

MAMATWAN MANGANESE (PTY) LTD

PLAN OF STUDY

PROPOSED MAMATWAN MANGANESE MINE AND ASSOCIATED INFRASTRUCTURE ON R/E, THE R/E OF PORTION 3, PORTION 8 AND PORTION 18 AS OF THE FARM MAMATWAN 331 RD, NEAR HOTAZEL, NORTHERN CAPE PROVINCE

NC/EIA/10/JTG/GA/MAM/203

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Submitted to:

The Northern Cape Department of Nature Conservation (NC DENC)

Sasko Building

90 Long street

Kimberley

8301



REPORT



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	Originated By:	Reviewed By:	Approved By:
Name:	Monica Niehof	Retha Weir	Judith Mlanda
Designation:	Environmental Consultant	Quality Reviewer	Authorisations Manager
Signature:			
Date:	2014/03/19	2014/04/01	2014/04/04

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1. INTRODUCTION

1.1 Project Background

Environmental Assurance (Pty) Ltd [herein after referred to as ENVASS], as independent environmental consultant, has been appointed by the Applicant, Mamatwan Manganese (Pty) Ltd [herein after referred to as Mamatwan Manganese], to undertake all the authorisations required for the development of the proposed Mamatwan Manganese Mine. Mamatwan Manganese proposes to establish a new manganese mine and associated infrastructure on the Remaining Extent, The Remaining Extent of Portion 3, Portion 8 and Portion 18 of the Farm Mamatwan No. 331 RD (study area), constituting a total area of approximately 1090.9157 hectares (ha) within the Northern Cape Province of South Africa. The study area falls within the municipal boundaries of the John Taolo Gaetsewe District and Joe Morelong Local Municipality. The proposed mine will be located 21km north of Hotazel, 37km south from Kathu and 56km east of the town of Kuruman.

