First preference will be given to employees with a long service record.

5.4 Monitoring and Evaluation Plan

The success of the social and labour initiatives will depend essentially on whether or not milestones and targets have been achieved. The Monitoring and Evaluation Programme will strive and endeavour to achieve the outcomes as envisaged through the objectives of the "Mining Charter" which is referred to as the Broad-based Socio-economic Empowerment Charter for the Mining Industry published in 2004. This will be done through internal monitoring and evaluation, independent evaluation and project meetings

5.5 Financial Provision

In line with Sections 23 (1) (e) and 84 (1) (g) of the Mineral and Petroleum Resources Development Act (Act 28 of 2002), the applicant for a mining right must provide financially and otherwise for the Social and Labour Plan. The Riviera Tungsten Project will do this through a Human Resource Development Plan and a Community Development Trust.

6 TYPE AND SCALE OF POSSIBLE ENVIRONMENTAL IMPACTS

The following potential impacts and their associated mitigation were put forward from the results of the specialist desk top studies undertaken by the appointed specialist consultants, and by the EAP from the results of the environmental evaluation of the mining site and its environs. These potential impacts and their assessed level of severity will be assessed according to the results of the specialist studies still to be undertaken during the EIA phase of the project.

6.1 Air Quality

6.1.1 Impact

A weather station needs to be employed in the valley to measure wind data, air quality, temperature, rainfall and humidity. A number of dust monitoring stations will also need to be positioned at various key localities in the valley.

Baseline data needs to be collected for at least a year before mining commences. This data will need to be used for the EIA process. Prevailing wind data and dust monitoring will be important for deciding where to locate mine infrastructure and spoil areas. The impacts of dust on the agricultural industry could potentially be MEDIUM TO HIGH (e.g. setting of fruit, amongst others).

6.1.2 Potential Mitigation

The only effective dust suppressant in mining operations is the use of water, by wetting roads, employing mist sprays at the primary crusher and a rock and earth dumps. Slimes dams will need to be regularly rehabilitated with topsoil and vegetation to prevent dust pollution. A temporary irrigation system will need to be employed on the rehabilitated rock and earth dumps and slimes dam to ensure the success of the rehabilitation programme.

6.2 Geology, Soils, Topography and Land Capability

6.2.1 Impact

The impacts could be potentially HIGH to VERY HIGH for the proposed open-cast mining area. Potential impacts will result from the standard open-cast mining methods, which involve the removal of large volumes of topsoil, alluvial and colluvial overburden and rock in order to expose the ore body. The fragmented alluvial and colluvial overburden stockpiles are exposed to oxidation and un-weathered faces could potentially make contact with groundwater, affecting its quality. Topsoil is also stockpiled and replaced many years later during rehabilitation, which negatively affects soil structure, soil fertility and thus post-mining land capability. Post-mining changes to the topography will however be insignificant as the site is located in a fairly flat area.

6..2 Potential Mitigation

Rehabilitation guidelines will be included into the EMP. These guidelines will draw on specialist knowledge, the latest scientific literature and on the Chamber of Mines of South Africa's 1981 Handbook of Guidelines for Environmental Protection, Volume 3/1981. The Rehabilitation of Land Disturbed by Surface Coal Mining in South Africa.

6.3 Land Use

6.3.1 Impact

During the mining process the current land use of the potential open-cast mining area is progressively decommissioned before mining and could thus theoretically be re-established after the cessation of mining. Since mining is temporary (±20 years), agricultural activities could theoretically take place once decommissioning and rehabilitation has taken place on the remaining open areas.

As a result the impact on the existing land use in the area may be MODERATE to HIGH, depending on the agricultural potential of the soil.

6.3.2 Potential Mitigation

Rehabilitation of the area after mining will strive to re-instate the suitability of the area for pre-mining (current) land use viz. agriculture. Mitigation measures will be included into the EMP. Alternative land use options could also be considered, such as tourism.

6.4 Botanical Assessment

6.4.1 Impact

Impacts on vegetation and fauna within the boundaries of the site identified for the potential Riviera Tungsten Open-Cast Mining Project are likely to be LOW due to the fact that, with the exception of suitable habitat along the Krom Antonies River, the area has nearly been totally disturbed by farming activities and thus supports an extremely low floral biodiversity and limited breeding habitats.

The proposed mining activities may however have MODERATE to HIGH impacts upon groundwater-dependant ecosystems (if changes to or pollution of the ground and/or surface water occurs). Mining activities may also have HIGH impacts on riparian vegetation should the course of the Krom Antonies River or its smaller tributaries be changed.

6.4.2 Potential Mitigation

The recommendations of the botanical study and associated mitigation measures will only be able to be assessed during the EIA Phase of the project, once a detailed vegetation survey of the site affected by the Proposed Riviera Tungsten Open-Cast Mine has been undertaken. These mitigation measures will however be included into the EMP.

6.5 Freshwater Ecosystems

6.5.1 Impact

Potential impacts include:

- increases in sedimentation of the Krom Antonies River system;
- increases in erosion within the Krom Antonies River or its associated tributaries;
- loss of extant wetland areas;
- encroachment into riverine buffer areas (riverine buffer areas of between 30 and 50m from the edge of each river bank should be anticipated);

- diversion of even minor tributaries of the Krom Antonies River, resulting in increased downstream velocities, loss of ecosystem processes that are considered beneficial in terms of water quality amelioration or management of sedimentation and/or erosion;
- abstraction of surface or groundwater flows; and
- changes in the salinity, pH, nutrient loading or loading and/or concentrations of heavy metals and/or other chemical constituents that might impact on freshwater ecosystems within the Krom Antonies River or on the Verlorenvlei River downstream.

The impacts on the freshwater ecosystems could potentially be HIGH to VERY HIGH.

6.5.2 Potential Mitigation

These impacts will be researched further during the EIA phase, in order for a proper assessment of their ecological implications to be carried out, and for effective mitigation measures to be worked out.

Mitigation measures will include the drawing up of a detailed stormwater management plan, plans for active upgrading and rehabilitation of the riverine ecosystems associated with the Krom Antonies River (through establishment of effective riverine and other wetland buffers or setback areas, establishment of corridors for the movement of fauna along the river, between the mountains and the Verlorenvlei system downstream, management of alien fauna (fish) and flora and setting abstraction of surface and groundwater flows at sustainable levels). These mitigation measures will be included into the EMP.

6.6 Water Quality

6.6.1 Impact

Possible impacts include the deterioration in surface and groundwater water quality resulting from mining activities, affecting the Krom Antonies Rivier and the ecologically sensitive Verlorenvlei. The impacts on the surface and groundwater water quality could potentially be HIGH to VERY HIGH.

6.6.2 Potential Mitigation

Water quality and freshwater ecosystem-impacts are by nature, inextricably linked, and mitigation measures employed would apply to both spheres of management.

Mitigation measures are to be further elucidated during the EIA phase (and included into the EMP) would include compliance with relevant legislation regarding solid and liquid waste management systems, fuel and hazardous substances management, stormwater management and management of tailings/slime dams.

Effective mitigation would rely on the implementation of an exhaustive baseline water quality monitoring programme during the EIA phase, in order to determine the effects of mining on water quality during the Operational Phase.

The proposed monitoring network includes the upper, middle and lower reaches of the Krom Antonies River; the Hol and Kruismans Rivers upstream of the confluence with the Krom Antonies; the Verlorenvlei River downstream of the confluence with the Krom Antonies River; the old DWAF gauging site at G3H002, as well as the outflow from Verlorenvlei. Monitoring should start during the

EIA phase, prior to any construction, and continue during the Construction and Operational Phases of the mine should it be approved.

6.7 Hydrological and Hydrogeological Impacts

6.7.1 Impact

Given the agricultural activities in the valley, the farmers would want to know how the mining, with its infrastructure (spoil areas, slimes dams and mineral separation operations), would potentially affect their water resources both surface and groundwater.

To assess these impacts, two specialists were appointed to undertake specialist studies to understand the hydrological model and the groundwater model of the valley (i.e. gain an understanding of the potential impacts on the surface water and groundwater within the valley).

The potential impacts of the predictive models defined have indicated that with the appropriate mitigation the groundwater contamination risk is deemed to be LOW. Similarly, if spoil dumps and slimes dams are kept away from rivers and streams, the potential contamination of surface water can also be LOW.

6.7.2 Potential Mitigation

To obtain baseline information and monitor the impact of abstraction on the groundwater system a groundwater monitoring scheme must be set up.

It is envisaged that the clay material excavated during pit construction will be used for lining of areas where there is a contamination risk such as the plant and tailings (slimes) dam.

Facilities which pose a contamination risk to the groundwater should be located as far as possible from highly transmissive fault structures to minimise the risk of contaminant propagation along these zones.

Carry out the Phase 2 and 3 hydrogeological work in order to firm-up the preliminary conclusions reached from the Phase 1 work.

All rock and earth dump areas and slimes dams must be kept well away from the 1:100 year flood levels of rivers and streams.

All water used in the mining and processing operation must be recycled and must be stored in water tight reservoirs to prevent any pollution of groundwater or surface water.

6.8 Traffic Impacts

A Traffic Impact Assessment (TIA) will be required for the study area. The cumulative impacts of the proposed mining development will need to be assessed in terms of the current and future road infrastructure and what cumulative impacts the mining will have on the road system (wear and tare) and what impacts it would have on the agricultural community. Traffic counts would need to coincide with the harvesting of the various agricultural products produced in the valley.

The recommendations of the study, applicable impacts and mitigation will be assessed during the EIA Phase of the project and will be considered by the Town Planners and Civil Engineers in their design of the project.

6.9 Impacts on Heritage and Archaeological Resources

In terms of the National Heritage Resources Act (25 of 1999), it will be necessary to undertake both a Heritage Impact Assessment (HIA) and an Archaeological Impact Assessment for the whole mining development area. The HIA will to some degree be guided by the archaeological assessment, and the industrial nature of the mine building in a rural environment of the proposed development. The report will need to be submitted to the Provincial Heritage authority for comment in terms of the NHRA.

Because of existing agricultural pursuits, the potential impacts on heritage resources are anticipated to be LOW.

The recommendations of the study, applicable impacts and mitigation will be assessed during the EIA Phase of the project. Mitigation measures will be included into the EMP.

6.10 Visual Impacts

A Visual Impact Assessment (VIA) has been requested by DME. A 3-D terrain model may be required to assess the key observation points from which the proposed mine infrastructure will be visible.

The recommendations of the study, applicable impacts and mitigation will be assessed during the EIA Phase of the project. Mitigation measures will be included into the EMP.

6.11 Socio-Economic Impacts

The social and economic impacts (positive and negative) of the proposed mining development will be undertaken in the EIA phase of the project. The report will need to provide the assessed cost figures of the benefits and negative impacts of the proposed project on the social and economic environments of the region. The government's policies with respect to BEE status of the mining company will also need to be considered. A social engagement strategy will need to be provided and how such a strategy will be implemented for the local communities (Elandsbaai, Redelinghuys and Piketberg). The economic impact of the mine on the agricultural sector will need to be undertaken as part of the socio-economic impact assessment. The socio-economic impacts of the decommissioning of the mine will also need to be considered.

Whilst potential positive impacts of the mine on the economic environment of the region could be seen to be HIGH, potentially HIGH negative impacts on the socio-economic fabric of the Krom Antonies Valley could occur. It should be noted that economic impacts will only be felt for the approximate 20 year lifespan of the mine. Mitigation measures will be included into the EMP.

7. CONSULTATION WITH IAPs

7.1. Identification of IAPs

The identification of interested and affected parties has been undertaken by firstly noting the affected property owners and the IAPs that took part in the original public participation process undertaken for the Prospecting Right application (**Appendix 8a**). Notices were sent to the identified IAPs informing them of the application of Bongani Minerals for a Mining Right and of the Public Participation process being conducted as part of the Scoping Process, which forms part of the application (**Appendix 8b**). Advertisements were also placed in the *Die Burger* regional newspaper and the local *Die Weslander* newspaper calling for IAPs to register for the Mining Right application (**Appendix 8c**). The Wildlife and Environment Society of South Africa (WESSA) and Cape Nature were also identified as IAPs.

The many articles in the regional newspapers (**Appendix 9**) and the Carte Blanche TV shows have also played a useful role by informing potential IAPs of the proposed tungsten mine. A number of IAPs have, as a result of these newspaper articles and TV show, contacted the EAP to register as IAPs.

Dr. B. van der Merwe has also started a blog on the Verlorenvlei website. This blog has generated some interest in the proposed Riviera Tungsten Mine (**Appendix 10**).

7.2. Public Meetings

In terms of the Mining Right application, one meeting to discuss the Scoping Process, the mining and processing of the Riviera Tungsten deposit and the results of the specialist consultant's reports was held on 30 April 2009 in a large shed on the Karookop farm, as the Karookop Primary School was too small to accommodate all the IAPs that attended the first meeting. Some 130 IAPs attended the Scoping public meeting (**Appendix 11**).

A second Public Open Day will be held to discuss the EIA phase of the Mining Right application. The list of all current registered IAPs is provided in **Appendix 12**.

7.3. Summary of Issues Raised By IAPs for the Prospecting Right Application

A summary of the main issues raised by IAPs during the Prospecting Right application is provided below. Other issues that have been raised by IAPs for the Scoping process of the Mining Right application have been captured and noted below.

The IAPs raised the following issues relating to the Prospecting Right of the proposed Riviera Open-Cast Mining Project:

- EIA Process and public participation process was questioned;
- soils, topography and land use impacts;
- fauna, flora and ecosystem impacts;
- surface and groundwater impacts and the monitoring and mitigation thereof;
- air quality impacts and the monitoring and mitigation thereof;
- noise impacts;
- visual impacts;
- roads, transport and traffic considerations, studies needed and mitigation;
- heritage impacts;
- waste management and the anticipated impacts;

- socio-economic concerns; and
- project and mine related (production) issues.

7.4. Public Participation Process in terms of the Mining Right Application

The Scoping Report sets out the proposed scope of the EIA and EMP that will be undertaken for the proposed Riviera Tungsten Open-Cast Mine. This includes the alternatives that will be evaluated for various aspects of the project, the key environmental impacts and issues that need to be addressed, the specialist studies that need to be undertaken and the terms of reference of the specialist studies that will be undertaken during the EIA phase of the project.

The Scoping Report was made available for public review from Thursday 23rd of April 2009. Copies of the Scoping Report were made available for review purposes at the library in Piketberg and at the Karookop Primary School. A hard copy of the report was also provided to Dr. B. van der Merwe, a Director of Little Swift Investments 56 (Pty) Ltd., which owns the Farm Moutons Hoek (Farm 297/1). Many registered IAPs were also provided electronic copies of the DSR.

Advertisements were placed in the local *Die Weslander* Newspaper (English and Afrikaans) on 22 April 2009 and in the regional *Die Burger* Newspaper (Afrikaans) on 23 April 2009, giving notice of the proposed Mining Right application and the availability of the Draft Scoping Report and the public meeting.

The **public meeting** held to discuss the proposed Riviera Tungsten Mining Right application on **30 April 2009** at the Karookop Primary School was also advertised in the above newspapers. The meeting was relocated to a large shed on the Karookop Farm to accommodate all the IAPs who attended the meeting. Notes recorded at the meeting were provided in **Appendix 13a**.

Written comments on the Draft Scoping Report were to be forwarded to Withers Environmental Consultants by 25 May 2009. However, a number of IAPs requested additional time for providing written comment. The period for written comment was extended to 1 June 2009.

Written comments received by WEC have been included in this Final Scoping Report (**Appendix 14**). The comments received from IAPs (verbal and written) and the respective responses provided by WEC have been tabulated in **Table 6**.

8. PROPOSED RIVIERA TUNGSTEN MINING PROJECT: KEY CATEGORY DIVISIONS OF IMPACTS AND KEY ISSUES RAISED BY IAPs

All the issues raised by IAPs during the Scoping Process conducted thus far regarding the proposed Riviera Tungsten Mining Project have been divided into a number of **key environmental categories**. In turn the issues themselves have been divided into **key groups**. The issues listed below have been summarised from the reviewed IAP comments (**Appendix 11**), the notes taken at the public meeting (**Appendix 12**) and the corresponding summary Table (**Table 6**). The issues raised do not reflect any particular order nor have they been ordered in any way according to their potential severity of impact or significance. This will be undertaken in detail during the EIA Phase of the project. Each specific issue raised (reflected in ***bold italic print***) has been responded to by the environmental consultant (in normal print).

The issues raised have been divided into the following key environmental categories:

- Biophysical Environment Issues
- Alternative Development Options
- Engineering Issues
- Socio-Economic Issues
- Environmental Authorisation Process
- Legal Issues
- Heritage and Rehabilitation Issues

8.1 Biophysical environment issues

8.1.1 Impact of proposed Mining on Ecology and Biodiversity

1. ***Rare and threatened species of Fauna and Flora occur in the Moutonshoek Valley and Verlorenvlei RAMSAR Area. Refer to comprehensive studies done by Chittenden Nicks Partnership (1995) in conjunction with Weskus Streeksdiensteraad and Cape Province Administration.***

Very little natural vegetation remains on the 550ha mining lease area. However, it will be vitally important to assess the impacts of the mining on the integrated ecosystem of the Verlorenvlei system as a whole, especially the impacts on surface and underground groundwater flow along the Krom Antonies River and into the Verlorenvlei system. Specialist studies will determine the significance of such potential biophysical and ecological impacts.

2. ***By permitting mining in the catchment that feeds Verlorenvlei, as well as in the vicinity of the Krom Antonies River itself, will severely compromise these waters that are a breeding ground for a multitude of various flora and fauna. Some fauna and flora are already severely threatened in this area without needing any additional strain put on them by mining on their turf. Is Verlorenvlei not a recognised and protected environmental heritage site? How therefore can this mining operation even be contemplated?***

The potential impacts on the surface and underground water systems of the Krom Antonies River and inflows to Verlorenvlei will be assessed by hydrological, hydrogeological, vegetation and freshwater ecological studies. Desktop studies have already been undertaken by these specialist to understand how these systems work from biophysical points of view. These studies need to

continue to obtain a high degree of certainty on how these systems function and their level of integration before any conclusions can be drawn regarding the potential impacts.

3. ***The effect on the Verlorenvlei wetlands and estuary with specific reference to fauna and flora will need comprehensive study. There will be an impact on the vlei. The EIA must articulate the local importance and rarity of remnant vegetation and flora on and around the site, and whether any losses could be offset by search and rescue of key species as well as rehabilitation of like habitats within the general area.***

The area which would be directly impacted by the mining activities has largely been transformed by agricultural activities. However, there are still important fragments of indigenous vegetation, including

- ***Leipoldtville Sand Fynbos, which is classified as endangered,***
- ***Swartland Shale Renosterveld, which is classified as critically endangered,***
- ***Piketberg Quartz Succulent Shrubland, which should be classified as endangered because of the extremely small area it covers,***
- ***Piketberg Sandstone Fynbos,***
- ***Cape Lowland Alluvial Vegetation, which is also classified as critically endangered, and***
- ***Cape Lowland Freshwater Wetlands.***

CapeNature does not support any further loss of any endangered or critically endangered vegetation types. The CAPE fine-scale planning process has also classified terrestrial and aquatic Critical Biodiversity Areas (CBAs) within and adjacent to the application area. These CBAs must be taken into consideration in any further specialist studies.

Specialist studies on fauna and flora will be done in the EIA phase. All impacts will be assessed and possible mitigation measures will be included in the Environmental Management Plan.

