



**Environmental and Social Impact  
Assessment Report for the Gamsberg  
Zinc Mine and Associated  
Infrastructure in the Northern Cape**

**FINAL REPORT**

**Black Mountain Mining (Pty) Ltd**

**June 2013**

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# FINAL REPORT

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**Black Mountain Mining (Pty) Ltd**

**June 2013**

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For and on behalf of  
Environmental Resources Management

Approved by: Mr Stuart Heather-Clark

Signed:



Position: Partner in Charge

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## **GLOSSARY OF TERMS**

**“alternative”**, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to-

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

**“aquifer”** means a geological formation which has structures or textures that hold water or permit appreciable water movement through them.

**“biodiversity”** (“biological diversity” or “biodiversity”) means the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.

**“buffer area”** means, unless specifically defined, an area extending 10 kilometres from the proclaimed boundary of a world heritage site or national park and 5 kilometres from the proclaimed boundary of a nature reserve, respectively, or that defined as such for a biosphere.W

**“catchment”** The area from which any rainfall will drain into the watercourse or watercourses or part of the water course, through surface flow to a common point or common points.

**“clean water system”** includes any dam, other form of impoundment, canal, works, pipeline and any other structure or facility constructed for the retention or conveyance of unpolluted water.

**“concentration”** Concentrating involves milling, crushing and flotation of the ore to produce a concentrate for smelting. The ore is crushed and milled to reduce the size of the rock particles and to expose the minerals which contain the PGMs. The particles are mixed with water and special reagents and air is pumped through the liquid, creating bubbles to which the PGM-containing particles adhere. These float to the surface and are removed as a soapy froth.

**“construction”** means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

**“dam”** includes any settling dam, slurry dam, evaporation dam, catchment or barrier dam and any other form of impoundment used for the storage of unpolluted water or water containing waste.

**“dirty area”** means any area at a mine or activity which causes, has caused or is likely to cause pollution of a water resource.

**“dirty water system”** includes any dam, other form of impoundment, canal, works, pipeline, residue deposit and any other structure or facility constructed for the retention or conveyance of water containing waste.

**“environment”** The surroundings within which humans exist and that are made up of:

- i. the land, water and atmosphere of the earth;
- ii. micro-organisms, plant and animal life;
- iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
- iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being. This includes the economic, social, cultural, historical and political circumstances, conditions and objects that affect the existence and development of an individual, organism or group.

**“environmental impact assessment”** refers to the process of systematically identifying, predicting, assessing and reporting the potential positive and negative social, economic and biophysical impacts of any proposed project, plan, programme or policy which requires authorisation or permission by law and which may significantly affect the environment. The EIA includes an evaluation of alternatives, as well as recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures enhancing the positive aspects of the proposal and environmental management and monitoring measures. Although recognised as an EIA process in a South African context, the EIA process for this project is referred to as an Environmental and Social Impact Assessment (ESIA) in line with International good practice.

**“expansion”** means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

**“fault”** a zone of displacement in rock formations resulting from forces of tension or compression of the earth's crust.

**“Formation”** a general term used to describe a sequence of rock layers.

**“fractured-rock aquifer”** groundwater occurring in within fractures and fissures in hard-rock formations.

**“freeboard”** - with respect to water storage dams can be defined as the distance between the full supply level (spillway crest level) and the lowest point on the dam wall crest. Freeboard with respect to tailings dams can be defined as the distance between the mean operating level plus the 1:50 year flood-level and the lowest point on the wall crest of the tailings dam.

**“groundwater flow”** The movement of water through openings and pore spaces in rocks below the water table i.e. in the saturated zone. Groundwater naturally drains from higher lying areas to low lying areas such as rivers, lakes and the oceans. The rate of flow depends on the slope of the water table and the transmissivity of the geological formations.

**“groundwater recharge”** Refers to the portion of rainfall that actually infiltrates the soil, percolates under gravity through the unsaturated zone (also called the Vadose Zone) down to the saturated zone below the water table (also called the Phreatic

Zone).

**“habitat”** means a place where a species or ecological community naturally occurs.

**“Heavy metals”** include the elements in the centre of the Periodic Table (Transition metals) and have a density of  $>3\text{g/cm}^3$ . Common examples are V, Mn, Fe, Co, Ni, Cu, Zn, Ag, Cd, Au, Hg.