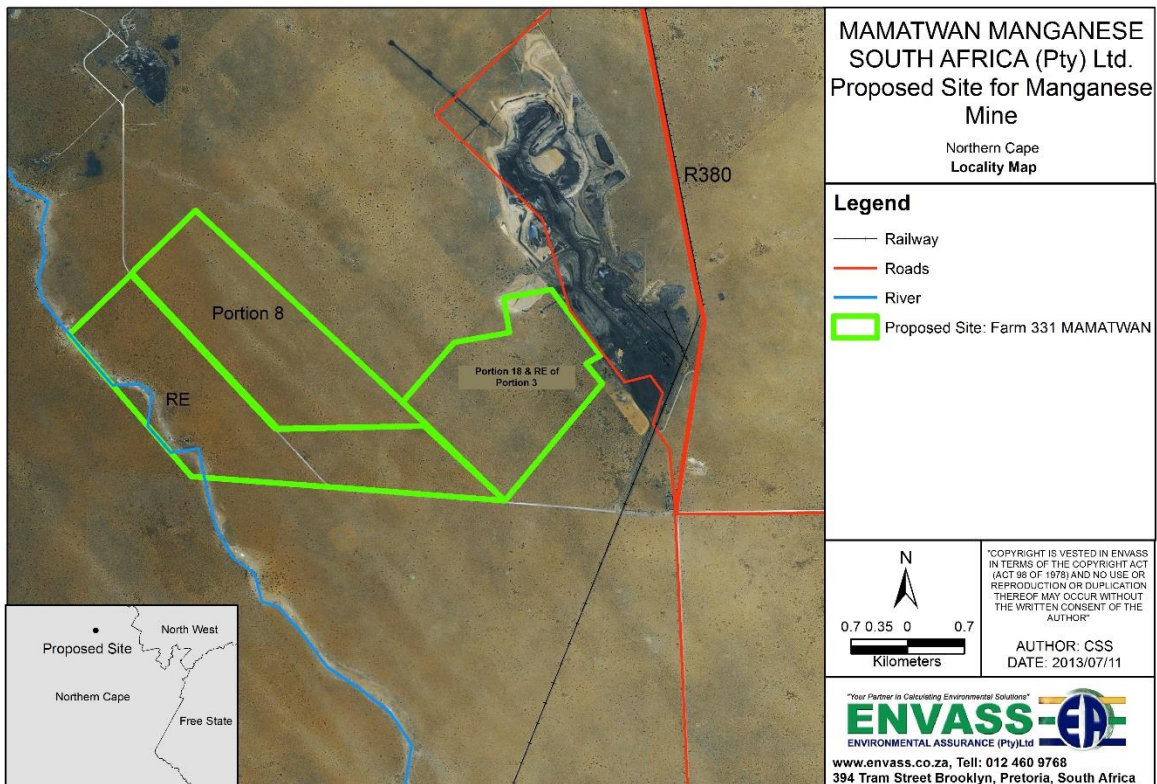


Figure 1: Locality map of proposed Mamatwan Mine

Mamatwan Manganese has obtained a new order prospecting right over the study area from the Department of Mineral Resources (DMR) on 10 July 2008. The study area is located in the Kalahari Manganese Fields (KMF) in the Northern Cape Province of South Africa. The KMF has the largest manganese deposit in the world, containing approximately 80% of the world's known high-grade manganese.

The infrastructure proposed for the Mamatwan mining operations on the above-mentioned properties includes:

- Bulk water supply from the Vaal-Gamagarra pipeline;
- Surface storage and reticulation of raw potable water;

- Underground supply reticulation;
- Dirty water pumping and settling infrastructure;
- Pollution control;
- Bulk water supply from Eskom;
- Surface electrical reticulation;
- Underground electrical reticulation;
- Stand-by generators;
- Paved access and internal roads and parking areas;
- Stormwater culverts and catchment dam;
- Rail line siding extension and loop with rapid loading station;
- Admin offices and training centre;
- Workshops;
- Clinic;
- Stores and bulk fuel supply;
- Change house and laundry;
- Camp lamp, self rescuer and proto equipment storage and control;
- Sewage treatment and disposal;
- Core yard;
- Fire prevention;
- Potable and fire water distribution;
- Rescue chambers;
- Main ventilation fans;
- Underground workshops; and
- First aid facilities.

1.2 Legislative Context

NATIONAL LEGISLATIVE FRAMEWORK

This section provides an overview of the legislative requirements applicable to this project and it includes the acts, guidelines and policies considered in the compilation of this report. The legislative motivation for this project is underpinned by the Constitution of South Africa, 1996 (Act No. 108 of 1996), which states that:

The State must, in compliance with Section 7(2) of the Constitution, respect, protect, promote and fulfil the rights enshrined in the Bill of Rights, which is the cornerstone of democracy in South Africa. Section 24 of the Constitution states:

24. Environment

-Everyone has the right-

- (a) *to an environment that is not harmful to their health or well-being; and*
- (b) *to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-*
 - (i) *prevent pollution and ecological degradation;*
 - (ii) *promote conservation; and*

(iii) secure ecologically sustainable development and use of natural resources while promoting a justifiable economic and social development.

Section 24 of the Constitution of South Africa (Act No. 108 of 1996) requires that all activities that may significantly affect the environment and require authorisation by law must be assessed prior to approval. In addition, it provides for the Minister of Environmental Affairs or the relevant provincial Ministers to identify:

- new activities that require approval;
- areas within which activities require approval; and
- existing activities that should be assessed and reported on.

Section 28(1) of the Constitution of South Africa (Act No. 108 of 1996) states that: *“every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”*. If such pollution or degradation cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution or degradation. These measures may include:

- Assessing the impact on the environment;
- Informing and educating employees about the environmental risks of their work and ways of minimising these risks;
- Ceasing, modifying or controlling actions which cause pollution/degradation;
- Containing pollutants or preventing movement of pollutants;
- Eliminating the source of pollution or degradation; and
- Remedying the effects of the pollution or degradation.