8.1.2 Impact of Proposed Mining on Water Resources of Verlorenvlei and Surrounds

1. ***The most overwhelming issue is that of the hydrological affect on Verlorenvlei and the reduction in inflow from the Krom Antonies River. There is no mitigation that could eliminate this effect on a RAMSAR site and one of South Africa's most important wetlands.***

Refer to 8.1.1.1 and 8.1.1.3 above. It is agreed that the maintenance of the current hydrological flow into the Verlorenvlei system is of cardinal importance. It is therefore vital for the success of the EIA that access to the farms within Krom Antonies Valley is obtained to be able to undertake the required detailed specialist studies listed in 8.1.1.1 above. The brief of the specialists mentioned above and for the mine engineers will be to recommend various mitigation measures for reducing the significance of the potential impacts on the integrated Verlorenvlei system, and to assess the resultant significance of the potential impacts after mitigation.

2. ***The potential impact of the mine on water resources – groundwater, surface water and coastal waters – is of extreme concern. Water is a very real issue, where there is a nationally recognised shortage, especially in this particular valley. Drawing water from rivers from afar (the Berg and Olifants Rivers) and Verlorenvlei's own Krom Antonies River is totally unsustainable. The impact could possibly be felt in distant places (i.e. Potatoes in the Sandveld or spring flowers in Namakwaland). The water emanating from the Krom Antonies River catchment is of high quality and also water stressed. Pollution of all sorts (water, air, noise) will undoubtedly have consequences in times to come. Most businesses, farms and residents in the***

Verlorenvlei rely on ground and surface water resources, which are at serious risk of pollution by the mine.

Freshwater inflows into the rivers systems of Verlorenvlei are not only vitally important for the ecology of the vlei but obviously also for the farmers within this catchment who rely on water from the rivers and groundwater for irrigation. It is highly unlikely that water from the Berg and Olifants Rivers will be required for the proposed mining operation. The proposed studies mentioned in 1.1.2 need to be undertaken to assess the impacts of mining on the river and ecosystems associated with the applicable catchment of Verlorenvlei.

- 3. Surface water flows in the Verlorenvlei catchment tend to be primarily limited to event-driven, short-duration episodes, and groundwater plays a strong role in maintaining the Kruis River/Verlorenvlei river system. Malan and Day note that extensive lengths of the rivers in this arid area are characterised by hyporheic (i.e. subsurface) flow from a multitude of intersecting groundwater outflows (springs and seeps). This alludes to the importance of the ground water flows. Extensive dewatering of the excavated pit would be required through the mining operation, with water stemming from both the primary (surface) aquifer and from faults running through the underlying rock layers (Appendix 5, p. 20). This suggests that the pit will intercept, and attract, water from the aquifers. Dr L Day (Appendix 5, p. 23) suggests that sealants or linings to be used to prevent inflows into the pit, or that cut-off trenches are used to divert groundwater flows into existing stream systems. Neither option is in our view practically possible. Whilst cut off drains may in places be able to intercept the surface alluvial aquifer, it could not do so for the deeper confined or semiconfined aquifers.***

The proposed integrated specialist studies (hydrology, hydrogeology, botany and freshwater ecology, together with the geotechnical and mine engineers) should be able to assess the biophysical environment to obtain a better understanding to in turn assess the significance of the potential impacts and proposed mitigation and reduce the significance of such potential impacts.

- 4. Will a Reserve Determination be made for the required water flow in the Krom Antonies River, i.e. is there any more water that can be extracted from the River for use in the mine without affecting the River and ultimately the Verlorenvlei?***

Specialist ground and surface water studies will be undertaken during the EIA phase. The results of the specialist studies will be assessed against the results obtained by CSIR in their rapid reserve determination for Verlorenvlei. Whilst a Reserve Determination of the Krom Antonies may not be possible, the specialist scientists should be able to assess the significance of the potential impacts.

- 5. The DSR provides no information on the estimated volume of water that the mine would use in this extremely water-sensitive geographical area. How much surface and ground water would be abstracted?***

The peak water demand to be used by the mine and minerals processing is determined to be: mining $\pm 100\text{m}^3$ (dust suppressants) and 3500m^3 minerals processing: The source of water will be groundwater (dewatering). It should be noted that 70% of the water used in the minerals processing could be recycled. These figures will be revised once the specialist have compiled their studies.

- 6. The Government sponsored Working for Wetlands programme has been active in the Verlorenvlei area doing wetland rehabilitation work for years. All this work will be destroyed by the proposed mining activities and will have detrimental effects on all activities and ecosystems downstream. This investment of tax payer's money into a worthy combination of environmental rehabilitation and job creation could be***

seriously compromised by threats to the water quality and quantity as noted in the Scoping Report under “constraints” pg iii) “drainage to the sensitive Verlorenvlei estuary” . We call for the environmental constants to constructively engage with Working for Wetlands about this issue and make the findings of this process available to other I&AP’s.

Specialist ground and surface water studies to assess the impacts of the proposed mine will be done in the EIA. The EIA will be made available to IAPs for comment in due course.

- 7. We question the use of water for mining activities in an area that is already known to be extremely water stressed. We have called for comment from the Department of Water Affairs and Forestry on current and future availability of water in the area. We call for a specialist report by a geohydrologist that specifically addresses the issue of availability of water in the catchment area and the potential impact of abstraction of water for the proposed mine on other water users. We call for reference to the concept of the ecological reserve as upheld in the National Water Act.***

A geohydrological study will be done in the EIA. DWAF will also be asked to supply comment on the EIA. The necessary applications will be made to DWAF in terms of the National Water Act, by the responsible geohydrologist.

- 8. Potential impacts identified by Dr Day are of serious concern to DWAF as it can have a negative impact on the water resource. DWAF is interested to know what the present ecological state and classification of the river is and how the mining activity will impact on the present state.***

The present state of the river and possible impacts will be assessed in the EIA. Various specialist have been appointed to undertake such studies.

- 9. The risk of pollution in the catchment area of the Verlorenvlei due to the hazardous substances involved in the processing of the mineral and the importance of the Verlorenvlei itself as a Ramsar site must therefore mean that there cannot be any reason to allow such a development to take place. Statements by the mining company that they will prevent this pollution of the groundwater from taking place must be measured by the well documented cyanide poisoning of ground waters that occurs around the gold mines of the North West province as well as the acidification of the groundwaters and wetlands surrounding the Mpumalanga coal mines shows that legislation and so called mitigation procedures as proposed by Bongani minerals simply do not work as there is no monitoring or enforcement of legislation by the authorities.***

The potential risks of polluting the Krom Antonies River will be undertaken by specialist studies. If it is possible to mitigate such risks totally, then mining and processing could be considered. If the anticipated risks of pollution remain high dispute mitigation mining may not take place. Please note that the cyanide is used in gold processing and not in tungsten processing. Similarly the acidification of groundwater by coal mines is very different to tungsten mining. All the mitigation recommended by specialist will be included in the EMP. Such recommendations include monitoring during mining and after closure of the mine. Monitoring and enforcement is tightly controlled by DME in terms of the EMPR.

- 10. Reference was made to the “perennial Krom Antonies River”. 2009 was the first in decades that this river flowed through the summer which is hardly perennial!***

The report has been amended.

11. The “predictive zones of influence” for the draw down of groundwater by the “pits” (as shown in the SRK report) seem more appropriate to a homogenous material. What will be intersected are at least two aquifers, the one being at the highly fractured contact zone with the granite pluton. The presence of at least two fault lines further complicates predictions regarding groundwater flow and potential interference with the current water distribution within the Verlorenvlei valley.

Refer to 8.1.2.3 above. Please note that the modelling undertaken did take the two aquifers into account. The model will be refined once drilling and pump testing of boreholes is carried out during the EIA phase of the project.

12. The Report indicates that the proposed prospecting activities will result in a pit depth of approx 200m, with the first ore being at approx 60m. The Department of Agriculture is concerned for the aquifers in the proposed area of activity as they lie 10 – 30m below the surface. It is also clear that this could lead to the accumulation of surface water which could potentially become contaminated enroute to the aquifer leading contamination of the aquifers in the Valley and, most landowners make use of the groundwater for domestic and livestock watering purposes, and some for crop production. Contamination of the groundwater would rob the Agricultural landowners of their right to make a living. This Office feels justifies in requesting a more focused Specialist Study on the Impact of the Proposed Activity on the Groundwater Supply and Quality.

Refer to 8.1.2.1-8.1.2.9 above. Detailed hydrologist impact assessment will be undertaken, which includes the drilling of a number of shallow and deep boreholes, the testing of the chemistry of the groundwater and the volumes that can be pumped. In addition a geotechnical assessment will be undertaken to determine the potential weathering of the host rock and the possibility of contaminating the surrounding groundwater, especially during dewatering. Monitoring for possible pollution of groundwater will take place during mining and after closure.

8.1.3 Impact of polluted groundwater

1. Should groundwater be polluted by the mine, it would have catastrophic consequences for those who rely on groundwater for both drinking water and irrigation (a substantial amount of irrigation in the Verlorenvallei is supplied by groundwater. Water supplied by the Redelinghuys Municipality is derived from an artesian well in a valley above Matroozefontein just outside Redelinghuys at a rate of 31 litres/second (977,616 m³/annum). This presumably emanates from the semi-confined aquifer through which the pit will be excavated. Any changes to the quality and availability of the water from the fountain will have serious health, welfare and development implications for the town.

Specialist ground and surface water studies will be done in the EIA phase to identify, assess and rate possible impacts as well as suggest possible mitigations.

2. What could the impact of continuous blasting in the Moutonshoek Valley have on the underlying strata and thus groundwater flows? If the behaviour of groundwater is still an uncertain science how can anyone really be sure? The 1969 earthquake in Tulbagh shut down 13 fresh water “fonteine” around the Verlorenvlei.

See 8.1.3.1 above. Blasting will hardly cause earthquakes.

3. Any mining which will negatively and irreversibly impact groundwater depth and quality – and therefore the extent, quality and ecological functioning of streams and

wetlands in the area – should not be permitted as should any further impacts on the Krom Antonies and Verlorenvlei Rivers.

We agree with this sentiment and hence for the specialist studies that need to be undertaken to either prove such impacts or disprove them.

4. Para 5.1.8.6, points out that “contamination of the soil and groundwater by accidental spills of chemicals, fuel, oil and/or grease must be kept to a minimum by applying a good “housekeeping” approach. The IAP simply does not have the confidence that Bongani Minerals (Pty) Ltd have the moral fiber or the will to ensure that NO accidents occur and that the waste tailings will be maintained for the entire life of the mine. I also simply do not have the confidence that the stipulated processes will be implemented with the greatest speed and enforced with the greatest capacity in order to avoid contamination of the soil and water.

All mines must have SHE personnel appointed. The SHE offices must report all incidents of pollution, spills etc. All pollution incidents must be cleaned up according to the EMPR. Other monitoring and auditing tools will be in place to ensure that such pollution is noted and cleaned up. Such incidents are also controlled by a number of Acts (eg. NEMA, Minerals Act, National Waste Act).

5. The alarming problem is that Groundwater pollution also occurs on different timescales than surface water contamination. Flow rates vary widely and can be as slow as two miles a year. Because of this, non point source pollution can take years or even decades to appear in wells and just as long or even longer to dissipate or be converted. It could take ten years from Het Kruis to pollute Verlorenvlei- 2 miles per year. groundwater pollutants can enter the body directly through water supplies or by eating foods prepared with contaminated groundwater or grown in fields using contaminated sources, it may also effect humans when they are in direct contact with polluted waters. This could mean that all the potatoes, fruit, etc could be contaminated in the Verlorenvlei valley which uses ground water to irrigate its lands. As you are aware the mine is going to be situated on the Krom Antonies River which feeds the Verlorenvlei water catchment area.

See 8.1.3.1 above. The existing hydrogeological model of groundwater and the subsurface geology created by SRK will be assessed and refined in accordance with actual drilling results, groundwater pumping and geotechnical studies that still need to be done.

6. What chemicals are used in the extraction process to concentrate tungsten, and will these chemicals not leach into the groundwater and ultimately into the river systems of Verlorenvlei from the slimes dam?

The chemicals used in the refining process are “house-hold” chemicals such as potash and alkali caustic soda (The proposed metallurgical plant will be divided into two operations according to Venmyn Rand (Pty) Ltd.: The Concentrator plant, utilising mill, float and gravity operations to generate molybdenum sulphide and tungsten oxide (Scheelite) concentrates; and a Concentrates Treatment plant to produce ammonium paratungstate (APT) via either a soda ash leach route involving crystallisation or an alkali caustic soda leach route involving either solvent extraction or ion exchange).

Details regarding the volume and type and concentration of each chemical to be used and released by all the different processes in the Concentrates Treatment Plant only become available once the exact composition and chemistry of the ore body has been determined (Geotechnical Report to be conducted during the EIA phase will contain this information).

The chemicals used will as a matter of course be determined by the choice of end-product i.e. low grade flotation/gravity concentrate (30% WO₃) ; leached flotation/gravity concentrate (60-65% WO₃); or APT (ammonium paratungstate) at 96.8% WO₃. Choice of end-product will only be made once the detailed analysis of the ore (and Bongani Mineral's subsequent economic feasibility analyses) have been completed. Chemical waste should however be "treated" in some manner to reduce the pollution properties. Recycling plants for being able to reuse the refining chemicals should be built into the plant.

The slimes dam/s will be lined with a layer of mined in-situ clay. The sides of the dams will also be periodically covered with layers of clay once the water has evaporated from the slimes tailings. These clay linings will function as engineered hydraulic barriers to the movement of water and leachate from the slimes dams into the surrounding environment (the potential composition of the leachate is to be determined during the EIA phase).

8.1.4 Impact of proposed mine on surface water salinities

1. The Coalition would like to clarify any suggestion that current irrigation is affecting the salinity in the Krom Antonies River. Irrigation backflow would add nitrates; yet the DSR reports that nitrate levels were insignificant. The salinity lower down in the river is due to the salinity of the soils that the river flows through.

The salinities of the river will be assessed over at least one year's assessment of data collection. Should mining go ahead, longer term monitoring data will be collected. Conclusions will be drawn from such results.

2. Precisely what changes in salinity, pH, nutrient loading and concentrations of heavy metals are envisaged?

A specialist surface and ground water study will be undertaken in the EIA phase. Any pollutants from the ore body will be assessed before any mining takes place. The chemistry of the slimes dams and soil and rock stockpiles will also be determined. Geotechnical and geochemistry tests will be undertaken of the core to be drilled during the EIA Phase. All results will be assessed to determine potential pollution.

8.1.5 Impact of the proposed mine on river diversion

1. On page iii of the DSR, the risks of diversion "of even minor tributaries of the Krom Antonies River, resulting in increased downstream velocities, loss of ecosystem processes that are considered beneficial in terms of water quality amelioration or management of sedimentation and/or erosion" are listed as a "constraint". On page 36 of the DSR, the following is stated: "Mining activities may also have HIGH impacts on riparian vegetation should the course of the Krom Antonies River or its smaller tributaries be changed." Despite this, on page ii of the DSR, "whether to construct a river diversion for the opencast mining operations" is listed as a design alternative being considered by Bongani Minerals Pty Ltd and their appointed consulting engineers.

The significant impacts of river diversion need to be carefully assessed by the specialist consultants. All alternative options also need to be assessed by the specialist consultants. All mitigation also needs to be assessed. Once all the results of the assessments are known, the Alternative with the least significant impacts will be chosen.

8.1.6 Current water use and impacts on water quality

1. As a result of the non-compliance with Regulation 49(1)(d), no effort was made in the DSR to describe current water use in the affected area in any detail. Such information is available, inter alia, from the Kromantonies Water Users' Association (KWUA), a registered water users' association under the National Water Act, 1998.

A hydrocensus of the Krom Antonies River valley is to be undertaken by SRK. The hydrocensus will gather all such information to be used in the specialist hydrogeological and hydrological assessment.

2. We live in a winter rainfall area where the surrounding mountains soak up the rain and release it slowly through springs over the following summer. Farmers pump water from this renewable store of water to irrigate their trees during the summer months. The effect of blasting as well as the removal and placement of millions of tons of rocks into waste heap will cause an increase in the stresses of the bedrock and this may cause the surrounding rock to fracture which may affect the storage capacity of the mountain. This will have a direct affect on the amount farmers can irrigate. Any decrease in the amount farmers can irrigate will have a major impact on sustainability. A decrease in the amount of stored water will also decrease the amount of springs that are located on the mountain. Piketberg has some rare flowers such as gladiolus insolens which is associated with patches that are wet all year round. This rare plant is found only on Zebraskop and the Lavant in the Piketberg range above Moutonshoek, nowhere else in the world, and any decrease in water will threaten its existence.

See section 8.1.1, 8.1.2 and 8.1.3 above. The preliminary model created by SRK indicates that there should be no impact on the Table Mountain aquifer on Bo-Piketberg. This model will be refined once the detailed hydro geological study is undertaken.

3. There will be a need to de-water and from the graphics, the zone of influence has been modelled on a large scale. This de-watering will impact on the inflow of groundwater into the river, the base flow, especially in the dry summer months. This will lead to flow reductions in the river and associated water quality issues. There may be an increase in salinity as a result of less dilution by fresh groundwater in-flow. We place on record that the hydro geological section of the DSR was completed by a Mr Des Visser who is not a specialist hydro geologist.

See sections 1.2, 1.3, 1.4 and 1.6 above. Mr Des Visser has been practicing as a hydro geologist for the past 21 years. Note also that Mr. Visser is but one specialist who compiled the SRK preliminary report.

8.1.7 Impact of the Proposed Mining on Agricultural Land

1. The location for the proposed mine is at the epicentre of a profitable farming area which contributes to the local, provincial and national economy and which provides hundreds of permanent and seasonal jobs for farm workers. Products include grapes, citrus, potatoes, rooibos, buchu, lavender, beef cattle, sheep, racehorses, wheat, rye, lucerne, teff and oats. We must retain and have more secure local sources of food particular in view of the threats posed by climate change and the current global financial crises. Significant productive capacity will be lost as a result of the mine, and the remaining capacity is likely to be significantly affected by the

mine. The DSR contains no assessment of current agricultural production by the affected area (again because of non-compliance with Regulation 49(d))

The physical and economic impacts of the proposed mining operation on agriculture will be assessed during the EIA before any conclusions can be drawn as to the significance of the impacts of mining on agriculture.

2. It is stated that –“agricultural activities could theoretically be re-established after the cessation of mining”. Is “theoretically” really going to be good enough? Is there an open cast mine anywhere in the world where this has been achieved? Can I receive evidence of such a site?

Not all of the 550 ha will necessarily be lost to agriculture. The agricultural soils specialist and agricultural economist will determine the potential land use for sections of the 550 ha that will not be disturbed.

3. The Global Community, and especially Africa, is in continues struggle to ensure food security. The imminent effects of Climate Change will only exacerbate this problem. The loss of any productive agricultural properties (areas directly affected by the proposed mine site as well as those indirectly affected due to impact of mining activities) is therefore unacceptable.

See 1.7.1 above. Other land uses can also be considered on the 550ha mine area that could generate an income.

4. South Africa already has a major food security problem and to set precedents around mining on existing farms could escalate our food shortages to pandemic proportions. The overall effect that many such mines could have on South Africa food supply and the overall economic condition of the market is tremendously concerning.

The loss of 550ha of mostly dry land agriculture will hardly cause a significant food security problem in S.A. The agricultural economist will quantify the significance of removing 550ha out of agricultural production.