**“hydrogeological”** The study of distribution and movement of groundwater.

**“hydrological”** The study of movement, distribution and quality of surface water.

**“impact”** The positive or negative effects on human well-being and / or on the environment.

**“interested and affected parties (I&APs)”** any person, group of persons, organisation or any organ of state that may have jurisdiction over any aspect of / or whose interests may be positively or negatively affected by the proposal or activity and/ or who are concerned with a proposal or activity and its consequences.

**“Irreplaceable loss”** a permanent impact that is impossible to replace if lost or damaged.

**“natural habitat”** Land and water areas where (i) the ecosystems' biological communities are formed largely by native plant and animal species, and (ii) human activity have not essentially modified the area's primary ecological functions. All natural habitats have important biological, social, economic, and existence value.

**“mitigate”** The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.

**“permeability”** the ease with which a fluid can pass through a porous medium and is defined as the volume of fluid discharged from a unit area of an aquifer under unit hydraulic gradient in unit time (expressed as  $\text{m}^3$ ,  $\text{m}^2$  or  $\text{m/d}$ ). It is an intrinsic property of the porous medium and is independent of the properties of the saturating fluid; not to be confused with hydraulic conductivity, which relates specifically to the movement of water.

**“porosity”** Ratio of the volume of void space to the total volume of the rock or earth material.

**“proponent”** Black Mountain Mining (Pty) Ltd, part of the Vedanta Group plc, is applying for various environmental authorisations / permits / licences in terms of the relevant environmental legislation.

**“phased activities”** means an activity that is developed in phases over time on the same or adjacent properties to create a single or linked entity through interconnected internal vehicular or pedestrian circulation, sharing of infrastructure, or the continuum of design, style or concept by the same proponent or his or her successors.

**“Prescribe”** Means only as prescribe by regulation in the Government Gazette.

**“Project”** As demarcated according to mining license boundaries – exclude the town, Eskom and those portions of the land under company charge where mining or accessory works are being carried out.



**“protected area”** means those protected areas contemplated in section 9 of the NEMPAA.

**“public participation process”** A process of involving the public in order to identify issues and concerns, and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of NEMA refers to: a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific matters.

**“reasonable measures”** - The measures that a reasonable (ordinary) person would regard necessary for the specific purpose. Reasonable person in this case would refer to a person with expertise in the specific field.

**“Regulator”** Means the government agent responsible for the application processing, permitting, implementation, control and prosecution of persons and their actions in order to adhere to a specific piece of legislation.

**“residual deposit”** means any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right.

**“residual stockpile”** means any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, beneficiation plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or production right.

**“runoff”** All surface and subsurface flow from a catchment, but in practice refers to the flow in a river i.e. excludes groundwater not discharged into a river.

**“SANS Class 1”** South African National Standard 241:2006 for Drinking Water (Class 1).

**“saturated zone”** The subsurface zone below the water table where interstices are filled with water under pressure greater than that of the atmosphere.

**“scoping”** the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an environmental assessment. The main purpose of scoping is to focus the environmental assessment on a manageable number of important questions. Scoping should also ensure that only significant issues and reasonable alternatives are examined.

**“significance”** significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e. biophysical, social and economic).

**“Social & Labour Plan (SLP)”** Plan required by the Department of Mineral Resources to outline a mine’s plan to align itself with the pillars of the Mining Charter.

**“Stakeholder”** A person, group or organization with the potential to affect or be affected by the process or outcome of mine closure.

“**storage coefficient**” the volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head.

“**test pumping**” or aquifer testing is the process whereby an aquifer is subjected to pumping from a borehole under controlled test conditions in order to determine the hydraulic parameters of the groundwater system through its response to the stress of abstraction.

“**total dissolved solids**” It (often abbreviated TDS) is an expression for the total mass content of dissolved ions and molecules or suspended microgranules in a liquid medium.

“**transmissivity**” the rate at which a volume of water is transmitted through a unit width of aquifer under a unit hydraulic head ( $m^2/d$ ); product of the thickness and average hydraulic conductivity of an aquifer.

“**Wetland**” “wetland is the land which is transitional between dry and wet systems, where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which supports or would support vegetation that is adapted to life in saturated soil (National Water Act 36 of 1998 In DWAF, 2005).