National Environmental Management Act, 1998 (Act 107 of 1998) [as amended] and Environmental Impact Assessment Regulations (2010) [as amended]

Mamatwan Manganese is applying for environmental authorisation (EA) in terms of the National Environmental Management Act, 1998 (Act no 107 of 1998) (as amended) [NEMA] and the Environmental Impact Assessment (EIA) Regulations of 2010 (Government Notice No's R 543, 544 and 545 in Government Gazette No. 33306 of 18 June 2010) as (amended) for the construction and operation of a manganese mine.

NEMA strives to regulate national environmental management policy and is focussed primarily on co-operative governance, public participation and sustainable development. NEMA makes provisions 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.

The proposed construction and operational activities associated with the manganese mine falls within the ambit of the scheduled activities listed in Government Notice (GN) No. 544 and 545 (Refer to Table 3 below). A full Scoping and EIA process must be undertaken in terms of the requirements stipulated in GN. No. 543. The content of a Scoping Report must include:

28. (1) A scoping report must contain all the information that is necessary for a proper understanding of the nature issues identified during scoping, and must include-

- (a) details of-
 - (i) the EAP who prepared the report; and
 - (ii) the expertise of the EAP to carry out scoping procedures;
- (b) a description of the proposed activity;
- (c) a description of any feasible and reasonable alternatives that have been identified;
- (d) a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is-
 - (i) a linear activity, a description of the route of the activity; or is to be undertaken;
 - (ii) an ocean-based activity, the coordinates where the activity is to be undertaken
- (e) a description of the environment that may be affected by the activity and the manner in which activity may be affected by the environment;
- (f) an identification of all legislation and guidelines that have been considered in the preparation of the scoping report;
- (g) a description of environmental issues and potential impacts, including cumulative impacts, that have been identified;
- (h) details of the public participation process conducted in terms of regulation 27(a), Including-
 - (i) the steps that were taken to notify potentially interested and affected parties of the application;
 - (ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the application have been displayed, placed or given;
 - (iii) a list of all persons or organisations that were identified and registered in terms of regulations 55 as interested and affected parties in relation to the application; and
 - (iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;
- (i) a description of the need and desirability of the proposed activity;
- (j) a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;

- (k) copies of any representations, and comments received in connection with the application or the scoping report from interested and affected parties; and
 - (m) any responses by the EAP to those representations and comments and views;
 - (n) a plan of study for environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include-
 - (i) a description of the tasks that will be undertaken as part of the environmental impact assessment process, including and specialist reports or specialised processes, and the manner in which such tasks will be undertaken;
 - (ii) an indication of the stages at which the competent authority will be consulted;
 - (iii) a description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and
 - (iv) particulars of the public participation process that will be conducted during the environmental impact assessment process;
 - (o) any specific information required by the competent authority; and
 - (p) any other matters required in terms of sections 24(4)(a) and (b) of the Act.
- (2) In addition, a scoping report must take into account any guidelines applicable to the kind of activity which is subject of the application.
- (3) the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in subregulation (1)(c), exist.

The proposed development includes the following listed activities as stipulated in the EIA Regulations of 2010:

Table 1 Listed activities applied for

GOVERNMENT NOTICE	ACTIVITY	ACTIVITY DESCRIPTION	PROJECT RELEVANCE
544	9	The construction of facilities or infrastructure exceeding 1 000 metres in length for the bulk transportation of water, sewage or stormwater - <ul style="list-style-type: none"> i) With an internal diameter of 0.36 metres or more; or ii) With a peak throughput of 120 litres per second or more, excluding where: <ul style="list-style-type: none"> a) Such facilities or infrastructure are for bulk transportation of water, sewage or storm water or stormwater drainage inside a road reserve; or 	Bulk water supply infrastructure exceeding 1000 metres in length is required for the mining operations and will be constructed.