5. The Department of Agriculture is very concerned about the impact of eventual possible mining activities which would impact on the existing agricultural activities in what is considered to be a highly productive valley, able to sustain a rich & diverse variety of agricultural practices. The Department of Agriculture request a fully comprehensive & independent Specialist Study to determine the Agricultural Potential of the land before any prospecting right be awarded, and more specifically, the potential loss of agricultural land should mining activities begin:

- **Conduct a comprehensive soil classification & soil potential study;**
- **Review the relationship between the soil study and the extent and potential of the present Agricultural activities on the land;**
- **Assess the loss of land to agriculture that the proposed activities would create, including estimated losses to (estimated/potential) mining activities;**
- **Assess the potential financial loss to agriculture (and individual landowners, in particular) should the proposed activities lead to the establishment of a mine;**
- **Review mitigation measures for all of the above circumstances, including the possibility of calling the entire Valley a “no-go” area for this & similar Applications**

Two detailed studies will be undertaken to determine the potential impact on the agriculture in the valley and in particular on the 550ha mining lease area, namely: a detailed agricultural soils potential of the 550ha mining lease area and a detailed agricultural economic impact assessment to assess the loss of 550ha of agricultural land to mining as described by the Department of Agriculture.

8.1.8 Impact of noise and air pollution from Mining

- 1. The IAP stated that only 0.3% of the ore contains Tungsten and only this amount of concentrated ore will be taken away. The rest of the 10.8 million tons will be held in heaps on the mine allotment and cause dust. Slimes dams will also cause dust. This will have a huge effect on the remaining agriculture in the valley.***

The soil and rock spoil from the mine will be separated according to its types. Each mine dump will be covered with topsoil and alluvium removed from the open cast mine and vegetated with grasses and eventually indigenous vegetation. The slimes dams will also be rehabilitated with time. The volumes and placement of the dumps and slimes dams still need to be determined. Dust is a real threat to human and animal health and to agriculture (fruit and grapes). Dust monitoring will be undertaken and mitigation will be in place to reduce dust pollution.

- 2. Any dust suppression mechanism involving water adds to the water requirements of the mine, which information has been omitted from the DSR.***

This is an important factor that needs to be taken into consideration as to how much water the mining operation will require. Details of the mine operation and resource use will be finalised in the EIA phase.

- 3. The mine will generate huge volumes of dust from a number of different sources including the initial overburden stripping, the continuous traffic of large trucks in and out of the excavation as well as increased traffic along the dust road through the Moutonshoek valley, the moving and loading of ore by large earthmoving machines, the ongoing blasting operations, the ore crushing process and the dust blown off the immense overburden dumps. It is most unlikely despite any assurances to the contrary from Bongani Minerals that they will be able to control this hazard the consequences of which are extremely detrimental to human and animal health , to agriculture , to indigenous plant life and to freshwater purity. In terms of the existing legislation if the mining application is approved Bongani Minerals will be required to comply strictly with the limits set down by the authorities and failure to do so will result in closure of the entire mining operation until acceptable levels of dust management have been established to the satisfaction of the authorities. The full extent of the dust dispersal has not yet been established but it appears to be far wider than the immediate vicinity of the mine and the scope of the specialist consultants investigations will have to be broadened accordingly if this is in fact found to be the case.***

The above has been noted and see 8.1.8.1 above. Dust baseline studies will be undertaken in the EIA and will continue throughout the mining phase and long after rehabilitation has taken place.

- 4. If the envisaged dust fall out has the far reaching impact it could have, what kind of plants would survive in a nursery so close to the mining operation?***

See 8.1.8.2 and 8.1.8.3 above. Dust suppressants will be used to reduce the generation of dust.

5. It is stated that “prevailing wind data and dust monitoring will be important for deciding where to locate mine infrastructure and spoil areas”. Just how much room is there to play with if the data and monitoring indicate the area presently under consideration will not be viable?

Baseline dust monitoring will be carried out together with wind monitoring. Decisions will be made once all the necessary data is available.

6. Continuous blasting 24 hours a day as well as noise from crushing and treatment activities will affect quality of life of residents of an area which up to now has not seen any industrial activities.

Baseline noise monitoring will be undertaken during the EIA. Noise and vibration (blasting) monitoring will be undertaken throughout the mining phase of the project.

7. A toxic fog would rise over the slimesdams as the wind blows, carrying it for kilometres in a toxic blanket. Unless frequent rehabilitation means instant rehabilitation, it is not good enough. The wind does blow in this valley and it will pick up toxic fog even if the slimesdams are rehabilitated weekly.

Slimes dams are generally wet, thus preventing windblown dust. As the slimes dam grows higher, rehabilitation takes place with covering of soil and vegetation. Refer also to 8.1.8.1 to 8.1.8.8 above.

8.1.9 Issue regarding alien and invasive species

1. On page ii of the DSR, “the opportunity to clear alien vegetation and rehabilitate stretches of the Krom Antonies River and river valley river course modification being a recipe which encourages the dominance by alien invader species and dramatic movement of large volumes of sand during floods” was listed as an “opportunity” to be created by the mine. However, had there been compliance with Regulation 49(1)(d) and the DSR had properly identified current land use, the DSR would have reported the extensive measures taken by landowners in the Verlorenvallei since 2005 to address the problems of alien and invasive species.

The specialists are well aware of the programmes of alien vegetation removal within the Verlorenvlei catchment despite the fact that they could not gain access to the land within the Krom Antonies River valley. Once detailed studies have been undertaken the EIA will report on the true state of the environment.

2. We have been clearing alien species in the Krom Antonies River for 14 years using biological means (galls) and chemical and physical means for 4 years. We have had phenomenal results that have been felt all the way down to the Verlorenvlei. It is a classic case study of a great model of success! By the time Bongani propose to start mining in 2011, there will be very few alien trees to clear. I insist that you also remove this item from your list of opportunities.

The reference to alien vegetation clearing as an “opportunity” for the proposed mine will be removed from the FSR.

8.1.10 Impact of the Proposed Mining on Verlorenvlei, a Registered Ramsar Site

1. ***The West Coast Bird Club's objection to the project is the potential damage to Verlorenvlei which is an Internationally Important Bird Area, IBA SA 103 and a Ramsar Site.***

The impacts on the birds of Verlorenvlei will be determined by the inflow of freshwater. As mentioned above, it is therefore vitally important that the potential impacts on the hydrology of the sub-catchment area and the groundwater be determined by specialist studies. An avifaunal survey will be undertaken to assess the potential impacts of the proposed mine on avifauna in the area.

2. ***The Verlorenvlei is internationally recognised under the RAMSAR Convention on Wetlands 1971 and in respect of which South Africa, as a contracting party, has an international law obligation to protect.***
 - ***Verlorenvlei supports over 189 bird species.***
 - ***The wetland is regarded as one of the ten most important wetlands for wading birds in the southwestern Cape, a particularly important feeding area for the White Pelican *Pelecanus onocrotalus* and supporting a number of threatened bird species.***
 - ***It supports over one thousand waders of more than eleven different species, mainly migrants from the northern hemisphere and provides further feeding, nesting and resting facilities.***
 - ***Greater Flamingo and Lesser Flamingo also occur here, as well as relatively large numbers of little Bittern and Caspian Tern.***
 - ***The wetland is a moulting ground and winter refuge for large numbers of various species of Anatidae.***
 - ***There are high densities of African marsh harrier which forage over the marsh and reedbank areas as well 4-5 pairs of African Fish eagle.***
 - ***Significantly large numbers of Great crested grebe, Redknobbed coot, Hartlaub's gull and White-breasted cormorant are also supported at this wetland.***
 - ***The global fish species population of the Berg river redbin is restricted to Verlorenvlei as well as several endangered mammals and endemic reptiles and snakes.***

We would like to request that specialist surveys be conducted on the impact of the mining operation and particularly the effects of water usage for mining, on the Verlorenvlei wetland area. This should include primarily, a specialist bird study but, because of its importance for other taxa, a number of specialist studies must be identified and conducted through the environmental impact assessment process.

All the appointed specialists will investigate the potential effects of the proposed mine on the Verlorenvlei ecosystem in view of the fact that it is part of a larger ecosystem and is a registered Ramsar site. Apart from the hydrological, hydrogeological and freshwater ecological studies, a fish and avifaunal study will also be undertaken to assess the potential impacts on the greater Verlorenvlei system.

3. ***This Department of Agriculture is also aware that the Moutonshoek Valley is the most significant catchment & source of both surface water & "slower released" seepage water for the very significant wetland lower down in the river system known as Verlorenvlei. Natural wetlands are extremely important to agricultural production as they filter silt & other particles out of the water in & around rivers to create clean, usable water. This Department of Agriculture feels justified in requesting that the above "Specialist Study on the Impact of the Proposed Activity on the Groundwater***

Supply and Quality” be expanded to include a comprehensive “Reserve Determination Study for the Verlorenvlei” in order to determine that the proposed activities will not adversely affect the wetland (Verlorenvlei) which is regarded as being very significant in the bio-diversity which contributes to agricultural production in the region.

The hydrological study will assess the annual run-off and together with the results of the CSIR study on the rapid reserve determination method used, the volume of water used by the agricultural sector and that of the proposed mine, and the results of the freshwater ecologist will assess whether the CSIR figures can be used or not.

8.1.11 Impact of Climate Change and Water Use on Available Water Reserves

1. Will climate change be included in the climate study?

It will be important to capture at least one year’s worth of biophysical data. This data will be assessed together with the available data for the Verlorenvlei catchment area. Conclusions and recommendations will be based on this data. In addition, the assessment of this data will take into account the available data on climatic change, especially for the West Coast which is anticipated to become drier in future. The drying out of the West Coast will have an impact on water use in this region and potential impacts on the ecosystems of the area can be expected. Remembering, of course that mining will only be for 18 years. Climate changes would not be as significant within this time frame.

8.1.12 The impact of blasting and mine design on the instability of the Piketberg Mountain to the east of the mine.

- 1. We call for a specialist report on the potential impact of blasting on the aquifers in the area. We call for input and review from CSIR, DWAF and DOA on the effect of blasting on aquifers and resultant potential impact on other water users in the area, including impact on the ecological reserve, with specific reference to Verlorenvlei. The potential to impact aquifers raises concern with respect to other water users in the larger area.***

Specialist groundwater and geohydrology reports will be done for the EIA phase. DWAF and DoA are commenting bodies on the EIA.

- 2. Not only is blasting a source of continuous noise pollution but it will generate considerable amounts of dust hazard and the seismic effects may have serious repercussions none of which issues have received any attention in the DSR . Since we have been denied access to the mine design by Bongani Minerals it is not possible to establish the precise dimensions and location of the pit particularly in relation to the slopes of the Picketberg mountains. We have further misgivings regarding the angle of repose of 39o that has been used in the calculations and determines the pit size. If this angle is too steep as our consultant feels it is then a smaller angle of incline will increase the pit size and bring the lip of the pit crater closer to the steep gradient slopes of the Piketberg Mountains. A combination of heavy rain and continuous seismic reaction to blasting may cause some rock as well as fines that make up the loose scree of the mountain foothills to dislodge and slide down the mountain side which in turn could cause a more generalised landslide. This circumstance is evidenced by the problems encountered by the Chapman’s Peak Toll Franchise in attempting to stabilise the steep mountainside above the road.***

Their toll road is closed more often than it is open due to the danger of uncontrolled rock falls. The consequences of a large scale landslide into the pit would be a major disaster and yet there is no mention at all in the DSR of such a serious contingency. Any indication that there is movement of dislodged rock and /or scree will necessitate immediate cessation of all mining operations until the situation is stabilised. In the light of the hazards and possible damage as well as serious injury in consequence of mining operations I regard it as essential that the Scoping Report include an in depth investigation into the issues of blasting and the possible consequences as well as the remedial measures that are required to secure the affected mountainside.

Specialist studies to investigate possible impacts will be done in the EIA phase. An in depth geotechnical study is to be undertaken by geotechnical engineers, engineering geologist and mining engineers. The final mine design will be undertaken based on these and other studies to be undertaken. See section 1.8 above.

8.1.13 Impact of the proposed mining on the Greater Cederberg Biodiversity Corridor

- 1. The Greater Cederberg Biodiversity Corridor is a well-established initiative which aims to connect the Wilderness area of the Cederberg Mountains via a corridor to the sea at Eland's Bay. The Piketberg Mountains and Moutonshoek Valley form an integral part of the proposed Biodiversity Corridor. The presence of a large-scale open-cast mine in the proposed corridor is completely out of line with this initiative, which is why the mine has been rejected, amongst other conservation bodies, by CapeNature and the Wildlife and Environment Society of South Africa. Mining activities and the conservation of the natural environment are entirely incompatible. There are all too many examples of this in South Africa – as a start, one need only to witness the devastation caused by open cast mining on the West Coast north of Lambert's Bay.***

The mining is to take place within the highly agriculturally developed Krom Antonies River valley and will have no impact on the Piketberg Mountains to the east or south. Mining occurs mostly on old agricultural areas (refer to the gold and coal mines of the old Transvaal region). Most of the old diamond mines on the West Coast have not been rehabilitated. A good example of good mining practises on the West Coast is Namakwa Sands.

8.1.14 Impact of slime dams on environment

- 1. The DSR also recommends that all rock and earth dump areas and slimes dams must be kept well away from the 1:100 year flood levels of rivers and streams, and that all water used in the mining and processing operation must be recycled and must be stored in water tight reservoirs to prevent any pollution of groundwater or surface water. It is therefore both puzzling and alarming that, on the current Site Plan (Figure 7 in the DSR), both the spoil dump and the slimes dam are situated right next to the Krom Antonies River.***

The site plan and mining operations is to be informed by the specialist studies and will only be finalised in the EIA.

- 2. Once again I am unable, with the assistance of our consultant, to assess the dynamics of the slimes dam because we have been denied access to the***

Metallurgists Report and the Venmyn Rand Mine Design and Concept reports. It is nevertheless apparent to us that the slimes dam will be many times larger than anything indicated in the DSR. In addition we view the position of the slimes dam next to the river as indicated in the DSR to be ill considered particularly when so much emphasis is placed on maintaining an uncontaminated freshwater system. This attitude only reinforces our belief that Bongani Minerals are paying lip service only to the fundamental principles of “clean mining practises”. The precise chemical ingredients that are being proposed for the slimes dam contents is also not known to us without the full details that we have been denied access to. We therefore anticipate your full disclosure of information and the prompt delivery of the reports and other issues that we have asked for.

See 8.1.14.1 above. The specialist initial metallurgical report has been made available in this Revised Scoping Report.

- 3. The storage and or disposal of the waste materials at a Molybdenum / Tungsten mine could directly and indirectly affect agricultural practises in the proximity of such a mine as well as further afield and potentially have a significant impact on agricultural production in the Valley. On the “chemical reactivity level,” some minerals, especially sulphide minerals (of which molybdenum is one) will eventually, on exposure to air and water, begin to produce acid which will leach into run-off water to be dispersed into both ground and surface water. The Department of Agriculture therefore requests a Specialist Study at this early stage of the process to Investigate and Review the proposed Storage, Processing and Waste Management Handling, as well as the potential danger imposed by such Waste as a Pollutant to surface & Groundwater, of Mining Sites similar to this one.***

A detailed hydrogeological assessment of the two aquifer systems will be determined by detailed assessment of shallow and deep boreholes which will need to be drilled. In addition, a geotechnical assessment of the host rocks and soils will be undertaken. The information gathered from such studies will be used to assess the likelihood of pollution of the aquifers and surface waters during dewatering and minerals processing. The integrated management of waste will be incorporated into the EMP.

8.2 Alternative Development Options

8.2.1 Alternative Development Options to be Considered

- 1. The IAP feels there has to be a third alternative that must be considered and that declares the area as a “No-Go” zone.***

The so-called “no go” development option is being considered. If the results of the specialist studies indicate that there will be a number of significant negative impacts on the biophysical and socio-economic environments of the Krom Antonies Valley and therefore on the Verlorenvlei, that cannot be sufficiently mitigated, then the recommendation will be made, not only by the specialists, but also by the EAP, that the impact of mining the tungsten deposit will be of such a significant nature that the Mining Right should not be approved.

- 2. Regulation 49(1)(d) of the MPRDA Regulations requires the scoping report to: “identify and describe reasonable land use or development alternatives to the proposed operation, alternative means of carrying out the proposed operation, and the consequences of not proceeding with the proposed operation” There are three***

separate aspects to this requirement, namely: a. Identification and description of “describe reasonable land use or development alternatives to the proposed operation”; b. Identification and description of “alternative means of carrying out the proposed operation”; and c. Identification and description of “the consequences of not proceeding with the proposed operation”. Only the second requirement has been addressed in the DSR, namely on page ii, as part of the Executive Summary, which describes alternative design alternatives for the mine. The third requirement is addressed in a single line in the DSR, namely “The no-go alternative will also be considered, in which the status quo for the area will remain, viz. that of agriculture and livestock farming” (DSR p. ii). Unfortunately it is not sufficient for compliance with Regulation 49(1)(d) to defer this description to the environmental impact assessment – Regulation 49(1)(d) specifically requires the consequences of not proceeding with the proposed operation to be identified and described in the Scoping Report.

In terms of Alternative options, only two options exists: either mine or don't mine. The “don't mine” option means that the status quo remains the same, i.e. that of agriculture. The Alternative options have been described in greater detail in this Final Scoping Report.

- 3. What this mine will cause is downstream damage that others, be it plants, insects, animals or people, will be forced to pay for. There is no possible way any study can anticipate the cost in collateral damage. The mine cannot guarantee a completely closed feedback loop, and is in potential violation of human and animal rights. Therefore I ask the question. How can there be any alternative than the ‘no go’ option?**

All alternative options will be assessed in the EIA phase.

8.3 Engineering Options

8.3.1 Impact on Infrastructure

- 1. How will services, such as water and electricity get to the mine and what will the impact be on the surrounding area.**

Water for mining purposes will be extracted from the dewatering process of the mining operations. The total volume of water actually required will still need to be determined by how much water can be recycled. The processing plant requires about 3500 m³ per day. Recycling of water will be undertaken. Venmyn Rand (Pty)Ltd. have estimated that 14,945 KW will be absorbed per annum during the establishment of the Concentrator Plant, Tailings Treatment Works, Tailings Dam(s) and Offices and that 801 kW will be absorbed during the establishment of the Concentrates Treatment Plant. Venmyn Rand (Pty)Ltd. have also estimated that a Maximum Demand of 16, 000 KW will be absorbed per annum during the operational phase of the Concentrator Plant, Concentrates Treatment Plant Tailings Treatment Works, Tailings Dam(s) and Offices. These estimates will however be verified by the appointed Civil Engineer for the project during the EIA phase. Should an upgrade of electricity be needed, the upgrades electricity lines may well follow the existing alignment of the powerlines into the Krom Antonies Valley. An engineering services report will be compiled in the EIA phase detailing all services for the proposed mine.

- 2. What is the proposed routes for the water pipelines that has to bring water from the Berg River and Olifants River?**

Water will not be piped from the Berg or Olifants Rivers. Refer to 8.3.1.1

- 3. *Blasting within the mine will further result in the spread of dust and the damage to infrastructure (cracking of walls, etc.) on properties surrounding the proposed location of the mine.***

The spread of dust from blasting cannot be mitigated. Fortunately very little dust is created by blasting granite rock. Blasting will probably have very little to no impact on the cracking of buildings. A crack survey will be conducted of all structures within the vicinity of the mine. A vibration monitor will monitor shock waves generated by blasting. Certain norms exist and the results need to be provided to the Mine Commissioner.

- 4. *The client must provide accurate and detailed information to all the specialists regarding their intended scale and extent of mining activities, details of the physical and chemical processes that will be used and descriptions of all infrastructures that would need to be built.***

Details of the mining activity, any processes involved and all infrastructures will be given to all specialists.

- 5. *Based on the current information available, CapeNature believes that the proposed mining activities and the associated increase in population, which will bring with it the need for additional roads, water supply, sewage and waste disposal, poses a high level of risk to the terrestrial and aquatic ecosystems in the area and their functioning. We believe that the proposed mine is entirely inappropriate for the area and could have significant and irreversible impacts on the environment.***

The impact of the proposed mine and associated activities will be assessed during the EIA process.