## ACRONYMS

<b>ADT</b>	Average Daily Traffic
<b>AIA</b>	Archaeological Impact Assessment
<b>ANC</b>	African National Congress
<b>ANFO</b>	Ammonium Nitrate Fuel Oil
<b>ARC</b>	Agricultural Research Centre
<b>ARD</b>	Acid Rock Drainage
<b>ARVs</b>	Anti-Retroviral Treatment
<b>BBBEE</b>	Broad-based Black Economic Empowerment
<b>BID</b>	Background Information Document
<b>BIR</b>	Bushmanland Inselberg Region
<b>BMM</b>	Black Mountain Mining (Pty) Ltd
<b>BMP</b>	Biodiversity Management Plan
<b>CAPEX</b>	Capital Expenditure
<b>CARA</b>	Conservation of Agricultural Resources Act, 1983 (No. 43 of 1983)
<b>CBA</b>	Critical Biodiversity Area
<b>CBO</b>	Community Base Organisation
<b>CDW</b>	Community Development Workers
<b>CI</b>	Conservation International
<b>CMA</b>	Catchment Management Agency
<b>Cope</b>	Congress of the People
<b>CPA</b>	Communal Property Association
<b>CRR</b>	Comments and Responses Report
<b>DA</b>	Democratic Alliance
<b>DoA</b>	Department of Agriculture
<b>DEA</b>	Department of Environmental Affairs
<b>DENC</b>	Northern Cape Department of Environment and Nature Conservation
<b>DEM</b>	Digital Elevation Model
<b>DGDS</b>	District Growth and Development Strategy
<b>DM</b>	District Municipalities
<b>DMR</b>	Department of Mineral Resources (previously Department of Mineral Energy - DME)
<b>DMS</b>	Dense Medium Separation
<b>DSR</b>	Draft Scoping Report
<b>DWA</b>	Department of Water Affairs
<b>EAP</b>	Environmental Assessment Practitioner
<b>EC</b>	Electrical Conductivity
<b>ECA</b>	Environmental Conservation Act (No. 73 of 1989)
<b>EIA</b>	Environmental Impact Assessment
<b>ESIA</b>	Environmental and Social Impact Assessment
<b>EIAR</b>	Environmental Impact Assessment Report
<b>EMF</b>	Environmental Management Framework
<b>EMPr</b>	Environmental Management Programme
<b>EMS</b>	Environmental Management System
<b>ERM</b>	Environmental Resources Management (Pty) Ltd
<b>ESA</b>	Earlier Stone Age
<b>ESMP</b>	Environmental and Social Management Plan
<b>FAS</b>	Foetal Alcohol Syndrome
<b>FET</b>	Further Education and Training
<b>FGD</b>	Focus Group Discussions
<b>GDP</b>	Gross Domestic Product
<b>GGP</b>	Gross Geographic Product

<b>GHG</b>	Greenhouse Gas
<b>GIF</b>	Gamsberg Iron Formation
<b>GN</b>	General Notice
<b>GNR</b>	General Notice Regulation
<b>Ha</b>	Hectares
<b>HCM</b>	Highway Capacity Manual
<b>HDPE</b>	High Density Polyethylene
<b>HIA</b>	Heritage Impact Assessment
<b>HIV/AIDS</b>	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
<b>HNC</b>	Heritage Northern Cape
<b>HSE</b>	Health, Safety and Environment
<b>HNC</b>	Heritage Northern Cape
<b>I&amp;AP's</b>	Interested and Affected Parties
<b>IBA</b>	Important Bird Area
<b>ICMI</b>	International Cyanide Management Code
<b>IDP</b>	Integrated Development Plan
<b>IFC</b>	International Finance Corporation
<b>ILO</b>	International Labour Organisation
<b>ILZSG</b>	International Lead and Zinc Study Group
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>IT</b>	Information Technology
<b>IUCN</b>	International Union for Conservation of Nature
<b>IWULA</b>	Integrated Water Use Licence Application
<b>KII</b>	Key Informant Interviews
<b>KMLM</b>	Khai-Ma Local Municipality
<b>Ktpa</b>	kilotons per annum
<b>kV</b>	Kilovolts
<b>kWh</b>	Kilowatt hours
<b>LC</b>	Least Concern
<b>LED</b>	Local Economic Development
<b>LM</b>	Local Municipalities
<b>LOS</b>	Level of Service
<b>LoM</b>	Life of Mine
<b>LRAD</b>	Land Redistribution for Agricultural Development
<b>LSU</b>	Large stock unit
<b>MAE</b>	Mean Annual Evaporation
<b>MAP</b>	Mean Annual Precipitation
<b>MAR</b>	Mean Annual Runoff
<b>mamsl</b>	Metres above mean sea level
<b>mbgl</b>	Metres below ground level
<b>MF</b>	Monitoring Forum
<b>MI</b>	Mega litre
<b>MPRDA</b>	Mineral and Petroleum Resources Development (No. 28 of 2002)
<b>Mm<sup>3</sup></b>	Million cubic metres
<b>m<sup>3</sup></b>	Cubic metres
<b>m<sup>2</sup></b>	Square metres
<b>m</b>	Metres
<b>m/s</b>	Metres per second
<b>MSA</b>	Middle Stone Age
<b>Mt</b>	Million tons
<b>Mtpa</b>	Million tons per annum
<b>MVA</b>	Million Volt-Amperes
<b>MW</b>	Mega Watts