		b) Where such construction will occur within urban areas but further than 32 meters from a watercourse, measured from the edge of a watercourse.	
544	11	<p>The construction of:</p> <ul style="list-style-type: none"> i) Canals; ii) Channels; iii) Bridges; iv) Dams; v) Weirs; vi) Bulk storm water outlet structures; vii) Marinas; viii) Jetties exceeding 50 square metres in size; ix) Spillways exceeding 50 square meters in size; x) Buildings exceeding 50 square meters in size; or xi) Infrastructure or structures covering 50 square meters or more: <p>where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse excluding where such construction will occur behind the development setback line.</p>	Infrastructure (associated with the mining operations) exceeding 50 square meters might be constructed within in 32m of the edge of a watercourse.
544	13	The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres.	The construction of facilities or infrastructure for the storage and handling of dangerous goods (i.e. fuel and diesel) with a combined capacity of 80 but not exceeding 500 cubic metres.
544	18	<p>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from</p> <ul style="list-style-type: none"> i) A watercourse; ii) The sea; iii) The seashore; iv) The littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater - <p>but excluding where such infilling,</p>	Infilling, depositing, dredging, excavation, removal or moving of soil / material (in excess of 5 cubic metres) from a watercourse, might occur.

		<p>depositing, dredging, excavation, removal or moving</p> <p>a) Is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or</p> <p>b) Occurs behind the development setback line.</p>	
544	22	<p>The construction of a road outside urban areas -</p> <p>i) With a road reserve wider than 13,5 meters;</p> <p>ii) Where no reserve exists where the road is wider than 8 meters or</p> <p>iii) For which an environmental authorization was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010.</p>	Roads (outside an urban area), wider than 8m will be constructed.
544	53	<p>The expansion of railway lines, stations or shunting yards where there will be an increased development footprint –</p> <p>Excluding:</p> <p>i) Railway lines, shunting yards and railway stations in industrial complexes or zones;</p> <p>ii) Underground railway lines in mines and</p> <p>iii) Additional railway lines within the reserve of an existing railway line</p>	Expansion of the existing Middelplaats siding (currently connected to the existing Mamatwan mine) is envisaged. A railway siding with railway loop for the purpose of loading and transport of manganese ore will be constructed.
544	37	<p>The expansion of facilities or infrastructure for the bulk transportation of water, sewage or storm water where:</p> <p>a) The facility or infrastructure is expanded by more than 1 000 meters in length; or</p> <p>b) Where the throughput capacity of the facility or infrastructure will be increased by 10% or more –</p> <p>excluding where such expansion:</p> <p>i) Relates to transportation of water, sewage or storm water within a road reserve; or</p> <p>ii) Where such expansion will occur within urban areas but</p>	Facilities and infrastructure will have to be expanded for purposes of bulk transportation of water from the existing Vaal Gamagarra pipeline to the mine.

		further than 32 meters from a watercourse, measured from the edge of the watercourse.	
544	47	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – i) Where the existing reserve is wider than 13.5 meters; or Where no reserve exists, where the existing road is wider.	Existing access roads will be widened and lengthened by more than 1 km.
545	15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for: i) Linear development activities; or ii) Agriculture or afforestation.	More than 20 hectares of land will be transformed by the construction of the mine and associated mining activities.
545	20	Any activity which requires a mining right or renewal thereof as contemplated in section 22 of the Mining and Petroleum Resources Development Act, 2002 (Act 28 of 2002).	The proposed mine and associated operations requires a mining right in terms of the Mineral and Petroleum Resources Development Act, 2002.

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

The proposed manganese mining operations requires authorisation from the Department of Minerals Resources (DMR). A Mining Right application in terms of Section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) has been applied for.

A Scoping and EIA process is being undertaken in accordance with the requirements of the MPRDA. The principles of the MPRDA is based on sustainable development by integrating social, economic, and environmental factors into the planning and implementation of mining projects, in order to ensure that exploitation of mineral resources serves present and future generations. Special consideration shall be given to the Environmental Management Programme (EMP) which shall include fulfilment of the requirements of Regulation 51 of the MPRDA.