8.3.2 Traffic Impact of Mining on Road Infrastructure and N7 Road

- 1. *What will the effect be of the mine on the road infrastructure of the region and on the N7 Road (probably from Piketberg to Cape Town)?***

The road from Het Kruis to Moutons Hoek (mine) will need to be upgraded (probably tarred) as staff for the mine will be bussed in on a daily basis (probably three shifts, as the mine will work 24hrs a day). The amount of additional traffic using the N7 for servicing the mine will probably be insignificant if the existing background traffic on the N7 Road is taken into consideration. A traffic impact assessment will be undertaken to assess the potential impacts of traffic.

- 2. *Whether the tungsten and molybdenum produced by the mining operation are to be transported by road or rail to Saldanha Bay, surely either mode would have a negative impact on a far wider geography than envisaged in the report? The roads between the Moutonshoek and Saldanha Bay would require major infrastructural improvements and a new rail link would have a negative impact on way of life of those in proximity to it and the environment surrounding it both during construction and operation.***

Refer 8.3.2.1 above. No rail link is envisaged.

- 3. *How wide is the 'study area'? Does the traffic impact take into account the pollution impact, the social impact of noise and road impact on ecosystems and animal corridors, the crime potential, the far reaching impact of destinations such as Saldanha? I notice elsewhere Saldanha is identified as the 'export port'. Does this***

study include an assessment of ecological social and economic impacts on this already overstressed and overdeveloped bay region?

If the proposed Tungsten concentrate is shipped from Saldanha harbour, no additional assessments need to be undertaken as these have already been done for the latest upgrade of the harbour. The increased traffic through the valley will be assessed as part of the TIA. According to the latest ecological studies for the upgrade of the harbour, the bay is not stressed.

- 4. The current road infrastructure will be damaged by the heavy traffic required for the project. All vehicles utilized by contractors and the mine should be licensed by the local Municipality so that some portion of the license fees is used to defray maintenance costs.***

Upgrades to the current road infrastructure will be undertaken by the mining company. A services report (including roads) will be done in the EIA phase. All vehicles will be legally licensed and registered accordingly.

8.3.3 Issue of waste management

- 1. The issue of waste management is also glossed over in the DSR. On page 10, the DSR states that “[w]aste rock, overburden and topsoil will be separately stockpiled at the surface, near the edge of the open-pit (the specific locations still need to be determined) (Figure 5). These stockpiles are also known as waste dumps. The waste dumps will be tiered and stepped, to minimise degradation (erosion).” However, Figure 5 indicates the proposed location of a waste dump. the design, location and management of a tailings dam containing toxic slurry is of major concern to the Verlorenvallei Coalition. As pointed out in paragraph 106 above, the DSR itself points out that the tailings dam should be situated as far as possible from “highly transmissive fault structures” and well away from the 1:100 year flood levels of rivers and streams (page 29). However, on Figure 5 the tailings dam seems to be situated directly next to the Krom Antonies River! The Coalition therefore requires detailed information on the proposed design, location and management of a tailings dam, including what tailings thickener would be used. Storm water run-off from the mining operations is likely to impact on water quality in the river. Waste rock dumps and tailings dams are notorious for causing groundwater contamination problems as a result of leachate generation and run-off, and are very difficult to manage. The tailings dam is located right next to the river - this is a recipe for disaster.***

Detail surrounding the tailing dams and other infrastructure will be informed by the results of the various specialist studies to be done and will be finalised towards the end of the EIA process.

8.3.4 Concerns about the proposed design of the open cast mining project

- 1. Why are existing homes, stables, barns and packing sheds not considered to be structures?***

In terms of the “Greenfield Project”, there are no buildings on the 550ha site of the proposed mine. No buildings adjacent to the 550ha mine site will need to be demolished.

- 2. Greenfield Project. This is an interesting definition and interpretation that takes no cognisance of impacts on the natural (and social) environments.***

***This presumably should be read in terms of an industrial context?
Do horse paddocks and outbuildings not constitute existing structures?
It is hardly possible for IAPs to make an informed decision without all the relevant documentation at hand. As the Venmyn Rand Concept Plan is fundamental to the functioning and scheduling of the proposed mine, it is in the public interest for this document to be released into the public domain a.s.a.p.***

The results of the Venmyn Rand Concept Report has been included in the revised Scoping Report and the whole report copied as an Appendix to this Final Scoping Report.

- 3. It is not clear how Bongani Minerals Pty Ltd has planned a large mining operation with extremely limited geological and mineralogical information available to it. At the same time, public information available on the tungsten deposit indicates that the grade of the deposit is at best marginal. In addition, Bongani Minerals Pty Ltd has apparently refused IAPs access to such information as is available and has been produced for Bongani Minerals Pty Ltd, such as the Venmyn Concept study.***

Refer to 8.3.4.2 above. The results are based on very detailed exploration undertaken by Union Carbide and Anglo American during the 1980's. At the current tungsten prices, the proposed Riviera Tungsten mine is highly viable.

8.3.5 Processing of Tungsten

- 1. In regard to further processing of tungsten concentrate it is stated: " Little information is available regarding these processes." Does this mean we cannot be sure of the impact of the mining process or that the unavailable information has subsequently been obtained?***

Because of the trademark secrets of processing tungsten certain sensitive information cannot be released for publication. The basic processing plant and the chemicals used are described in this revised Scoping Report.

- 2. What process will be followed to extract the tungsten from the erts?***

There are two processes as described in the DSR. The ultimate process to be used in the processing plant is unknown at this stage. More details will be provided in the EIA.

8.4 Socio Economics Issues

8.4.1 Impact of Proposed Mining on Existing Jobs

- 1. Agriculture is the biggest work provider in the area. The mine will terminate agriculture and no work will be provided for the community.***

The mine will provide 300 job opportunities during the mine construction phase and 400 during the operational phase. As much local labour from Piketberg and surrounds will be hired as possible. The specialist socio-economic assessment must be undertaken to assess the loss of agricultural jobs as a result of the proposed mine and associate such losses with gains provided by the mine. It will also be important to take into consideration the relatively short mining period of 18 years as opposed to the permanency of agriculture in such a socio-economic assessment. Not all

agricultural jobs will be lost in the valley. Potential job losses will be quantified in the socio-economic impact assessment.

2. ***Many permanent and contract farm workers, most of whom are women, will lose their jobs if this mining is permitted. As is so often the case in these situations, jobs created by these types of ventures will always be far lower than the actual jobs that are lost. With the high levels of unemployment in SA this is completely and utterly unacceptable, many will have to move away from their families to find work, creating yet another migration of our labour force from their homes as is so often the case. The area will never recover from this loss and the job loss factor will be devastating to the local community.***

The loss of jobs, especially those of women, will be considered in the socio-economic assessment that still needs to be undertaken to assess the impact on the socio-economic well-being of the agricultural industry in the Krom Antonies Valley. The displacement of farm workers will also need to be assessed.

3. ***Local people (by the hundreds) stand to be displaced and their jobs will be affected. Unsustainable Migrant Labour issues will become inevitable. Farm workers from Moutonshoek, Redelingshuys to Elands Bay could possibly lose their jobs and houses if agricultural activities are affected by the mine. Mining practices require skills largely not found within this region and thus will result in workers from other areas being employed, and not people from the region itself. The effects on females, benefiting from employment on farms, pack-stores, etc, will unarguably be rife and they would be out of work. The loss of employment will have extreme effects on a social level and increased levels of crime in a comparatively crime free area will imminently follow.***

The losses of jobs as a result of the proposed mine will be considered as part of the socio-economic assessment. The possibility of displacement of staff off the farms will also need to be addressed.

4. ***What is the risk to agricultural jobs should the mine cause pollution of water (above and underground) relative to the creation of 407 job opportunities by the mine?***

As mentioned above, the risks of pollution need to be determined by the hydrological and hydrogeological studies. Refer to 8.4.1.2 above.

5. ***There is a misrepresentation in the DSR that there is a "high level of unemployment" in the Piketberg area. Statistics from Statistics SA relied on by the specialist concerned clearly indicates that the unemployment rate in the Bergriver municipal area is just over 5%, compared to the national average which exceeds 20%. A statement that an unemployment rate of just over 5 % constitutes a "high level of unemployment" constitutes inaccurate, incorrect and misleading information within the meaning of Section 98(b) of the MPRDA.***

The data contained in the DSR was obtained from the Social and Labour Plan. The socio-economic impact assessment will quantify the unemployment rate in the Piketberg area.

6. ***There is a misrepresentation regarding "current underemployment" in the Piketberg Magisterial District. The Bergriver economy makes a significant contribution to government income (6.14% of the turnover generated by levy-paying firms in the West Coast District in 2005-2006; and the Bergriver economy grew at a rate of 10.33% from 2004-2006, in contrast with the rest of the West Coast District (decline of 5.03%) – that is significantly more than the national economy.***

These figures will be quantified and verified in the EIA.

7. ***The DSR does not in any way put forward a plan or propose further research into the following issues: a) What financial or other support will be provided to the workers and also the spouses of the workers who will have to be retrenched by the farms destroyed by the mine? b) Are there any plans to replace current social and welfare support for workers in the area (currently provided by the farms)?***

It is not the place of the DSR to contain such detail. The DSR is to scope issues. The above issues will be studied further in the socio-economic impact assessment of the EIA. Refer 8.4.1.1 to 8.4.1.3 above.

8.4.2 Impact of Dust on Fruit Industry

1. ***It is a known fact that dust has a huge impact on the setting of fruit (soft fruits and grapes) with the result that the proposed mining would have a devastating impact on the fruit farms of the Krom Antonies Valley.***

Dust monitoring will need to be undertaken throughout the life of the mine (operational and closure). Certain mitigation measures can be taken to reduce dust, but the incidence of dust will always be a factor. The degree of dust pollution from the mine is a factor of management (EMP). The potential economic losses to the fruit, flower and grape (export and wine) will need to be determined against the economics of the mine (which is seen as a temporary industry for 18 years) in a socio-economic impact assessment to be done in the EIA phase.

8.4.3 Impact of Falling Tungsten Prices on Mining in Krom Antonies Valley

1. ***Should mining be in operation based on the current price of tungsten (which currently makes the mine economically feasible), what will happen to the mine (infrastructure and waste dumps) should the price fall and the mine no longer becomes economically viable to mine?***

Bongani Minerals, with its Mining Right would need to provide financial securities to DME for the rehabilitation of the mine, should the mine stop production or should the mining company be declared insolvent, then the securities provided by Bongani Minerals will be used to rehabilitate the mine area.

8.4.4 Impact of mine on the value of affected property

1. ***The possibility of such a mining operation in the region has already struck fear into the hearts of the people and negatively affected property values and willingness to make capital investment particularly in the agricultural sector.***

The impact of the proposed mine on property values will be assessed in a socio-economic impact assessment to be done in the EIA phase.

8.4.5 Impact of Proposed mining on the Karookop School

- 1. The IAPs are concerned about the possible closure of the school for the children.***

If the school is forced to close because of the close proximity to the mine, the mining company should provide another school in a more suitable locality.

8.4.6 Vulnerable people and social development support

- 1. The DSR makes no reference to the existence of vulnerable people (the aged, ill and disabled people), also as result of an inadequate assessment of the status quo in the area (and as a result of non-compliance with Regulation 49(1)(d)).***

A socio-economic assessment will be undertaken in the EIA phase.

8.4.7 Impact of the proposed mine on the way of life and the sense of the place

- 1. Many Coalition members have raised the impacts that the proposed mine would have on the way of life and sense of place of the Verlorenvallei. Some members also link this to other development initiatives less destructive than a mine, such as tourism. Because of the DSR's non-compliance with Regulation 49(1)(d), none of these issues have been identified and described as required.***

Specialist socio-economic, visual and heritage assessments will be undertaken in the EIA phase. The loss of way of life and sense of place needs to be weighed against any possible positive impacts of the proposed mine.

8.4.8 Impact of the proposed mining on housing in the district

- 1. Who will be responsible to prevent illegal squatter camps being erected and chopping of firewood on surrounding farms with or without permission from the land owners? The IAP have worked on the following two projects and he saw the negative effect that the squatter camps had on the community: a) the Mandela squatter camp in Koekenaap as a result of the Namakwasand Mineral Mine . b) the George Carraige squatter camp in Vredenburg as a result of Saldanha Staal and Namakwasands South project.***

Housing will be provided for workers in Piketberg and workers will be bussed to the mine daily. No squatters will be allowed to settle on private land. Owners of property will be responsible for preventing squatters settling on their properties.

- 2. Who will be responsible for damage being done on the land where the mine group don't have any rights?***

A sewage system will be provided by the mining company. The water will be recycled once it has been treated for use in the mine (irrigation). Groundwater will not be polluted by sewage.

8.4.9 Impact of Proposed Mining on Tourism

- 1. The effect on tourism in the area could be a major factor, especially if the one takes into account all the potential negative effects from mining such as pollution, degradation of the wetlands, the visual impact of an unsightly opencast mine, dust pollution/settlement, noise pollution, increased traffic of heavy mining vehicles, diversion of water and resultant death of Verlorenvlei Ecosystem, Tourists visits the Valley because of the peacefulness and beauty of the area.***

The impacts of the proposed mine on tourism will to a large degree depend on the impacts on the biophysical environment of the region, and especially the impacts of water (agriculture and ecosystem of Verlorenvlei) and dust on agriculture (fruit, grapes and race horses). Refer to Section 1, 4.2, 4.4 and 4.6 above. Such impacts will be assessed by the economic impact assessment.

- 2. The International Tourist industry around Birding and Spring Flower Watching which is the area's main source of income will be jeopardised.***

If there is any chance that the mine will cause so much pollution that Verlorenvlei will be severely impacted on the authorities will not approve mining.

- 3. The threat to tourism in the area from the proposed mine is self evident if account is taken of the possible draining of the Verlorenvlei by over extraction of water and / or toxic pollution thereof. Likewise if the Elands Bay beach and bay are contaminated with dirty or polluted waste water from the mine this will be a definite deterrent to the surfing community. The full economic benefits of tourism in this area have not been fully quantified and its contribution to the fiscus adequately identified and yet the DSR does not consider the significant value of tourism at all in its assessment of loss of benefits due to the mining operation. I feel that the DSR falls glaringly short and call on Withers Environmental Consultants to remedy this omission.***

Refer 8.4.2.1 above. The DSR is not supposed to address issues, but rather table them. The EIA phase addresses such issues and assesses the significance of their potential impact caused by the proposed mining.

8.4.10 Impact of Mining and Infrastructure on Cultural Landscape

- 1. Mr Dexter and others believes that the mining proposed for this area is inappropriate and will have a negative effect on both the natural and human landscape. This area also falls into the Greater Cederberg Biodiversity Corridor and is part of a landscape wide biodiversity conservation plan. With this mining various sources of pollution will be created including air, water and noise pollution which are a huge environmental concern.***

The potential impact of the proposed mine on the cultural landscape of the Krom Antonies Valley will need to be assessed by a specialist heritage consultant. The impact on the historic buildings in the area will also need to be assessed.

8.4.11 Economic Impact on Mining on agricultural economy in the valley

- 1. Farming and agricultural enterprises will be compromised by the proposed mining. The potato industry in the Sandveld is the largest provider of food and work in the Western Cape and will be terminated by the proposed mining.***

Apart from the potential losses of jobs and its socio-economic impact on the region, the impact of the proposed mining on the economic agricultural industry of the Krom Antonies Valley will be assessed against the relatively short term economic gains of mining. An agricultural economist will provide an economic assessment of such potential impacts.

8.4.12 Impacts of mining on economic input and jobs at a local level and on social welfare

- 1. The loss of productive farming land and loss of jobs associated with farming practices will further result in a decrease of economic input into local suppliers of farming appliances, seed and seedlings, feed, fertilisers, etc. A vast array of businesses, from grocery stores, street vendors, clothing stores, steakhouses and others, will further experience a loss of income due to the loss of employment within the farming sector. This in turn results in loss of employment within surrounding towns. The extremely limited lifespan of the proposed mine (in relation to farming practices that have been sustained within the area for nearly two centuries and will continue to do so sustainably for centuries to come) will not provide sufficient economic input to sustain businesses in these towns. The many examples of towns where the economy have collapsed after mining practices have stopped, is proof enough.
The IAP would like a full cost benefit analysis of the short term benefits of mining versus the potential long term benefits of ecotourism and farming in this area is undertaken.***

Specialist socio-economic assessments will be undertaken in the EIA phase to assess the impacts of mining agriculture and losses of agricultural jobs.

8.4.13 Concerns about the Social and Labour Plan

- 1. The IAP object to the fact that Prof Blooms states that such a plan will become the “building blocks for future economic development and growth of the local area”. This plan is supposed to offer people opportunity to become functionally literate and numerate, learnerships, skills programmes, portable skills and any other training as part of human resource development. Local Government should be investing in creating opportunities for our local human resource to be trained in the type of agriculture currently present in our area, We don’t want Bongani Minerals (Pty) Ltd to be granted a mining license with the capacity to provide employment for only 407 people (a debatable figure) for a period of +- 20 years, in order for the Government (Local and National) to abscond their responsibilities toward our local labour force.***

The mining company is obligated to undertake training and skills development as is contained in the Social and Labour Plan put forward in the Mining Right application. The socio-economic impact assessment will take such training further and provide tangible recommendations in this regard.

8.4.14 Visual Impact

- 1. The location of the proposed mine in an area which has breathtaking mountain scenery and a splendid rural farm setting is a most dismal and devastating thought. Any suggestion that this mine will not completely destroy the entire district and its people is frankly utter nonsense. A first time traveller to this area confronted by a massive crater surrounded by ugly dumps of overburden and a complex of industrial buildings with crusher and milling plants and a huge slimes dam would think that all***

the demons in hell had been let lose to destroy one of the most beautiful valleys on the entire west coast. This enormous and ugly pit will not only be a great wound to the body of mother earth it will also be an unhealing wound to our nation. To consider this wanton destruction for mercenary gain is to sell your soul for “thirty pieces of silver”.

A visual and heritage impact assessment will be undertaken in the EIA phase.

- 2. The pit itself, the slimes dams, the heaps of overburden rock and waste rock are going to have a significant negative visual impact especially for residents who are close to the mine. The historical lack of will by government to force rehabilitation as well as lack of commitment by mining companies to rehabilitate on cessation of mining activities means that the pit, slimes dams and dumps will become a permanent feature of the area. There are many examples all over the country where this can be shown to be the case.***

Refer 8.4.15.1 above. The heritage impact assessment will be undertaken to assess the mine, with its dumps, in terms of the sense of place. A mine rehabilitation plan will also be undertaken. The rehabilitation of the mine area and its dumps has to be undertaken by the mining company. Collateral is put in place for rehabilitation by the mining company.

8.4.15 Light Pollution

- 1. In point no. 6 of your scoping report, ‘Type and scale of possible environmental impacts’, you neglected to include the impact of light pollution. Obviously you have never observed the night skies of the area and were never overawed by the scale and immensity of the universe around you. Maybe your little ego would have shrunk a little then and words of praise like that of a poet or psalmist may have shed a little light in the darkness. Instead the glaring artificial spotlights of your mining rigs will obliterate the stellar beauty of the universe, and to such a mind-set the universe will be a place of darkness.***

A Visual Impact Assessment that addresses “light pollution” will be undertaken in the EIA.