<b>MWP</b>	Mine Works Programme
<b>NAG</b>	Net Acid Generating
<b>NCPGDS</b>	Northern Cape Provincial Growth and Development Strategy
<b>NCPSDF</b>	Northern Cape Provincial Spatial Development Framework
<b>NDM</b>	Namakwa District Municipality
<b>NDT</b>	Namakwa Diamond Trust
<b>NEMA</b>	National Environmental Management Act, 1998
<b>NEM:AQA</b>	National Environmental Management: Air Quality Act, 2004
<b>NEM:BA</b>	National Environmental Management: Biodiversity Act, 2004
<b>NEM:PAA</b>	National Environmental Management Protected Areas Act,
<b>NEM:WA</b>	National Environmental Management: Waste Act, 2008
<b>NGO</b>	Non-Governmental Organisation
<b>NHRA</b>	National Heritage Resources Act, 1999 (No. 25 of 1999)
<b>NWA</b>	National Water Act, 1998 (No. 36 of 1998)
<b>NWMS</b>	National Waste Management Strategy
<b>PCD</b>	Pollution Control Dam
<b>PGNC</b>	Provincial Growth and Development Strategy
<b>PoS</b>	Plan of Study
<b>PWB</b>	Pelladrift Water Board
<b>PIA</b>	Paleontological Impact Assessment
<b>PV</b>	Present value
<b>RDP</b>	Reconstruction and Development Programme
<b>ROM</b>	Run of Mine
<b>ROSE</b>	Recycling Oil Saves the Environment
<b>SA</b>	South Africa
<b>SAG</b>	Semi-Autogenous Grinding
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SALT</b>	South African Large Telescope
<b>SANRAL</b>	South African National Roads Agency Limited
<b>SANS</b>	South African National Standards
<b>SAPS</b>	South African Police Service
<b>SAWQ</b>	South African Water Quality
<b>SAWS</b>	South African Weather Services
<b>SCEP</b>	Stakeholder Consultation and Engagement Plan
<b>SCP</b>	Social Closure Plan
<b>SDF</b>	Spatial Development Framework
<b>SHE</b>	Safety, Health and Environment
<b>SIA</b>	Social Impact Assessment
<b>SKA</b>	Square Kilometre Array
<b>SKEP</b>	Succulent Karoo Ecosystem Programme
<b>SLAG</b>	Settlement Land Acquisition Grant
<b>SLP</b>	Social and Labour Plan
<b>SMME</b>	Small, Medium and Micro-sized Enterprises
<b>SS</b>	Suspended Solids
<b>STD</b>	Sexually Transmitted Disease
<b>TB</b>	Tuberculosis
<b>TDS</b>	Total Dissolved Solids
<b>TFS</b>	Technical Feasibility Study
<b>ToR</b>	Terms of Reference
<b>Tpa</b>	Tonnes per annum
<b>TSF</b>	Tailings Storage Facility
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organisation
<b>WMA</b>	Water Management Area

<b>WML</b>	Waste Management License
<b>VAC</b>	Visual Absorption Capacity
<b>VIA</b>	Visual Impact Assessment
<b>VOPI</b>	Vegetable and Ornamental Plan Institute
<b>VU</b>	Vulnerable
<b>WMA</b>	Water Management Area
<b>WMP</b>	Waste Management Plan
<b>WRD</b>	Waste Rock Dump