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

The National Water Act, 1998 (Act 36 of 1998) (NWA) aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level.

The purpose of NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways, which take into account:

- *Meeting the basic human needs of present and future generations;*
- *Promoting equitable access to water;*
- *Redressing the results of past racial discrimination;*
- *Promoting the efficient, sustainable and beneficial use of water in the public interest;*
- *Facilitating social and economic development;*
- *Providing for growing demand for water use;*
- *Protecting aquatic and associated ecosystems and their biological diversity;*
- *Reducing and preventing pollution and degradation of water resources;*
- *Meeting international obligations; and*
- *Managing floods and droughts.*

The construction and operational activities associated with the proposed manganese mine requires compliance with the requirements of NWA as listed under GN No. 19182. An application for an Integrated Water Use License (IWULA) will be lodged to the Department of Water Affairs (DWA) in terms of Section 21 of the NWA to undertake the following activities:

- a) *Abstraction of water;*
- b) *Storing of water;*
- c) *Impeding or diverting the flow of water in a watercourse;*
- g) *Disposing of waste in a manner which may detrimentally impact on a water resource;*
- i) *Altering the bed, banks, course or characteristics of a watercourse; and*
- 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.*

National Heritage Resource Act, 1999 (Act No. 25 of 1999)

The proposed manganese mine must comply with the requirements stipulated in the National Heritage Resources Act, 1999 (Act 25 of 1998) (NHRA). NHRA legislates the necessity for cultural and Heritage Impact Assessment (HIA) in areas earmarked for development, which exceed 0.5 ha or linear development exceeding 300 metres in length. The Act makes provision for the potential destruction to existing sites, pending the archaeologist's recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).

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

- (a) *The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) *The construction of a bridge or similar structure exceeding 50m 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.*

Archaeological impact assessments (AIAs) are often commissioned as part of the heritage component of an EIA and are required under Section 38(1) of the NHRA of 1999, Section 38(8) of the NEMA and the MPRDA.

The process of archaeological assessment usually takes the form of:

1. A scoping or initial pre-assessment phase where the archaeologist and developer's representative establish the scope of the project and terms of reference for the project;
2. A Phase 1 AIA;
3. A Phase 2 archaeological mitigation proposal; and
4. A Phase 3 heritage site management plan.

Phase 1: Archaeological Impact Assessment

Phase 1 AIA generally involve the identification and assessment of sites during a field survey of a portion of land that is going to be affected by a potentially destructive or landscape altering activity. The locations of the sites are recorded and the sites are described and characterised. The archaeologist assesses the significance of the sites and the potential impact of the development on the sites and makes recommendations. It is essential that the report supply the heritage authority with sufficient information about the sites to assess, with confidence, whether or not it has any objection to a development, indicate the conditions upon which such development might proceed and assess which sites require permits for destruction, which sites require mitigation and what measures should be put in place to protect sites that should be conserved.

Minimum standards for reports, site documentation and descriptions are clearly set out by the SAHRA and supported by Association of Southern African Professional Archaeologists (ASAPA). The sustainable conservation of archaeological material (*in situ*) is always the best option for any sites that are deemed to be of importance. The report needs to indicate which sites these are, explain why they are significant and recommend management measures. In certain kinds of developments which involve massive intervention (mining, dam construction, etc.), it is not possible to reach a conservation solution other than to develop a programme of mitigation which is likely to involve the total or partial "rescue" of archaeological material and its indefinite storage in a place of safety.

Phase 2: Archaeological Mitigation Proposal

If the Phase 1 report finds that certain archaeological sites in a development area are of low significance, it is possible to seek permission from the heritage authority for their destruction. The final decision is then taken by the heritage resources authority, which should give a permit or a formal letter of permission, or in the case of an EIA issue a comment allowing destruction.