8.5 Environmental Authorisation Process

8.5.1 Impacts of the Previous Prospecting Right Application on the Present Mining Right Application

- 1. The devious and underhanded manner by which this application has been dealt with in the past gives no confidence in the manner in which the new process will be logical and fair and much legal activity is envisaged before the dust starts to rise from this destroyed valley. How DEAT is going to approve the impact study is beyond my comprehension.***

WEC cannot vouch for the way in which the Prospecting Right was obtained, but it is hardly likely that DME would approve an application that was “devious” or “underhand”. Certainly, the current application for a Mining Right is being conducted according to the strict requirements of the MPRD Act. In terms of the current application, a Scoping Process and an EIA process is being undertaken. In addition, an EIA application in terms of NEMA also needs to be carried out for various triggers of the R396 and R387 Regulations. In addition, an application for a Departure in

terms of Section 15 of LUPO (15 of 1985) must be granted for a temporary change in Land Use before mining can begin (from the Berg River Municipality).

2. *The full history of the previous prospected rights has not been included in the Draft Scoping Report.*

Since this application deals with a Mining Right there is no need to provide the history for the application for a Prospecting Right. The history section of the current report deals with the history of the tungsten mineralisation and the various granting of rights in terms of MPRDA.

3. *The question was asked whether the objections given for the Prospecting Right Application by IAPs could be carried over to the new Mining Right Application.*

Since the current application deals with an application for a Mining Right, the IAPs need to provide their objections and concerns again for the current EIA process being run.

4. *The first application from Bongani has been rejected. What has changed that new applications are being considered again?*

This is the first Mining Right application by Bongani Minerals. A Prospecting Right has previously been granted, but has since lapsed.

5. *As this is the fourth application for mining rights in the valley, despite the previous three being turned down, I find it alarming and audacious, especially since we were assured by the Chairperson of the Remdec meeting of 26/02/2009 that not another application by Bongani Minerals will be considered. Even more surprising is the fact that in all your previous applications there were gross irregularities and total disregard for the rules and regulations of the DME. I will not allow any person or entity access to my farm for the purpose of prospecting.*

See 8.5.1.1 and 8.5.1.4 above. We believe that the chairperson referred to the application of another Prospecting Right by Bongani would not be entertained before the Judicial Review had been resolved. The Prospecting Right subsequently lapsed and the Judicial Review therefore fell away. The Bongani application is for a Mining Right.

6. *In addition to the gross irregularities with regard to the whole question of the prospecting rights, it is apparent that at some stage prior to April 2009, Withers Environmental Consultants (WEC) were briefed by the applicant to start preparing a Scoping Report for the mining rights application. We do not know when this mandate was given to WEC, save that the Job No. on the front page of the DSR is 07/11/1190. We presume that this number refers to 7 November, either 2007 or 2008. Whatever the case, and we believe it is important for WEC to disclose to I&AP's the exact date when it received the mandate, it is quite clear that the DSR, (48 pages without annexures), could NOT have been prepared and made ready for publication during the two months of March and April 2009. The conclusion to be drawn is that WEC and specialists appointed by the consultancy, started to work on the DSR several months, if not years, in anticipation of an application for mining rights being made to the DME. We find it unacceptable that the process re the mining rights application was embarked upon before the judicial review scheduled for 29 April 2009. We believe that on these grounds alone, the present application should be placed on hold until such time as the judicial review is re-instated.*

Refer to 8.5.1.1 and 8.5.1.5 above. WEC was appointed by Bongani Minerals in November 2007 to undertake a desktop study (due diligence) regarding the requirements of NEMA for the proposed mining of tungsten in the Krom Antonies River valley. Wiaan Basson of Messrs Rock Ventures has

been appointed by Bongani Minerals to project manage the proposed Riviera Tungsten Mining Project, including the submission of the Mining Right Application to DME in terms of MPRDA. WEC was requested on 6 February 2008 to provide a quote for undertaking an application in terms of NEMA for the proposed Riviera Tungsten Project. WEC together with SRK, Ninham Shand, Dr. C. Boucher and Dr. Day were appointed on 14 December 2008 to undertake a NEMA application. WEC was appointed by Bongani Minerals on 1 April 2009 to assist them with the MPRDA application since Messrs Rock Ventures had resigned from the project.

8.5.2 The Legal Process Regarding Public Participation

- 1. If the application for a Mining Right is still in the beginning stages, why is this process so hasty and why was the notice of the meeting given with such a short lead time.***

The MPRD Act only provides a timeframe of 30 days from the date of acceptance of the Mining Right Application to submit the Final Scoping Report. A public meeting has to be held within this timeframe and therefore the notice of the meeting is shorter than that for the NEMA process (which in this case still needs to be undertaken). The comment period for the public participation process is, however, 30 days. Thus comment for the Scoping Process is for a 30 day period after the advertisement, i.e. to 25 May 2009. Comments received by this date will be submitted to DME for consideration with the Final Scoping Report. As it is, DME has instructed that the DSR be revised in accordance with the comments received from the IAPs during the initial 30 day comment period and that the Revised Scoping Report (this Final Scoping Report) be made available to registered IAPs.

- 2. Inappropriate and offensive reference to coloured members of the community at the one and only public consultation meeting to date was made.***

The EAP referred to the Coloured workers of the farm as the "volk". Being English speaking and having to address the meeting in Afrikaans the EAP was not under the impression that this was a derogatory term. The EAP apologises unconditionally for using this term and it was not used with any disrespect to the Coloured staff present at the meeting.

- 3. The variety of issues included in the scoping report and the number of people who could potentially be affected mean that the meeting will not cover all relevant matters in one day. What guarantees will be given regarding provision of proper sound recording equipment, microphones so people can be heard by all present and absolutely accurate recording of the names of all people present?***

A second public meeting (Open Day) will be held where all IAPs can discuss issues with the specialist consultants. No formal meeting will take place and the Open Day will be held over a whole day.

- 4. What procedures will be put in place to ensure that all IAPs have adequate opportunity to raise their objections to this development? The IAP would like to be informed of any meetings well in advance so we are able to attend.***

All public meetings will be advertised in the local and regional newspapers 14 days in advance of the meeting and all registered IAPs will be informed of public meetings. Refer to 8.5.1.3 above.

- 5. The report specifically mentions the public participation process undertaken for the Prospecting Application. Again I find it contradictory that at the meeting Mr Withers***

states in front of 300 odd people that this is totally separate from the Mining Right Application. I believe the full extent of IAP input from a far wider range of people and interests was not considered in both the Prospecting and Mining Applications. The applicant and consultants must surely be aware the impact of this mine is far reaching. Your own report suggests this. The assumption that the bare legal requirement would suffice was in my view an arbitrary decision taken without consideration for the communities directly and indirectly affected by a proposal such as this.

The Prospecting application has nothing to do with the Mining Right application which is a new process. The Mining Right Application allows for at least two public meetings. An Open day will be held to discuss the results of the EIA together with its specialist studies.

- 6. The meeting was an insult to all of the interested and affected parties (IAP) as to how the meeting was conducted. The notice period was hopelessly too short and the obvious ‘ticking of boxes’ or ‘following the Process’ was disgusting. Participants travelled far and wide and most had to sacrifice a whole day’s work to listen to (in our opinion) pro forma generic drivel. We object to this and will not tolerate such interaction in the future. Do not even attempt to waste our time with such poorly researched rubbish. We agree with the lady who suggested you fire your secretary for preparing such a poor powerpoint presentation for you. We are fighting for our lives and for generations to come. The least you can do is treat us with the respect we deserve.**

The fact that 175 IAPs attended the meeting indicates that notification, whether directly or indirectly had the desired effect. Scoping meetings are not for providing detailed information but rather for allowing the opportunity for IAPs to provide comments, information and suggestions to the process. The meeting achieved this (refer to the notes recorded at the meeting).

- 7. Why were the press advertisements informing the public about a meeting to discuss the DSR only placed on Wednesday 22 April 2009 and Thursday 23 April 2009, seven days before the meeting on 30 April 2009? Why were these advertisements placed over the period of national and provincial parliamentary elections in South Africa? (N.B. 22 April 2009 was a public holiday.) We regard the timing of the press advertisements and the seven day notice period of the public meeting as procedural irregularities which further render the public participation process followed to date inadequate and invalid.**

See 8.5.2.1 above. Please note that the Swartlander newspaper only comes out on a Wednesday, which happened to be a (unscheduled) public holiday for voting.

- 8. The report indicates that the same process of identifying and notifying IAPs will be used as in the Scoping process, and will place advertisements in the Burger regional newspaper and the local Swartlander. As I find this decision arbitrary and insulting I venture to ask: a. Did the consultant take into account the broad based opposition to this proposal? b. Has the consultant considered the link between the wider area of some of the studies and the demographics of the IAP base? c. On what research if any did the consultant base the decision as to how to advertise? d. Does the consultant know the circulation figures and reach of the newspapers used? e. Has the consultant any idea of the demographic makeup of the area? f. Has the consultant considered radio as a medium of communication g. Has the consultant taken into account isiXhosa speakers in the potentially affected areas?**

The method of advertisement by the EAP is within norms of the legal process. In future, the EAP will also advertise the EIA process in the Cape Times to reach the English public in Cape Town and Western Cape region.

- 9. *This SCOPING REPORT and the POWERPOINT PRESENTATION at meetings are in English only. The applicant and WEC considered advertising in Die Burger and Swartlander targeted the correct demographic profile. Why were both the above not in Afrikaans as well? Was there an ulterior purpose or motive? Were relevant considerations not considered? Was there a failure to take a decision? Was the decision simply arbitrarily taken?***

Whilst the slide presentation was in English, the verbal presentation took place mostly in Afrikaans. No ulterior motive was meant by the slides being in English.

- 10. *This office understands that there has been previous legal action during a previous, related Application regarding this Applicant, for rights on similar, if not the same, portions of land. This came about as a result of previous Public Participation – the Department of Agriculture is bemused as to why this legal action is not being taken into account by DME in an effort to spare this and other commenting authorities time and resource wastage. This office feels that because of the previous events this PPP needs to be both more comprehensive and more thoroughly interrogated than usual and request that a very transparent and thorough PPP be ensured by DME during this Application.***

The previous public participation process was undertaken in terms of the Prospecting Right Application. The current application is for a Mining Right. A full public participation process is being undertaken in terms of the Mining Right application. Another round of public participation will be undertaken during the EIA phase. It should also be noted that a full EIA process needs to be taken in terms of NEMA.

8.5.3 Mineral Rights Approval

- 1. *Bongani Minerals' application to the Department of Mineral and Energy (DME) has been accepted. The IAP enquired if this means that Bongani Minerals has already obtained Mineral Rights to mine.***

The DME has only accepted the Mining Right application for the applicant to appoint an environmental assessment practitioner to undertake an EIA process, which includes a public participation process (i.e. this process, which includes the public meeting held, forms part of the Scoping process). No mining rights have been approved by DME, thus far.

- 2. *The company behind the mine has very dubious credentials and obtaining the mining license can only be achieved by illegal activities as evidenced by the manner in which the prospecting rights were attempted to be attained.***

The management of Bongani Minerals takes exception to the insinuations that it is acting illegally in anyway.

- 3. *I note the Mining Application was signed on the 25 March 2009 and the Scoping report required by 18 April 2009. [less than the MPRDA minimum requirement for public participation] This just before a general election begs the question: Was this action of signing the application while the Prospecting Application was still to go to court, arbitrarily made without the relevant considerations being taken into account?***

Refer to 8.5.2.1 and 8.5.2.7 above. Please note that IAPs were given the required 30 days to provide written notice on the DSR. These written comments were captured (Table 4) and have been included in this Final Scoping Report. IAPs have again been given the opportunity (30 days) to comment on this FSR.

4. ***If the Prospecting right application is a totally separate issue from the Mining right application as repeatedly stated by Mr Withers at the meeting on 30 April 2009 [and tacitly agreed by Mr Van der Walts silence], it should not be used as part of this process, or used as reference for identifying IAPs. I and several other IAPs would like a full and satisfactory explanation of Mr Withers stance on this matter. I would also like to know why the Mining Application could not wait till the Prospecting Application case was heard in a court of law? Were WESSA and Cape Nature notified as IAPs? If so when and how? Do WEC have proof of notification?***

Whilst the two processes are completely separate applications, there is no reason why the relevant concerns of IAPs that commented on the application could not be used in the Mining Right Application. Similarly for the use of the registered IAPs. Since the prospecting application was about to expire and since the Review application was set down to be heard in the court after this date, Bongani Minerals were obligated to lodge their Mining Right application to retain their option on the “mineral rights”. Had they not done so, other companies that had already lodged Prospecting Right on the land would have obtained such “mineral rights”. WESSA and CapeNature were notified. Proof of such notification is available in the Final Scoping report.

8.5.4 National Water Act Implications

1. ***Is the National Water Act not affected by the process and why is it not being discussed at the meeting?***

The National Water Act definitely forms part of the Mining Right application, as approval by DWAF for a number of activities will need to be provided. Mention of the National Water Act is contained in the Draft Scoping Report. The fact that no mention of the National Water Act was made in the power point presentation at the meeting was done to reduce the time of the presentation.

2. ***DWAF have serious concerns regarding this application and the impacts the project can have on surface and groundwater. This project will also have negative impacts on other water users in this catchment. Bongani Minerals (Pty) Ltd will have to apply for a water use licence to this department. The applicant will have to convince this Department why a licence should be granted and how negative impacts will be mitigated. Please note that the application for an Authorisation must be made in terms of sections 21 (c), (i) and (j) of the National Act (Act 36 of 1998) A thorough water quality management plan will have to be provided to this Department as part of licence application.***

An application with all the requirements will be made for water use licence from DWAF. All the appropriate specialist consultants have been appointed to address all the issues raised by DWAF and other IAPs. The results of these studies will be contained in the EIA report. The appropriate specialist will contact DWAF for the necessary approvals.

8.5.5 Lack of Contact with Authorities, especially DEA&DP and DEAT

1. ***The IAP is concerned that Department of Environment and Tourism (DEAT) has not been notified of the application, especially as the Verlorenvlei is a Ramsar site,***

which is under the jurisdiction of DEAT. The Ramsar site has international ramifications as it is one of the UNESCO programmes.

The fact that DEAT had not been informed of the Mining Right Application together with other IAPs was an oversight of the EAP. DEAT was, however, subsequently informed of the Scoping Process. No comments have been forthcoming from DEAT to date. DEA&DP will be informed of the Mining Right application in terms of a NEMA application that still needs to be submitted to them. DEA&DP were informed by DME of the Scoping Report. Comments were received from DEA&DP and have been worked into this Final Scoping Report.

8.5.6 Controlling Authority for Mining Operation

- 1. Who will take responsibility that the mine does not pollute the environment during its operational and closure phases?***

DME and DWAF will be responsible for checking that the operation of the mine (and during mine closure) does not cause any pollution. Bongani Minerals will need to monitor whether pollution is taking place in accordance with their approved EMP. Such monitoring also needs to take place long after mine closure. DEA&DP will also monitor any pollution in terms of NEMA (as they will also need to provide a ROD for the mine).

8.5.7 Controlling Authority for Land Use

- 1. If the application for temporarily rezoning is submitted to the local Municipality, what will your recommendation be, given that there is so much opposition to the proposed mine? What would happen if the Municipality rejects the rezoning application because of the many complaints received against the mine from the community?***

Firstly WEC are not responsible for the submission of the LUPO application to the Berg River Municipality. Bongani Minerals would need to appoint a consulting Town Planners to prepare and lodge the application. It should be remembered that conclusions and recommendations cannot be drawn or made at this point in time as the results of the specialist studies still need to be completed. Should it be found from the results of the specialist studies that potentially significant impacts cannot be sufficiently mitigated, then the EAP will put such conclusions in his recommendations. It will, however, be up to the various approving authorities to make their required decisions based on the information provided to them. The Municipality would not base their decision only on the number of objections of the many IAPs into consideration, but would need to firstly consider what the merits of the objections were, as well as take the merits of the application as an integrated whole into consideration (i.e. strive for sustainable development).

- 2. In terms of the Land Use Planning Ordinance, 1985 (Ordinance 15 of 1985) no person shall contravene or fail to comply with the provisions incorporated in a zoning scheme compelled in terms of Ordinance 15 of 1985. The subject property is located in an area where the Scheme Regulations compiled in terms of Section 8 of Ordinance 15 of 1985 are applicable. The subject property is currently zoned Agricultural 1, which does not make provision for mining. Mining activities are accommodated as the primary use of Industrial Zone 3. The subject property will therefore have to be rezoned in order to legally operate a mine. Alternatively application can be made in terms of Section 15 of the Ordinance 15 of 1985 to utilise the agricultural zoned land, on a temporary basis, for mining activities. Mining activities must furthermore comply with the policy guidelines contained in the Berg***

River Municipality Spatial Development Framework (approved in terms of the Municipal systems Act, 2000 via Council Resolution R8 730 of October 2008).

Refer to 8.6.7.1. A temporary rezoning application to mine for a period of ± 20 years will be made by the Berg River Municipality.

8.5.8 Non-compliance with the Mineral and Petroleum Resources Development Act (MPRDA) Regulations

- 1. Non-compliance with Regulations 46 and 49 of the MPRDA Regulations, particularly in its failure to identify and describe the consequences of not proceeding with the proposed mining operation.***

The so called “no-go” option was included in the DSR. The Revised Scoping Report refers in more detail to the Alternatives to be considered

- 2. Land-use of the affected area is well established, with the livelihood of many existing businesses and workers dependent on existing land-use, namely agriculture. It is particularly problematic that alternatives to the proposed mine, and the many positive consequences of not proceeding with the mine, are not identified and described as required by the Regulations. This means that the Department is not provided with all relevant facts to make a decision on this application. This non-compliance with Regulation 49 taints the remainder of the DSR by ensuring inadequate and misleading representation of the facts applicable to the proposed mining area through omission of relevant information.***

The alternatives put forward in this FSR will be assessed fully in the EIA phase.

- 3. Regulation 46(a) requires the Social and Labour Plan (app7) to contain “a preamble which provides background information of the mine in question”. Appendix 7 contains no such preamble, and no information at all on the mine or the mining company itself. It is therefore submitted that the DSR itself is non-complaint with both Regulations 46 and 49 and should be rejected on this basis alone.***

The Social and Labour Plan formed part of the Mining Right application which was approved by DME. A full Socio-Economic Impact Assessment will be undertaken in the EIA phase of the project.

8.6 Legal Issues

8.6.1 Issues regarding the EMP

- 1. Referring to page 5 of the EMP. The last line states “The EMP which had been submitted on the 18th of October 2006”. The EMP submitted on 18 October 2006 did not contain page 18a – a diagram containing three proposed holes in the ROAD RESERVE. This page 18a miraculously found its way into the (already accepted) EMP in January 2007 – one of Bongani’s second PR application’s MANY fatal flaws. (An original copy without p18a can be viewed at Candice Meyer’s office at Webber Wentzel Bowens in Cape Town). This is part of the reason why Bongani’s second PR application was subject to Judicial Review. (That was never heard in court due to the fact that, despite assurances to the contrary, DME accepted Bongani’s MR application somewhere between 10 and 25 March 2009.) We find this situation very disturbing, because when DME gave us these assurances on 26 February 2009, they***

would already have been in possession of Bongani's Social and Labour plan. Our rights in this matter are reserved.

The EMP referred to above deals with the Prospecting Right which has nothing to do with the Mining Right Application which will have its own EMPR and EMP. Refer to 5.1.5 and 5.3.4 above. Please also note that in terms of Section 22 (2) of MPRDA "the Regional Manager must accept an application for a mining right if".

- 2. Unacceptable for Bongani Minerals Pty Ltd to refuse I&APs access to crucial information regarding the mining process, ore analysis and estimated water use. Without this information, IAPs cannot assess the potential impact on water resources; the risk of water pollution through the leaching of metals; or the financial viability of the proposed mine.**

Some of this information has been provided in the this revised Scoping Report which IAPs will have a further 30 days to comment on. Additional information regarding specialist studies will be made available for comment in the Draft EIA Report.

- 3. Mineral Resources Upon review of the available documentation it strikes me as unprecedented that a Mining Right Application could be contemplated when very little information is known or disclosed pertaining to the geology of the Riviera granite and surrounding wallrock, and the distribution of the related W-Mo mineralization. The 23-page extended abstract of Walker (1983) appears to be the single and only primary source of sketchy geological information related to the mineralization. That work was never peer-reviewed, nor is there any independent verification of the "mineral reserve" reported there-in (Walker, 1993, p.13) and subsequently cited in Rozendaal et al (SA Journal Geology, Vol. 97, pp 184ff, June 1994) and the SRK Consulting report "Riviera Tungsten Groundwater Impact Assessment".**

The Mining Right Application is based on the original results obtained by Union Carbide and Anglo American from their very detailed exploration programme. It should be noted that this joint partnership were on the point undertaking a bulk sample by sinking an inclined shaft into the ore body before the price of tungsten fell dramatically. No mining company would spend millions of Rands on heresay or a "25 page extended abstract". Additional hydrogeological and geotechnical studies will be undertaken during the EIA phase. Refer to the two specialist reports undertaken by Venmyr Rand and EMC dated February 2009.

8.6.2 NEMA and the EIA process

- 1. The DSR makes no mention of the environmental management principles contained in Section 2 of NEMA. This is crucial, because the MPRDA explicitly makes itself subject to those principles in its Section 37 (1)(b), and provides that the principles apply to all prospecting and mining operations, as the case may be, and any matter relating to such operation; and serve as guidelines for the interpretation, administration and implementation of the environmental requirements of the MPRDA.**

The applicable NEMA Principals have been included in the RSR.

- 2. It is my understanding that a full EIA is required in terms of Regulation R385 and WEC has been appointed by Bongani Minerals (Pty) Ltd to conduct such an assessment. With reference to Para 1.1 of the Scoping Report it is stated that a**

second EIA process is required in terms of NEMA and that this process will run separately to the MPRDA process (p.2). Para 1.4 (p.5) states that “WEC were also appointed to undertake an EIA process in terms of NEMA”. This is totally unacceptable to me. It is obvious that the WEC Consultant/s conducting such an EIA will find it difficult to be unbiased as Bongani Minerals is funding the process. Without a second and independent Consultant’s opinion, the findings in the WEC report will go unchallenged and as such will favour Bongani Minerals (Pty) Ltd’s case As an IAP, as well as being a taxpayer, I expect that the DME appoint their own consultant to conduct a separate and independent EIA as required by NEMA. It is stated on page v of PLAN OF STUDY FOR EIA AND EMP that impacts are “predicted for the purposes of a qualitative impact analysis (the expected severity of impacts and the level of confidence required in their prediction), which will guide the planning of the Proposed Riviera Open-Cast Mining Project.” I am of the opinion that these predictions and resulting guidelines for the planning of the project are of such extreme importance, that it cannot justifiably rest only with one Consultation company. Given the fact, that Mr Aubrey Withers were allegedly found to be trespassing on private property recently, it creates doubt to the integrity of the entire scoping process and also undermines the much required “level of confidence” in Mr Withers.

Two full EIA processes will be run: one in terms of MPRDA and one in terms of NEMA. All the relevant information at the disposal of the EAP must and will be disclosed. The EAP is independent and does not write “sweetheart” reports.

- 3. We are concerned about the financial effects for WEC. Based on desktop research it would seem that WEC is a small environment consulting company with the result that a project of this size would result in the WEC being financial dependant on Bongani Minerals (Pty) Ltd (“Bongani”) which may make it impossible for them to make objective recommendations in this regard.**

WEC is known in the industry for not writing “sweetheart” reports (refer to 6.1.1 above). Please note that the information and conclusions and recommendations contained in the report are made based on the information received from specialists.

- 4. In terms of the country's legislation, in particular co-operative governance, it is submitted that reports from each process should be released for public review at the same time and that IAPs can reasonably expect the two authorisation processes to run in parallel, to obviate the situation where one authority is pressurised into a decision because another authority has already decided.**

a) When is WEC intending to initiate the EIA process in terms of NEMA?

b) Will the two authorisation processes run in parallel and if not, why not?

Please note that DME and DEA&DP make decisions autonomously and in terms of completely different sets of legislation. Whilst DEA&DP need to comment on the MPRDA in terms of co-operative governance, their decision making is independent of each other. The NEMA application will be launched towards the end of July 09. Since the time frames specified for the two processes are different, they will not run parallel with each other.

- 5. We submit that appointing the same firm, even if they are an independent environment consulting company, for both studies is a blatant breach of good corporate governance principles as documented in the various King reports on Corporate Governance. As such we would require that a different firm be appointed to perform one of these studies. In the event that a separate firm is not appointed, at the very least, a completely separate team should be engaged to complete the different assessments to ensure that there is the required objectivity. The draft**

scoping report includes details about the size of WEC and indicates (on pg 7) that four professional staff support Mr Withers. Based on this information it would seem unlikely that separate teams could be used for the different studies.

Since the two processes are so similar, very little core information will change. In addition, the specialist studies will be the same for both processes. It therefore seems superfluous to have two different EAPs for the two processes.

- 6. The DME has given Bongani Minerals 6 months to present their EIA. A number of specialists quoted in the Draft Scoping Report have indicated that they would need a minimum of 1 year to do adequate baseline studies and collect sufficient relevant data to make informed recommendations. How do Bongani Minerals and WEC propose to solve this conundrum? Is it possible that the applicant will short-cut the EIA process in order to comply with DME regulation?**

Unfortunately, the MPRDA only allows for 6 months to produce the final EIA report. This is a failure of the Act as it is impossible to complete certain specialist studies within this time frame. An extension of time will be applied for from DME for producing the Final EIA Report.

8.6.3 National Environmental Management Biodiversity Act (NEMBA)

- 1. How can it be assumed that the mine will not have far reaching effects on nationally protected plants over an area far larger than the footprint of the mining operation? On page 3 of the DSR, it is stated that “[i]t is not expected that the footprint of the proposed Open-Cast mine will impact on any nationally protected vegetation types.” Firstly, it is important to note that the actual “footprint” of the mine is 555 ha, which is the total “mine lease area” required for the pit area and all the structures and facilities associated with the mine, including waste dump, slimes dam and plant area (DSR page 4). Secondly, members of the Coalition report sightings in the Verlorenvallei of a number of species listed on the Threatened and Protected Species lists issued under the National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004).**

Very little natural vegetation will be directly affected by the actual mining. Whilst some dust pollution is expected, the significance of the dust should not have any impact on the surrounding natural vegetation. The potential impacts of the mine on ground and surface water will be assessed in the EIA phase.

- 2. According to your Environmental Evaluation (Section 5) potential impacts on flora and fauna, and freshwater ecosystems appear to be most significant, yet, this appears to be contradictory to what is said in Section 1.2.4 dealing with NEM: Biodiversity Act. In addition, the Biodiversity Act provides for ‘the protection of species and ecosystems that warrant national protection’ (viz the Verlorenvlei estuary, protected under the Ramsar treaty).**

All the relevant legislation protecting ecosystems will be taken into account by the specialist appointed to undertake studies in the relevant disciplines (vegetation, freshwater ecology, fish, birds etc.).

8.6.4 National Environmental Management: Air Quality Act (NEM:AQA)

- 1. The DSR fails to record that the metallurgical plant would require an atmospheric emissions licence under the NEM:AQA, 2004 (Act 39 of 2004). As at the date hereof,**

the Coalition has not received formal notice of any such application. AQA also imposes other general legal obligations in relation to air quality, including emissions to air from mining and metals processing.

The tungsten metallurgical plant does not require smelting for its processing. It is a chemical plant and therefore no emissions will be released to the atmosphere. Dust monitoring will be undertaken.

8.6.5 National Environmental Management: Waste Management Act (NEM:WMA)

- 1. The DSR fails to record that both the mine and the metallurgical plant would require a waste management licence under the NEM:WMA, 2008 (Act 59 of 2008). The WMA also imposes other general legal obligations to waste generation and management. As at the date hereof, the Coalition has not received formal notice of any such application.***

A waste management license will be applied for in due course. Discussions will be held with the Berg River Municipality.

8.6.6 Environment Conservation Act (ECA)

- 1. The DSR lists the ECA, 1989 (Act 73 of 1989) as part of the legal framework applicable to the proposal, but fails to mention that this act has been repealed by the WMA, which comes into effect on 1 July 2009.***

The Scoping Report was produced before 1 July 2009 and could thus not note an Act that was not in effect at the time. This will be updated in subsequent reports.

8.6.7 Land Use Planning Ordinance (LUPO)

- 1. On page 45 the DSR refers to a “temporary change in land use” from Agriculture Zone 1 to Industrial Zone II in terms of the Land Use Planning Ordinance, 1995 (Ordinance 15 of 1985) to operate the mine. Presumably this “temporary change” is in fact for the life of the mine, i.e. 18-19 years. As at the date hereof, the Coalition has not received formal notice of any such application to the local authority.***

Changes in land use will be applied for in due course by the appointed town planners.

8.6.8 Ramsar International Convention on Wetlands

- 1. The Convention on Wetlands of International Importance (commonly known as the Ramsar Convention) came into force on 21 January 1975 and provides a framework for the conservation and wise use of wetlands and their resources. These are presently 118 contracting parties (including South Africa, who became a member on 12 March 1975). The DSR, however, neglects to mention this international treaty under the section “Legal and Policy Framework.”***

The revised Scoping Report has been updated.

8.6.9 National Water Act, 1998 (Act 36 of 1998)

1. ***The National Water Act, 1998 (Act 36 of 1998) is noted as having bearing on the project under “Other Legislation (point 1.2.6). Given that the scoping report highlights a number of likely and significant impacts on surface and ground water, both in terms of quality and quantity, it is crucial that these issues are treated as being of utmost importance – and the provisions made within the National Water Act be referred to more thoroughly in the scoping report.***

The revised Scoping Report has been updated.

8.7 Heritage and Rehabilitation Issues

8.7.1 Impacts of the proposed mine on heritage resources

1. ***The Coalition is perturbed by the fact that the DSR describes the potential impacts of the proposed mine on heritage resources as ‘low’. This conclusion has been reached despite not even a desktop review having been done on existing heritage and archaeological resources in and around the affected area (in compliance with Regulation 49 (1)(d)). In fact, Coalition members are aware of the fact that there are plenty of San sites along the southwestern shore of the Verlorenvlei mountains. Mine activities could cause damage to the natural history and San culture heritage of the Verlorenvlei district.***

A heritage and archaeological assessment will be undertaken in the EIA phase. The well known sites on the shores of Verlorenvlei will not be affected by the mining operations.

2. ***How can the existing agricultural pursuits reduce the impact of the proposed mining operation on as yet unexplored sites? Our historical and archeological sites are not a resource but a legacy.***

Refer 8.7.1.1 above. It is hardly likely that deeply buried archaeological sites will be found in alluvial material (high energy environment). Certainly ploughing disturbs surface archaeological sites.

3. ***One of my concerns is that the valuable San rock paintings in caves near to the pit excavation will be damaged by rock falls as a direct result of the seismic affects of blasting. It is my contention that this cultural heritage must be preserved and whatever measures are required must be implemented including total removal and relocation if necessary.***

An Archaeological impact assessment will be undertaken. It is highly unlikely that blasting will affect rock paintings on the Piketberg mountains to the east.

8.7.2 Palaeo Ecology

1. ***IAP have been involved in research into the late Quaternary palaeoecology of the wetland and it is clear from our studies that the system is already highly modified from its pre-colonial farming situation and that it is very vulnerable to further degradation.***

A heritage assessment and an archaeological assessment will be undertaken in the EIA phase.

2. ***The sediments of the entire Verlorenvlei are a rich storehouse of palaeo ecological history and of immense scientific value. This valuable natural asset must be preserved and not threatened in any way whatsoever. The type of mining activity envisaged in this application is of a highly invasive nature and could cause irreparable damage to the Verlorenvlei. I consequently believe that it is absolutely necessary to widen the scope of the investigations to include a full depth investigation into the palaeo ecological issues and the possible damage that the proposed mine may have on this cultural treasure.***

The Verlorenvlei is 35 km to the northwest of the proposed mine. The proposed mine will therefore not impact on the palaeo-ecology of the vlei. It will therefore not be necessary to study the palaeo-ecology history of the Verlorenvlei.

8.7.3 Rehabilitation and surety

1. ***The proposed mine is an intrusion into a well ordered and successful community with an excellent track record in social consciousness and responsibility. In addition the visual setting is to say the least – stunning! If this mining company wish to persist with this application and heaven forbid they are finally granted approval then it is incumbent on them at the end of the mining operation to reinstate the entire area to precisely the condition they found it in. This would include inter alia ;***
 1. ***Refilling the mine pit with the dumped overburden and any additional suitable material required to return it to its original ground level and the planting and maintenance of suitable vegetation.***
 2. ***The removal of the slimes dam and contents to a suitable waste disposal centre e.g Vissershok Hazard Disposal Site.***
 3. ***The complete neutralisation of the slimes dam site and the planting and maintenance of same with approved vegetation***
 4. ***The demolition of all buildings of the processing plant including the concrete floor slabs and foundations and removal of same to a suitable waste disposal centre.***
 5. ***The demolition of any other buildings on the lease property erected by Bongani minerals not contaminated with chemical waste and removal of all rubble to an approved dump site.***
 6. ***The entire site of the mine lease to be reinstated to the original condition in which it was found.***
 7. ***The settlement of all claims for compensation by all parties suffering from health ailments caused by the mine operations***
 8. ***Any other issues of reinstatement not mentioned above.***

It is estimated that the cost of the above reinstatement will be in the order of R 0.75 Billion. In terms of the regulations Bongani Minerals are required to pay the assessed amount to the Department of Minerals in full prior to commencement of any mining operations to be held in an interest bearing account pending complete and approved reinstatement and only thereafter will the amount with interest be reimbursed to Bongani. Since the above issue is not made clear in the DSR I would anticipate that the matter will be fully detailed in the final Scoping Report.

A surety payment will be made to DME by Bongani to ensure rehabilitation. A mine closure plan will also be submitted to DME for approval in the EMP. The open cast mine will not be refilled. The mine dumps and slimes dams will be rehabilitated according to the closure plan.

- 2. A surety from the companies are worthless as they can be closed down or go bankrupt/or the directors/shareholders can simply disregard their responsibilities which is one of the reasons why the world is so polluted(see article by Blacksmith NY - 600 million earths). It is imperative that the companies issue a Bank Guarantee backed by the Directors/Shareholders which must be inflated yearly for any future clean-up. (The Directors/ shareholders must underwrite the guarantee and it must be in force for at least ten years after the mining stops. (See paragraph5 of Blacksmith article attached- Flow rate variations- I have marked it "A".) Refer to W.E.C. Response(Public Participation Table6) Item4 .6 page6 (April2009)**

Such guarantees have to be made by the mining company before mining may begin. The Directors of the company are held liable for any damage, pollution that may be caused as a result of mining.

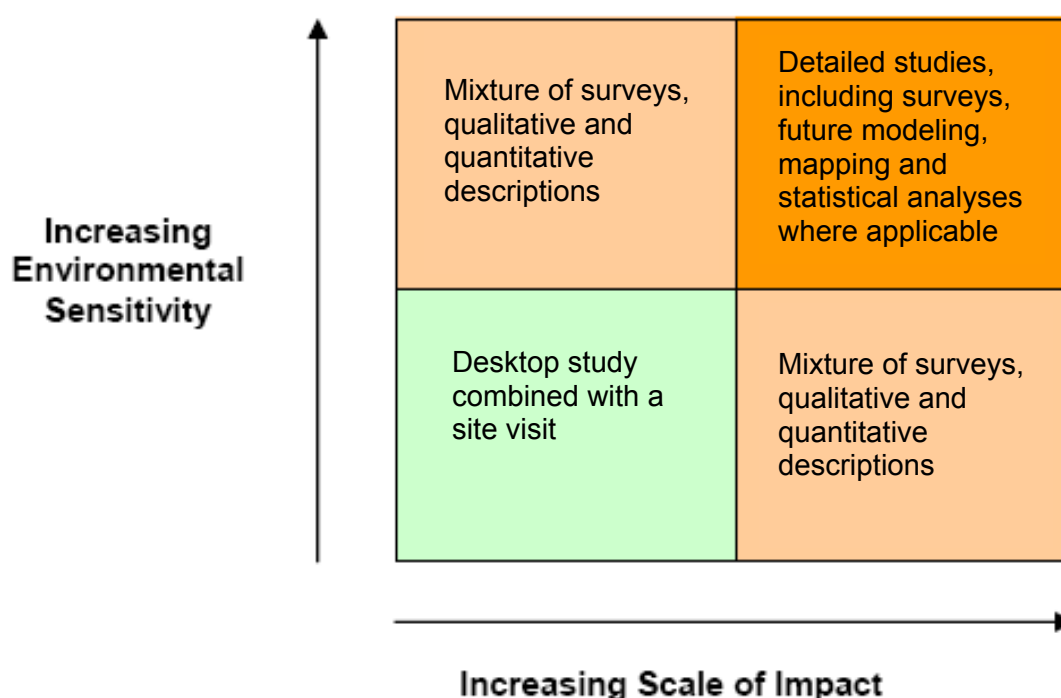
9. PLAN OF STUDY FOR THE EIA AND EMP

The plan of study for the EIA and EMP is set out below for review by the IAPs. The rationale for the different levels of study for the various environmental components is taken from the issues raised by specialist scientists/consultants and by IAPs, the expected severity of impacts and the level of confidence required in their prediction. The level of information required to develop adequate, practical management and mitigation measures was also a consideration in determining the terms of reference of studies.

9.1. Specialist Studies

The scope of studies as set out in the plan of study for the EIA (section 8.1.1 below) was determined by means of a **Professional Judgment / Risk-based Approach**, which considers the sensitivity of the particular environmental aspect in the study area and the level of confidence required for decision making. The higher the level of sensitivity or potential impact on the project or *vice versa* and the higher the level of confidence required for decision making, the greater the level of study required. In terms of the sensitivities of the Krom Antonies River Valley and Verlorenvlei systems and the desired higher level of confidence required for the EIA study, the darker shaded block will be applicable to the EIA study.

Such professional risk-based judgments on the scope of the EIA have been/will be further guided by WEC, by specialist consultant/scientist knowledge and by issues highlighted by IAPS during the public participation process.



The following preliminary specialist studies/assessments have been carried out during the Scoping Phase for the proposed Riviera Open-Cast Mining Project:

- Vegetation – Dr Charlie Boucher;

- Freshwater Ecosystems – Dr. Liz Day, the Freshwater Consulting Group;
- Water Quality – Mr. Nico Rossouw, Ninham Shand;
- Hydrology – Mr Gerald Howard, Ninham Shand;
- Hydrogeology – Mr Des Visser, SRK

Certain information regarding the social and economic environments of the Piketberg Region were taken from the Social and Labour Plan undertaken by Prof Jonathan Bloom, Umcebis Business Advisors (Pty) Ltd.

The preliminary reports/assessments conducted thus far will however require detailed study and re-working during the EIA phase in order to predict impacts for the purposes of a qualitative impact analysis (the expected severity of impacts and the level of confidence required in their prediction), which will guide the planning of the Proposed Riviera Open-Cast Mining Project.

The following outstanding studies and processes will also need to be conducted during the EIA phase through collation of existing information, field surveys, sampling and mapping with various impact assessment scenario's being undertaken.