Phase 2 archaeological projects are primarily based on salvage or mitigation excavations preceding development that will destroy or impact on a site. This may involve collecting of artefacts from the surface, excavation of representative samples of the artefact material to allow characterisation of the site and the collection of suitable materials for dating the sites. The purpose is to obtain a general idea of the age, significance and meaning of the site that is to be lost and to store a sample that can be consulted at a later date for research purposes. Phase 2 excavations should be done under a permit issued by SAHRA, or other appropriate heritage agency, to the appointed archaeologist. Permit conditions are prescribed by SAHRA, or other appropriate heritage agencies. Conditions may include as minimum requirements reporting back strategies to SAHRA, or other appropriate heritage agencies and/or deposition of excavated material at an accredited repository.

Should further material be discovered during the course of development, this must be reported to the archaeologist or to the heritage resources authority and it may be necessary to give the archaeologist time to rescue and document the findings. In situations where the area is considered archaeologically sensitive the developer will be asked to have an archaeologist monitor earth-moving activities.

Phase 3: Management plan for conservation and planning, site museums and displays

On occasion Phase 2 may require a Phase 3 program involving one of the following:

- The modification of the site;
- The incorporation of the site into the development itself as a site museum;
- A special conservation area; or
- A display.

Alternatively it is often possible to re-locate or plan the development in such a way as to conserve the archaeological site or any other special heritage significance the area may have. For example in a wilderness or open space areas where such sites are of public interest, the development of interpretative material is recommended since it adds value to the development. Permission for the development to proceed can be given only once the heritage resources authority is satisfied that measures are in place to ensure that the archaeological sites will not be damaged by the impact of the development or that they have been adequately recorded and sampled. Careful planning can minimise the impact of archaeological surveys on development projects by selecting options that cause the least amount of inconvenience and delay. The process as explained above allows the rescue and preservation of information relating to our past heritage for future generations. It balances the requirements of developers and the conservation and protection of our cultural heritage as required of SAHRA and the provincial heritage resources authorities.

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

The overarching aim of the National Environmental Management: Biodiversity Act, 2004 (NEMBA), within the framework of NEMA, is to provide for:

- *The management and conservation of biological diversity within South Africa as well as for the components of such biological diversity;*
- *The use of indigenous biological resources in a sustainable manner; and*

- *The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources.*

As part of its implementation strategy of NEMBA, the National Spatial Biodiversity Assessment was developed. This assessment classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels. The approach used for biodiversity planning is systematic and entails the following three key principles:

- *The need to conserve a representative sample of biodiversity pattern, such as species and habitats (the principle of representation);*
- *The need to conserve the ecological and evolutionary processes that allow biodiversity to persist over time (the principle of persistence); and*
- *The need to set quantitative biodiversity targets that quantifies the degree of conservation required for each biodiversity feature in order to maintain functioning landscapes and seascapes.*

Furthermore, the South African National Biodiversity Institute (SANBI) was established by the NEMBA, its purpose being (*inter alia*) to report on the status of the country's biodiversity and the conservation status of all listed threatened or protected species and ecosystems. NEMBA provides for a range of measures to protect ecosystems and for the protection of species that are threatened or in need of protection to ensure their survival in the wild, including a prohibition on carrying out a "restricted activity" involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 8 of the Act. Lists of critically endangered, endangered, vulnerable and protected species have been published and a permit system for listed species has been established.

It is also appropriate to undertake an Ecological (Fauna and Flora) Impact Assessment for developments in an area that is considered ecologically sensitive and which requires environmental authorisation in terms of NEMA, with such assessment taking place during the Scoping or EIA phase. The Applicant is therefore required to take appropriate reasonable measures to limit the impacts on biodiversity, to obtain permits if required.