- visual impact assessment;
- agricultural soil potential;
- archaeological and heritage impact assessment;
- Socio-Economic Impact Assessment supplemented by an Agriculture Land -use Study - Multi-Purpose Business Solutions (Prof Jonathan Bloom) in association with Tradouw Ondernemings cc (Prof Theo Kleynhans);
- air quality;
- land use;
- noise;
- detailed climatic specialist study (wind strengths and direction, rainfall, humidity, temperature);
- town planning (site development plan and LUPO application);
- architectural guidelines;
- landscaping architectural guidelines and rehabilitation guidelines;
- detailed civil engineering report; and
- fish impact assessment;
- avifauna;
- geotechnical impact assessment.

According to the preliminary specialist reports conducted thus far, more detailed studies and assessments would need to be provided by the appointed specialists/consultants during the EIA phase. As such, their **terms of reference**: should be expanded.

9.1.1. Terms of Reference for Specialist Studies

9.1.1.1. Vegetation:

- The possible occurrence of endangered plant communities (e.g. Piketberg Quartz Succulent Shrubland Vegetation) and/or red data plant species that have been recorded in the vicinity necessitates a detailed vegetation survey (including all-year sampling) to accurately pin-point the distribution of the remnant vegetation types (to describe and map the vegetation on the site) and to provide a comprehensive inventory of all species, including the presence and distribution of threatened plants present on any site supporting indigenous vegetation in the highly disturbed Krom Antonies River Valley;
- To determine the impact that opencast mining will have on the conservation status of natural vegetation in the mining area; and

- To propose management and mitigation measures for impacts on vegetation by the proposed Open-Cast Mine.

9.1.1.2. Freshwater Ecosystems

- To assess the ecological importance and sensitivity of aquatic ecosystems in the vicinity of the proposed mining area;
- To describe and map the freshwater ecosystems in the vicinity of the proposed mining area and their conservation status;
- The hydrological study must determine the 1:100 year flood lines of all wetlands, rivers and drainage areas in the mining area;
- To determine the impact that open - cast mining will have on the conservation status and functioning of freshwater ecosystems in the mining area;
- To determine the impact that open - cast mining will have on freshwater ecosystems.
- To propose management and mitigation measures for impacts on freshwater ecosystems; and
- To determine the surface water flow of streams in the mining area in terms of peak flows, dry weather flows, and flood lines

The following aspects would need to be investigated as part of a detailed baseline study, informing the freshwater ecosystem component of an Environmental Impact Assessment of the proposed mining development:

- Surveys of fish populations both within the Krom Antoniesrivier system, and in the Verlorevlei River system up- and downstream of the Krom Antoniesrivier confluence;
- Detailed surveys of macroinvertebrate fauna at strategic points along the Krom Antoniesrivier system, to establish *inter alia* the possible presence of the endemic bivalve *Unio caffer* along the river, as well as to obtain a clearer understanding of changes in aquatic invertebrate community structure along the river, in relation to changes in habitat quality and structure and water quality;
- Identification and mapping of groundwater dependent wetlands in the Krom Antoniesrivier valley that may be affected by dewatering and abstraction;
- Detailed assessment of the Krom Antoniesrivier along its length, to allow an assessment of Habitat Integrity at a scale that will allow future monitoring of the impacts of the proposed mining activities, if approved; and
- Collection of data relating to algal assemblages along the river.

The above data would need to be interpreted with reference to surface and groundwater water chemistry and flow data, as well as botanical information. They would also need to be interpreted in the light of similar data collected from the Verlorevlei River, both upstream and downstream of the confluence of the Krom Antoniesrivier system. The present Site 3, as well as an additional site between the confluence of the Krom Antoniesrivier and the confluence of the Hol River, should be selected for the baseline assessment. In addition, a more suitable reference site should be selected in the Verlorevlei catchment - it is suggested that the Bergvallei River should be considered for potential suitability from an ecological perspective. Data should be collected on at least a three monthly basis, over a minimum period of one year. This assumes that water quality and flow data are collected at more frequent intervals (i.e. at least monthly).

9.1.1.3. Water Quality and Hydrogeology (surface and groundwater) Impact Assessment

- A baseline water quality monitoring programme is required during the EIA phase, in order to determine the effects of mining on water quality during the Operational Phase;
- The potential impacts of mining on water quality should include those affecting surface and groundwater and must include potential impacts on Verlorenvlei;

- The monitoring network should include the upper, middle and lower reaches of the Krom Antonies River; the Hol and Kruismans Rivers upstream of the confluence with the Krom Antonies; the Verlorenvlei River downstream of the confluence with the Krom Antonies River; the old DWAF gauging site at G3H002, as well as the outflow from Verlorenvlei. The monitoring should start during the EIA phase, prior to any construction, and continue during the Construction, Operational and Decommissioning Phases of the mine;
 - To describe the surface water flow of streams in the mining area in terms of peak flows, dry weather flows, and flood lines;
 - To describe the geological environment before, during and after the proposed mining activities on the basis of the physical, hydraulic and geochemical properties of stratigraphical units;
 - To describe the groundwater regime in a regional geological and hydrogeological context, indicating the overall characteristics of geological settings and aquifer parameters;
 - To describe the groundwater regime in the study area including a detailed hydrogeological description of the characteristics of aquifer parameters;
 - To determine the dry and wet weather water balances for various phases of the mining operation;
 - To describe quality and quantity related aspects of the water resources potentially affected by mining (i.e. to determine the amount and quality of the water sources to be used in mining activities, to be used as baseline data);
 - To describe water quantity and quality of groundwater use within a study area determined by the specialist consulting scientists (minimum of a 1km radius from the edge of the mining area);
 - A detailed breakdown of groundwater quality is required, particularly if dewatering is required;
 - To determine the groundwater impact on water balances and water quality and management measures related to mining operations as input to the surface water balance;
 - To determine the impact of mining on the groundwater regime i.e. aquifers, streams, high recharge areas and surrounding groundwater use and water quality;
 - To quantify the impact of the mine on water resources to the level of detail required by the authorities;
 - To ensure compliance with the requirements of Government Notice No. 704, National Water Act, 1998 (Act 36 of 1998) Regulations on use of Water for Mining and Related Activities Aimed at the Protection of Water Resources;
 - To ensure compliance with the Chamber of Mines Best Practice Guidelines formulated with regard to both stormwater and surplus water management;
 - To define the water management systems, and to facilitate the planning and costing of these systems, and determine their potential impacts;
 - To propose management and mitigation measures for groundwater impacts;
 - To develop mitigation measures to a level of detail that will allow authorities to make a decision on the project;
 - To determine water supplies for human consumption. Albeit that most of the mining staff will not live on the property, provision of potable water supplies will be necessary; and
 - To prepare relevant water use licences for the project.
- To obtain specific aquifer information and parameters of the deposit and its surrounds, the following work will be carried out during the Groundwater Impact Assessment Phase 2:
 - A detailed hydrocensus of boreholes, springs and dug wells occurring in the study area will be carried out. During this survey information such as coordinates, borehole depth, diameter, water level, type of equipment, usage, volumes abstracted and reported yield will be acquired.
 - Water samples will be collected and the electrical conductivity (EC) and pH measured. Samples from selected boreholes (8 allowed in costing) will also be submitted to an SANAS accredited laboratory for chemical analysis, i.e. metals, anions and cations. Samples will also be submitted for stable isotope (Deuterium and O^{18}) and tritium analysis.

- The siting and drilling of three deep (150 to 200 m rotary air-percussion) boreholes into the secondary (bedrock) aquifer and six shallow (15 m mud-rotary) boreholes in the upper sandy unconfined aquifer. These boreholes will consist of seven test and two observation boreholes. One of the deep boreholes will be drilled through the ore body into the granite whilst the second will be drilled into the fault zone occurring on the northern side of the Riviera Granite Dome. The exact position of the latter borehole will be determined by geophysical surveys. The shallow boreholes will be located on the western side of the proposed mine pit, the eastern side of the proposed mine pit, two in the proposed plant area and one in the proposed waste rock dump area. Note: No boreholes are proposed in the area proposed for the tailings dam as this area is in our opinion unsuitable for the tailings dam. The groundwater specialists recommend that the tailings dam be moved further away from the river to the area proposed for the plant. The observation boreholes will be between the two sets of test boreholes.
- Test pumping of the four test boreholes. Each borehole will be subjected to a step drawdown test consisting of 6 x 1 hr steps each of a higher pumping rate, 48 hr constant discharge tests (CDT) on three boreholes and a 72 hr CDT on the borehole drilled in the fault system. At the end of each test the water level recovery will be monitored at pre-determined intervals. The water level in the observation boreholes will also be monitored during the tests with automatic water level recorders. During test pumping of the deep boreholes the water levels in the shallow boreholes will also be monitored.
- Water samples for macro-chemistry, trace elements and stable isotopes (Deuterium and $^{16/18}\text{O}$) tritium analyses will be collected at the end of each CDT. The stable isotopes indicate the origin of water and the site specific hydrologic processes. Different concentration levels along defined trend lines are indicative of the water origin. Tritium is an indicator of the age of recharge to the aquifers.
- The vertical EC, pH and temperature profile of the groundwater in the test boreholes will also be logged. This is to determine if there is a variation in groundwater quality with depth.
- The data will be analysed and aquifer hydraulic properties, e.g. T, S and K values determined.
- The numerical flow model and contaminant transport model will be updated with the on-site aquifer parameters.
- The hydrogeological report will be updated for inclusion into the Environmental Impact Assessment (EIA) report.

The Department of Agriculture has suggested that the specialist groundwater study (Groundwater Impact Assessment Phase 2) include the following:

- Establish the depth of groundwater and groundwater quality;
- Establish a database to show the groundwater flow network for the area where drilling is contemplated and in the surrounding areas where the resource may be affected;
- Assess the impact resulting from the activities created by prospecting on the groundwater regime and the water table, and possible mining in the future;
- Assess the impact of the activities on the broader region's surrounding aquifers, including all neighbouring and other landowners who may source water from these underground reserves;
- Assess the impact of the drilling activity in the vicinity of any natural usage points (e.g. use at natural springs, fountains and wetlands);
- Investigate where the prospecting and potential mining operations will source water if not from underground sources on site and long-term effects on the entire Region; and

- Propose mitigation measures to minimize impacts to the satisfaction of all IAPs, including the possibility of recommending that the region be declared a “no-go” area to such Applications.

Furthermore, the Department of Agriculture has requested that the specialist groundwater study (Groundwater Impact Assessment Phase 2) be expanded to include a comprehensive “Reserve Determination Study for the Verlorenvlei”. The content of this study should include:

- Undertake a comprehensive hydrological study that links and determines groundwater and surface water resources to the replenishment regime of the Verlorenvlei;
- Determine and assess the total contribution (groundwater and surface water) contributed by the Moutonshoek Valley;
- Determine and assess the potential water resource which the mining activities could remove from this contribution due to actions related directly and indirectly to future prospecting and mining activities i.e. water utilization/consumption, including a clear stipulation and identification of all recycled (“grey”) water and non-reusable waters (without referring to “theoretical” or “potentially reusable” volumes – there are similar operations in practice and the Study is to use them as examples and identify them in the Report);
- Determine and assess the potential loss to the resource should the potential pollution threat caused by mining activities become a reality; and
- Review all information gathered, assess whether there are other contributing factors and potential contributors of value not yet considered, and, after reviewing those/their contributions, recommend mitigation measures, including the possibility of declaring the area a “no-go” region for the applied activities.

9.1.1.4. Soils and Land Capability Impact Assessment

- To describe and map the soil types and the agricultural soil potentials covering the mine lease area using a detailed grid;
- To review the relationship between the soil study and the extent and potential of the present agricultural activities on the land;
- To determine the impact that open - cast mining will have on land capability; and
- To propose management and mitigation measures for soils and the restoration of post-mining land capability.

9.1.1.5. Heritage and Archaeology Impact Assessments

- To describe and map the heritage and archaeological resources of the mineral rights area;
- To determine the significance of such heritage and archaeological resources;
- To determine the impact that opencast mining will have on heritage and archaeological sites;
- To determine the impact of the open cast mine and waste dump and slimes dam on the cultural landscape of the Krom Antonies Valley; and
- To propose management and mitigation measures for impacts on heritage and archaeological sites.

9.1.1.6. Socio-Economic Impact Assessment

The DME has requested (in their letter dated 24 June 2009) that Bongani Minerals (Pty) Ltd. conduct a full Socio-Economic Impact Assessment to determine and compare the feasibility of the proposed mine with that of the existing land use.

The DME specified that: *“A comparative assessment of reasonable and existing land use / development alternatives to the operation must be done as contemplated in Reg. 49(l)(d). The reliance of land-use on clean water, clean air and infrastructure must be explained. Consider the Risks, Costs and Benefits of the different options in strategic context based on relevant*

information. The proposed specialist socio-economic study in 9.1.1.6 (of the Draft Scoping Report) must include all risks, impacts and costs on current land-use namely agriculture and others, schools crèches, training, housing, land values, jobs, lifestyle, quality of life, soils, projects, road infrastructure, current water users and electricity supply and other industries such as agriculture and tourism. It must further submit verifiable details of the income and benefits of the mine. Submit the ToR for such a study to this department and all other authorities before or on 20 July 2009”.

The Department of Agriculture requested that the (Socio-Economic) specialist study: *”Assess the loss of land to agriculture that the proposed activities would create, including estimated losses to (estimated/potential) mining activities; Assess the potential financial loss to agriculture (and individual landowners in particular) should the proposed activities lead to the establishment of a mine; and Review mitigating measures for all the above circumstances, including the possibility of calling the entire Valley a “no-go” area for this and similar Applications”.*

Multi-Purpose Business Solutions in association with Tradouw Ondernemings cc have accordingly been appointed to conduct a social and economic impact assessment supplemented by an Agriculture Land -use Study for the proposed Riviera Tungsten Open-Cast Mining Project.

The guidelines provided by the Department of Environmental Affairs and Development Planning, Western Cape, for involving Social Assessment Specialists in EIA Processes (February 2007) together with the Guidelines for Involving Economic Specialists in EIA Processes (June 2005), will form the basis of the full Socio-Economic Impact Assessment.

Multi-Purpose Business Solutions in association with Tradouw Ondernemings cc propose to prepare a Social Impact Assessment (SIA), and refer specifically to the following:

- Specification of the research approach and survey methodology used for the assessment;
- Identification of impacts and assessment of key impacts identified during primary research, discussions with individuals and key stakeholder groups, as well as the Scoping Phase of the EIA process;
- Preparation of a basis for the implementation of measures required to mitigate impacts;
- Develop a monitoring and evaluation framework;
- Stipulate key findings from the study; and
- Offer recommendations/mitigation measures including an assessment of alternatives.

In order to achieve the required outcomes, interviews will be conducted and information collated in terms of the following:

- A primary assessment will be conducted of the broader community in order to ascertain their perceptions of the proposed mining activity, aspirations, fears and social interaction and cohesion, sense of place, etc. This portion of the primary assessment will focus on the communities of Piketberg, Eendekuil and landowners in the Krom Antonies Valley, which include farm workers. Permission from the farm owners will be obtained in order to gain access to the farm workers. A list of farms with owners/managers will be obtained and they will be contacted for an appointment.
- A primary assessment will be conducted of small businesses owners in the Piketberg and Eendekuil areas that could be local suppliers (vendors) for the new mining project. A sample of businesses representative of different sectors and especially sectors most likely to be affected by the development, will be assessed and surveyed with a strong focus on the business community in locations surrounding the site;

- Discussions and interviews will be conducted with other key stakeholder groupings in the area, i.e. Farming Associations, Business Chambers, other interest groups, community groups, Bergrivier Municipality, etc.

In addition, the following will be prepared:

- A framework for the implementation of a social engagement programme that is aligned with the Social and Labour Plan; and
- Proposals for a Monitoring and Evaluation programme as required by the SIA Guidelines and aligned with the Social and Labour Plan.

The guidelines provided by the Department of Environmental Affairs and Development Planning for involving Economic Specialists in EIA Processes (June 2005) form the basis of the Economic Impact Assessment. Essentially this guideline focuses on a “checklist” approach that encompasses the following:

- Assess the viability and financial feasibility of the project;
- Establish the fit with spatial planning from an economic perspective;
- Assess the societal costs and benefits, which essentially refer to the social impacts;
- Quantify the economic impact; and
- Provide guidance for the monitoring and evaluation of impacts and socio-economic obligations.

The following aspects among others will be covered in the economic assessment of the project:

- The contextualisation of the project in the broader economy of Piketberg with specific reference to the Krom Antonies Valley (should the data permit) and the need (timing) and desirability (placing) of the mine in the context of the Provincial Spatial Development Framework (PSDF), local structure and spatial developments plans and the IDP for the Piketberg area;
- The quantification of the value added (Gross Geographic Product) and the direct, indirect/induced employment during both the construction and operational phases;
- Qualitative benefits will be assessed by highlighting the primary and secondary agglomeration impacts and the potential of the development to support internal capacity development of businesses in the area;
- Negative socio-economic impacts are associated with development in general. These issues, which relate to externalities, will be considered and essentially supported by our proposed Social Impact Assessment;
- Attention will also be given to options for small business development in the area together with community involvement in order to further the desire of the local authority to establish, support and mentor previously underrepresented small businesses in manufacturing, services, tourism and other labour-intensive industries;
- The revenues accruing to public authority will be considered. The latter will be assessed in terms of the net effect of infrastructure required that is provided by the mine and the Bergrivier Municipality;
- Employment and Unemployment in the area and the impact of the proposed mine on employment levels will be assessed. The skill levels of locals to partake or contribute to the project during the construction and operational phases will also be stated. Skills levels of locals coupled to a need to create and develop capacity are essential motivators for the involvement of local communities in the construction and operational phases of the project; and

- A social engagement strategy will be proposed to the developers to address and mitigate some potential impacts that are aligned with the Social and Labour Plan. A 10-year economic impact projection based on the operational phase of the project will be provided inclusive of the construction phase. The latter is a requirement of the Economic Specialist Guidelines. An economic impact model will be used to assess the Gross Regional Product and employment impacts of the mining project.
- All too often, Socio-Economic Impact Assessments offer a one-dimensional view of the effect developments have on the socio-economy of a locality, region, province or country (i.e. focusing only on the gross benefit of direct investment and expenditure). Multi-Purpose Business Solutions in association with Tradouw Ondernemings cc believe the need exists to ascertain the net socio-economic impact and therefore the focus of the assignment will be to determine the quantified benefit in relation to quantified cost (where possible). Typically, for a development of this nature, the economic costs will emanate from the loss of economic revenue due to the development of the land, e.g. alternative use, leakages, labour implications, etc. The latter is an incremental approach and could be considered as an analysis that assesses a situation “with the project” and “without the project”. Although the ideal is to quantify the incremental impact, Multi-Purpose Business Solutions in association with Tradouw Ondernemings cc will consider measures such as employment, revenue and infrastructure as possible metrics for assessment.

The scope of work required to assess the impact of the mine on agriculture land uses in the directly affected area entails the following:

- Determination of the financial-economic viability of the potential land-use from soil classification by means of farm modelling and compare this with the current land-use of all individual landowners on whose properties the proposed mining may take place.
- Assess each farm and the impact of the mine in terms of (1) the loss of income from the land occupied by the mine (2) the impact thereof on the viability of the remaining part of the farm (if applicable).
- Assess each farm and the impact of the mine on the remaining part of the farm in terms of a possible reduction in the quantity and quality of irrigation water due to the mining activities, based on hydrological evidence

The scope of work required to assess the impact of the mine on agriculture land uses on the farms downstream of the mining area entails the following:

An impact assessment is required of the proposed mining activities on the potential reduction in the quantity and quality of irrigation water and groundwater on the production pattern and profitability of each potentially affected farm downstream from the proposed mining area. This assessment can only be initiated once the potentially affected farms downstream of the mining operation are identified and a hydrologist and a soil scientist have assessed the potential magnitude and probability of the reduction in the quantity and quality of irrigation water and groundwater and the impact on crop yields and production patterns. Multi-Purpose Business Solutions in association with Tradouw Ondernemings cc will discuss this with the relevant professionals who will be tasked to identify the farms potentially affected by the mining operation. Thereafter, a clearer perspective can be obtained and the parameters in which the analysis will be conducted can be determined. A similar approach used for the assessment of the agriculture land-use of farms directly affected will be adopted for an analysis of farms downstream from the mining operation.