National Forest Act, 1998 (Act 84 of 1998)

The purposes of the National Forest Act, 1998 (Act 84 of 1998) as amended (NFA) includes *inter alia*:

- (c) *provide special measures for the protection of certain forests and trees;*
- (d) *promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes.*

The study area contains protected tree species identified in terms of Section 12 (1) (d) read with Section 15 (1) and Section 62 (2) (c) of the NFA. The listed of protected tree species was published in GN 877 of 22 November 2013. Protected trees likely to be found in the study area includes: *Acacia erioloba* (commonly known as Camel Thorn or Kameel Doring), *Acacia haematoxylon* (commonly known as Grey Camel Thorn) and *Boscia albitrunca* (commonly known as Shepherd's tree). A permit for the removal / destruction of protected trees will be applied for with the Department of Agriculture, Forestry and Fisheries (DAFF).

National Veld and Forest Fire Act (Act No. 101 of 1998)

The purpose of the act is to prevent and combat veld, forest and mountain fires throughout the Republic. The act provides for a variety of institutions, methods and practices for achieving the purpose. There is a risk of veld fires during the construction and operational phases of the mine. The applicant and all contractors and employees have roles and responsibilities in terms of this act that have to be implemented.

National Environmental Management: Air Quality Act (Act No 39 of 2004)

Section 28 (1) of NEMA places a general duty of care on any person who causes pollution, to take reasonable measures to prevent such pollution from occurring. The objective of the National Environmental Management: Air Quality Act, 2004 (NEM:AQA) is to regulate air quality in order to protect, restore and enhance the quality of air in the Republic, taking into account the need for sustainable development. Furthermore, the provision of national norms and standards regulating air quality monitoring, management and the control by all spheres of government determine that specific air quality measures should be adhered to. Dust created during the construction and operational phases of the proposed manganese mine could influence air quality and thus make this legislation relevant to this development. Air quality monitoring during the operational phase of the mine will be considered to be a measure to exercise this duty of care, since it will establish the types and volumes of dust emissions emanating from the operational activities.

Conservation of Agricultural Resources Act (Act 43 of 1983)

The aim of the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA) is to provide for control over the utilisation 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 EIA phase of the project will take into account the requirements of CARA as well as determine the potential direct and indirect impacts on agricultural resources as a result of the proposed mining development.

National Environmental Management: Waste Act (Act 59 of 2008)

The National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM:WA) and Waste Classification and Management Regulations, 2003 (GNR: 634 – 635): To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

The construction and operational activities associated with the proposed manganese mine shall be in accordance with the requirements of National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM:WA) and Waste Classification and Management Regulations, 2003 (GNR: 634 – 635).

Mine Health and Safety Act (Act No. 29 of 1996) as amended (the Act)

The following is an extract from the Act:

“...Objectives of Act:

1. The objectives of this Act are:
 - (a) To protect the health and safety of persons at mines;
 - (b) To require employers and employees to identify hazards and eliminate, control and minimise the risks relating to health and safety at mines;
 - (c) To give effect to the public international law obligations of the Republic that concern health and safety of at mines;
 - (d) To provide for employee participation in matters of health and safety through health and safety representatives and the health and safety committees at mines;
 - (e) To provide for effective monitoring of health and safety conditions at mines;
 - (f) To provide for enforcement of health and safety measures at mines;
 - (g) To provide for investigations and inquiries to improve health and safety at mines; and
 - (h) To promote –
 - (i) a culture of health and safety in the mining industry;
 - (ii) training in health and safety in the mining industry; and
 - (iii) co-operation and consultation on health and safety between the State, employers, employees and their representatives....”

The construction and operational activities associated with the proposed manganese mine shall be in accordance with the requirements of the Act.