All the work proposed as part of the assignment will be included in the full Social and Economic Impact Assessments, which will be presented as two reports, i.e. a Social Impact Assessment and an Economic Impact Assessment. The latter will include the Agriculture Land Use Assessment of directly and potentially affected farms. An executive summary will be included that provides a concise indication of strategic impacts and findings. A section of limitations will be included to highlight aspects that curtailed the studies. All the impacts will be assessed in accordance with guidelines for the assessment of impacts used by Environmental practitioners. Cumulative impacts, where applicable, will also be assessed. The latter assessment will require the perusal of the studies and recommendations conducted as part of the EIA process by other professionals in the team.

9.1.1.7. Air Quality Impact Assessment

- To determine and describe the baseline air quality in the study area;
- To identify potential dust emissions from the open-cast mine during its various phases;
- To predict the health and nuisance impact of emissions (dust) on sensitive receptors in the area;
- To propose management and mitigation measures for air quality impacts from open-cast mining (in line with Dust Fall Standards SANS 1929:2004, **Appendix 16**);
- To provide details regarding dust suppression methods and dust monitoring; and
- To determine the cumulative impact of the proposed mine operations on sensitive receptors in the area.

9.1.1.8. Noise Impact Assessment

- To determine and describe the existing ambient noise levels in the study area;
- To estimate the noise emissions from the open-cast mining operations;
- To estimate the noise emissions from the proposed surface infrastructure;
- To predict the noise impact of the mine on sensitive receptors in terms of applicable legislation and accepted guidelines; and
- To propose management and mitigation measures for mine noise impacts.

9.1.1.9. Visual Impact Assessment

- To describe existing views of the study area from key observation points, such as roads running alongside the study area and homesteads;
- To simulate the visual intrusion of the mine and its infrastructure from critical viewing points.
- To assess the visual impacts of the mine; and
- To propose management and mitigation measures for visual impacts of the mine.

9.1.1.10. Geotechnical Impact Assessment

- Carry out a preliminary geotechnical assessment of the proposed pit design:
 - Ascertain material properties of soils and rocks;
 - Investigate preliminary pit slope angles in soils and rocks and optimisation of overall pit slope angles.
- Carry out an assessment of the site material properties:
 - Exploring the potential for use of the *in situ* clay as engineered hydraulic barriers (lining material) under the proposed tailings facilities;
 - Assess the dispersive nature of the materials and the likelihood of metals or other compounds going into solution in groundwater and the potential impacts that this will have on the environment.

- Conduct a specialist geotechnical study, concentrating on the impacts that the above findings (above two main bullets) will have on:
 - The project footprint related to the open pit;
 - The project footprint related to spoil and waste disposal;
 - The stability of spoil dumps; and
 - Any other significant issues that may arise once the proposed collation of geotechnical and geochemical information is completed.

9.1.1.11. The Impact Assessment on Indigenous Fish

In keeping with the requirements of applicable National Legislation and with the RAMSAR convention specialists will need to be appointed to assess/survey fish populations both within the Krom Antonies River system, and in the Verlorenvlei River system up- and downstream of the Krom Antonies River confluence and to propose management and mitigation measures for potential impacts.

According to CapeNature: *“The Verlorenvlei system supports four indigenous freshwater fish species, of which three are likely new species that have not been found anywhere else. These are the Verlorenvlei Redfin (now part of the Pseudobarbus group), the Cape Kurper (the Verlorenvlei population is genetically very distinct) and Cape Calaxias (two species, one genetically very distinct and restricted to the Verlorenvlei). The Krom Antonies River has a considerable number of critically endangered Verlorenvlei Redfin in its upper reaches. The Verlorenvlei system is already under high levels of water stress, with fish and other water dependent biota confined to small pools in summer. The indigenous fish in these pools are very susceptible to changes in water quality and water temperature during these periods”.*

It is therefore imperative that:

- A fish impact assessment be undertaken to assess the impacts of mining on the water quality of the Krom Antonies River and the impact on the Vlei;
- Thresholds on water quality be (salinity) be determined that will start impating on indigenous fish; and
- Mitigation measures are put forward for ensuring the survival of indigenous fish in the river and in Verlorenvlei.

9.1.1.12. Impact Assessment on Avifauna

In keeping with the requirements of applicable National Legislation and with the RAMSAR convention specialists will need to be appointed to assess/survey bird populations both within the Krom Antonies River system, and in the Verlorenvlei River system up- and downstream of the Krom Antonies River confluence and to propose management and mitigation measures for potential impacts.

The Verlorenvlei is an internationally important habitat for waterfowl and migrant birds. Any impact on water inflow reductions or pollution of such inflows would have a serious impact on the ecology of Verlorenvlei. It is therefore necessary to:

Undertake a baseline study of the avifauna associated with the Krom Antonies River and its wetlands and the Verlorenvlei to Redelinghuis;
 Assess the impacts of water reduction to the Krom Antonies River caused by extractions for the mine and its resultant impact on the avifauna;
 Provide mitigation measures for ensuring that the bird population along the riparian zone of the Krom Antonies River and Verlorenvlei river are not impacted upon;

9.1.1.13. Impact Assessment of Weather

It is important to know what the prevailing wind directions are when placing mine infrastructure especially from the point of view of the impacts of dust.

It is therefore important to undertake a baseline study of the weather characteristics of the Krom Antonies River Valley. The following parameters should be measured:

- prevailing wind directions and their strengths;
- temperatures;
- humidity;
- rainfall; and
- solar radiation (evaporation and cloud cover).

Certain recommendations including where to place rock dumps and the slimes dam will be based on wind data to diminish the impact of dust on mine infrastructure and agricultural activities (crops). Weather monitoring must continue throughout the operational phase of the mine. Wind data will be related to dust monitoring.

9.2. Additional Procedures to be Included in the EIA Process

Apart from the above specialist studies that are envisaged for the EIA process of the Mining Right application, the following reports and procedures will also be required.

9.2.1. Town Planning

Town Planners will need to be appointed to provide the site development plan of all the infrastructure required for the mining operation and would need to work closely with the mining engineers, environmentalists, civil engineers, etc. Various alternative layouts will also need to be considered.

The town planners would also need to apply for a temporary change in land use from Agriculture Zone I to Industrial Zone II in terms of the Land Use Planning Ordinance, 1995 (Ordinance 15 of 1985) to operate the mine.

9.2.2. Architectural Guidelines

Industrial Architects will need to be appointed to provide the architectural guidelines for the proposed buildings to be erected for the operation of the Riviera Tungsten Open-Cast Mine. The Heritage and Visual Impact specialists would need to work closely with the architect to get a feel for the theme or particular vernacular chosen for the actual mining infrastructure of the proposed Riviera Tungsten Open-Cast Mine.

9.2.3. Civil Engineering

Civil, Geotechnical and Mining Engineers will provide the necessary details with respect to the civil engineering requirements of the proposed open-cast mine during the EIA phase, including but not limited to (stormwater, potable water provision, sewage disposal, water reservoirs, dams, roads and road upgrading, electricity, and solid waste disposal).

Estimates already provided during the scoping phase will be verified by the appointed Civil, Geotechnical and Mining Engineers during the EIA phase.

Information pertaining to civil engineering requirements during the EIA phase should thus include:

- A detailed stormwater management plan is needed for the site, including specific measures to reduce the rate of runoff into freshwater ecosystems, and to manage the quality of runoff. The collection and recycling of stormwater for mining purposes is highly recommended;
- details of all built and constructed aspects of the proposed mining works are required;
- the electricity demand and provision for the total project (construction and operational phases) needs to be determined;
- details are required pertaining to additional infrastructure supporting the proposed mining operation – for example, new and/or upgraded roads, sewage treatment and disposal, water pipelines, electricity pylons or substations;
- details of proposed management / disposal of both on- and off-site sewage and other solid waste [including the volumes of waste to be produced and the design of a sewage treatment plant with a capacity for all staff members];
- details of the depth of excavation, as well as the maximum anticipated footprint are needed;
- detailed measures for dewatering are needed, including estimates of water volume to be abstracted, management thereof and impacts on the ground and surface water;
- detailed designs and layouts of water reservoirs and dams (for storage of water generated by dewatering of the pit);
- details pertaining to the volume of water to be used by the plant, people (potable water) and dust suppression and the proposed source thereof;
- potable water provision;
- details of the chemical and physical processes that are part of the proposed mining operation are required so that their potential impacts on downstream and adjacent aquatic ecosystems can be elucidated;
- details regarding areas for the storage or disposal of spoil generated from the Mining operation (rough tailings and slimes) are required.
- volumes and methods of fuel storage,
- details regarding the predicted noise and dust emissions and management thereof;
- details pertaining to internal roads, conveyers and pipeline routes; and
- the predicted volume and weight of traffic into and out of the valley and consult the appropriate roads authority regarding the access road (i.e. undertake a full Traffic Impact Assessment).

The engineers will need to ensure that the maps produced are drawn up by a surveyor and with a suitable scale to define impacts. These maps must include the sizes, slopes and location of the excavation, dumps and infrastructure and be used to describe the mining phases, explain proposed mitigation measures and allow for the monitoring of compliance.

The engineers will also need to ensure that bulk infrastructure is planned and available accordingly (i.e. consult with the applicable local authorities [e.g. Berg River Municipality] and obtain confirmation of services availability from them).

9.2.4. Landscape Architecture

A local landscape architects firm or alternatively an experienced West Coast rehabilitation specialist with nursery facilities will be required during the EIA phase to provide guidelines for landscaping the open space areas, streetscapes and gardens of the mining lease area. The landscapes would also need to provide guidelines on the rehabilitation of the various mine dumps and slimes dams. The Landscape Architect would need to work closely with the Town Planners and Architects. The Landscape Architect's recommendations would also then feed into the Visual Impact Assessment. It is recommended that a nursery be started on site soon after approvals have been obtained.

9.2.5. Rehabilitation Plan

A mine closure plan will need to be submitted to DME for approval, detailing the demolition and removal of all infrastructure; rehabilitation of the slimes dams; waste rock dumps; internal roads and all other areas affected by the mining activity. These directives for rehabilitation will be determined by the specialist studies to be conducted during the EIA phase, and especially the Landscape Architect or specialist rehabilitation company.

Directives for rehabilitation will also be included into the EMP, which is required in terms of section 39(1) of the MPRDA.

A surety payment will also have to be paid by Bongani to DME to ensure that rehabilitation takes place.

9.2.6. Land Surveying

Land surveyors will also be required to provide a terrain model of the mining area by undertaking a detailed contour survey of the site. This data will be required by the town planner, engineers and visual impact assessment practitioner. A 3-D model of the open-cast mine will need to be generated and continuous surveying of the mine works will need to be undertaken as it progresses.

9.3 Consultation with IAPs

9.3.1 Identification of IAPs

The identification of interested and affected parties will have been done during the Scoping process. Advertisements will be placed in the Cape Times and in *Die Burger* regional newspapers and the local *Die Weslander* newspaper calling for IAPs to register for the EIA process of the Mining Right application.

9.3.2 Public Participation Process

In terms of the EIA process of the Mining Right application, an Open Day will be held at the Karookop Primary School, together with all the specialist consultants, who will be on hand to discuss their findings and answer any questions from IAPs. The responses to the comments raised will be made by the respective specialist consultants and the EAP. A formal meeting will not take place.

9.3.3 Summary of Issues to be Raised by IAPs

A summary of the main issues raised by IAPs after the Open Day will be provided.

9.4 Methodology to be used in Assessing the Significance of the Potential Environmental Impacts during the EIA Phase

For each potential impact, the **EXTENT** (spatial scale), **MAGNITUDE** and **DURATION** (time scale) will be described and assessed during the EIA phase of the project. These criteria will then be used to ascertain the significance of the impact, with and without the use of the proposed mitigation measures. **Tables 7 and 8** below, show the scale used to assess these variables, and defines each of the rating categories.

The **Significance** of an impact is derived by taking into account the assessed extent, magnitude, and duration of each identified impact. The means of arriving at the different significance ratings are explained in **Table 7**.

The respective specialist consultants will assess the anticipated significance of each potential impact noted.

TABLE 7: Criteria for the Evaluation Of Impacts

CRITERIA	CATEGORY	DESCRIPTION
EXTENT or spatial influence of impact	Regional (R)	Beyond 5 km of the proposed development.
	Local (L)	Within 5 km of the proposed development.
	Site specific (SS)	On site or within 100 m of the site boundary.
MAGNITUDE of NEGATIVE IMPACT (at the indicated spatial scale)	High (H)	Bio-physical and/ or social functions and/ or processes are <i>severely</i> altered.
	Medium (M)	Bio-physical and/ or social functions and/ or processes are <i>notably</i> altered.
	Low (L)	Bio-physical and/ or social functions and/ or processes are <i>slightly</i> altered.
	Very Low (VL)	Bio-physical and/ or social functions and/ or processes are <i>negligibly</i> altered.
	Zero (Z)	Bio-physical and/ or social functions and/ or processes remain <i>unaltered</i> .
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	High (H)	Bio-physical and/ or social functions and/ or processes are <i>vastly</i> enhanced.
	Medium (M)	Bio-physical and/ or social functions and/ or processes are <i>notably</i> enhanced.
	Low (L)	Bio-physical and/ or social functions and/ or processes are <i>slightly</i> enhanced.
	Very Low (VL)	Bio-physical and/ or social functions and/ or processes are <i>negligibly</i> enhanced.
	Zero (Z)	Bio-physical and/ or social functions and/ or processes remain <i>unaltered</i> .
DURATION of impact	Construction (C)	Up to 2 years.
	Short Term (S)	0-5 years (after construction).
	Medium Term (M)	5-15 years (after construction).
	Long Term (L)	More than 15 years (after construction).
PROBABILITY of occurrence	Definite (D)	>95% chance of the potential impact occurring.
	Probable (Pr)	20% - 95% chance of the potential impact occurring.
	Possible (Po)	5% - 20% chance of the potential impact occurring
	Improbable (Im)	<5% chance of the potential impact occurring.
CONFIDENCE levels	Certain (C)	More than adequate amount of information and understanding of the bio-physical and/ or social functions and/ or processes that may potentially influence the impact.
	Sure (S)	Reasonable amount of information and understanding of the bio-physical and/ or social functions and/ or processes that may potentially influence the impact.
	Unsure (U)	Limited amount of information and understanding of the bio-physical and/ or social functions and/ or processes that may potentially influence the impact.

TABLE 8: Definition of Significance Ratings

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
High (H)	High magnitude with a regional extent and long term duration. High magnitude with either a regional extent and medium term duration or a local extent and long term duration. Medium magnitude with a regional extent and long term duration.
Medium (M)	High magnitude with a local extent and medium term duration. High magnitude with a regional extent and short term duration or a site specific extent and long term duration. High magnitude with either a local extent and short term duration or a site specific extent and medium term duration. Medium magnitude with any combination of extent and duration except site specific and short term or regional and long term. Low magnitude with a regional extent and long term duration.
Low (L)	High magnitude with a site specific extent and short term duration. Medium magnitude with a site specific extent and short term duration. Low magnitude with any combination of extent and duration except site specific and short term. Very low magnitude with a regional extent and long term duration.
Very low (VL)	Low magnitude with a site specific extent and short term duration. Very low magnitude with any combination of extent and duration except regional and long term.
Neutral (N)	Zero magnitude with any combination of extent and duration.

10 CONCLUSIONS AND RECOMMENDATIONS

The Scoping Report sets out the proposed scope of the EIA and EMP that will be undertaken for the proposed Riviera Open-Cast Mining Project.

A number of site alternatives for the infrastructure necessary for the efficient operation of the mine will be evaluated by the specialist studies that need to be undertaken. For example, the prevailing winds will be used for siting the slimes dam and waste dumps to reduce dust pollution on downwind neighbours. The results of the hydrological and hydrogeological studies will also be used for the siting of such infrastructure to prevent any potential pollution of the rivers/streams by the slime dam.

The Draft Scoping report was advertised for review by IAPs and Government Authorities.

The key environmental impacts and issues raised by IAPs, officials and specialist consultants that need to be addressed have been noted. To address such issues, various specialist consultants need to be appointed to undertake the necessary studies to assess the significance of the potential impacts that may develop as a result of both the operational phase of the mine and its closure. The terms of reference of the specialist studies have been suggested in the Plan of Study for EIA.

Following the RMDEC meeting to consider the objections by IAPs, DME requested that the DSR should be revised and that the resultant FSR be made available to the registered IAPs for their final comments.

The Final Scoping Report has been made available for review and public in order to capture the views and concerns of IAPs before submitting the Final Scoping Report to the authorities for acceptance to proceed with the EIA phase of the project.

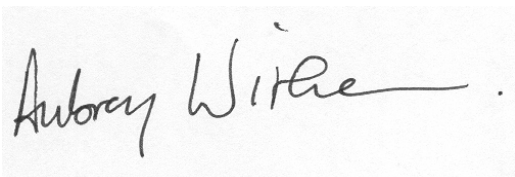
The following general conclusions and recommendations are made:

The necessary steps for the proposed Mining Right Application have been followed in accordance with the Regulations of MPRDA, 2002 (Act 28 of 2002), namely:

- 10.1 A number of potential environmental impacts have been identified from the environmental evaluation and Scoping Process conducted to date.
- 10.2 A public participation process has been undertaken as set out according to regulation 27 (5)(b) of MPRDA, (Act 28 of 2002).
- 10.3 The IAPs still have until 21 August 2009 to provide written comments on the Final Scoping Report. Any written comment received. These comments and responses will be provided to DME for consideration together with the Final Scoping Report.
- 10.4 A number of specialist desk top studies have been undertaken during the Scoping Process which added to the knowledge of the biophysical characteristics of the mine lease area and the environment of the Krom Antonies River Valley. The results of such initial studies also assisted with identifying potential environmental impacts, and the work that still needs to be undertaken in their respective specialist disciplines.
- 10.5 A number of additional specialist studies have been identified to assist with issues and potential impacts that have been raised by IAPs, officials and the existing appointed specialists. These additional specialist studies, together with the existing specialist studies

need to be undertaken during the EIA Phase of the proposed Riviera Tungsten Mining Right Application.

- 10.6 The following outstanding studies and processes will also need to be conducted during the EIA phase through collation of existing information, field surveys, drilling, sampling and testing and mapping with various impact assessment scenario's being undertaken.
- hydrogeology – Mr. Des Visser, SRK Consulting
 - visual impact assessment;
 - agricultural soil potential;
 - archaeological and heritage impact assessment;
 - socio-economic impact assessment;
 - air quality;
 - land use;
 - noise;
 - town planning (site development plan and LUPO application);
 - architectural guidelines;
 - landscaping architectural guidelines (rehabilitation);
 - detailed civil engineering report;
 - land surveying; and
 - detailed climatic specialist study
- 10.7 It is concluded that it will be in the best interests of the land owners, who are resisting access of the specialists to their land, to allow the above specialists studies to be undertaken without interference. It is only with the results of these specialist studies that informed decisions can be made as to the significance of the potential impacts assessed. The assessment of the significance of the impacts will ultimately guide the approval process by DME and other Government Departments of whether to approve the Mining Right or not.
- 10.8 Once the final comments have been received from registered IAPs, the FSR, together with any additional comments received, will be submitted to DME for their acceptance to move into the EIA Phase of the project.



A.W. WITHERS
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July 2009