PROVINCIAL LEGISLATIVE FRAMEWORK

Table 2: Provincial legislation, policies and guidelines considered

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THIS PROJECT	ADMINISTERING AUTHORITY	DATE
Northern Cape Provincial Spatial Development Framework (2012)	This framework was consulted to inform whether the proposed development is aligned with the objectives and strategies of the Northern Cape’s Policies and Spatial Planning. The PSDF accordingly recognises and is aligned with the applicable statutes, policies, protocols and agreements that regulate land-use at all levels throughout the biosphere, including: Relevant international agreements, protocols and conventions. National and provincial legislation and policy. Regional and local SDFs, structure plans and other policy.	Northern Cape Provincial Administration	2012
Northern Cape Nature	The proposed development will conform to the objectives,	Northern Cape	2009

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THIS PROJECT	ADMINISTERING AUTHORITY	DATE
Conservation Act, 9 of 2009	provisions and requirements of the Northern Cape Nature Conservation Act, 9 of 2009.	Provincial Administration	
Joe Morolong Local Municipality Integrated Development Plan 2012-16	This plan was consulted to inform the Need and Desirability of the proposed development as the Socio-Economic characteristics of the area. In addition, this plan was consulted to inform whether the proposed development is aligned with the objectives and strategies of the municipalities' planning objectives.	Joe Morolong Local Municipality	2012
John Taolo Gaetsewe Integrated Development Plan 2012-17	This plan was consulted to inform the Need and Desirability of the proposed development as the Socio-Economic characteristics of the area. In addition, this plan was consulted to inform whether the proposed development is aligned with the objectives and strategies of the municipalities' planning objectives.	John Taolo Gaetsewe District Municipality	2012
DEA&DP and DEA Guidelines on Public Participation	Used as a guide to inform of the public participation process.	Department of Environmental Affairs and Development Planning Department of Environmental Affairs	2012
DEA&DP and DEA Guidelines on Alternatives	Used as a guide to inform on the use and presentation of alternatives in the EIA process.	Department of Environmental Affairs and Development Planning Department of Environmental Affairs	2012
DEA&DP and DEA Guidelines on Need and Desirability	Used as a guide to inform on the need and desirability of the upgrade in conjunction with the above mentioned SDF's and IDP's.	Department of Environmental Affairs and Development Planning Department of Environmental Affairs	
The Vegetation of South Africa, Lesotho and Swaziland. Mucina & Rutherford (2006). SANBI, Pretoria	Utilised as a reference guide for the identification specific environmental information	Cape Nature	2006

1.3 Purpose of the Plan of Study

The Plan of Study (PoS) is a document which is intended to provide a summary of the key findings of the Scoping Phase of the EIA process, to ultimately describe the activities to be undertaken in the Impact Assessment Phase of the EIA process.

This PoS has been completed in terms of the requirements of Regulation 28 (n)(i-iv) of the EIA Regulations (2010), which sets out the approach to the Environmental Impact Assessment (EIA) of the Application which includes *inter alia*:

- (i) *A description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialised reports or specialised processes, and the manner in which such tasks will be undertaken;*
- (ii) *An indication of the stages at which the competent authority will be consulted;*
- (iii) *A description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and*
- (iv) *Particulars of the public participation process that will be conducted during the environmental impact assessment process.*

1.4 Details of the Applicant

Table 3: Details of the Applicant

NAME OF APPLICANT	Mamatwan Manganese (Pty) Ltd
REGISTRATION NO. OF APPLICANT	2008/016840/07
NAME OF MINE	Mamatwan Manganese Mine
CONTACT PERSON	Mpho Letsoalo / Dr. Wezi Banda
POSTAL ADDRESS	Postnet Suite X 9 Private Bag X 11 Biram Park Johannesburg 2015
PHYSICAL ADDRESS	The Reserve 1 st Floor (East Wing) 54 Melville Road Illovo Sandton 2196
TELEPHONE NUMBER	011 478 6600
FAX NUMBER	011 478 6657
CELL PHONE NUMBER	082 051 8027
EMAIL	mpho.letsoalo@enrc.co.za / wezi.banda@enrc.co.za
LOCATION OF MINE	The mine is situated on the Remaining Extent of Portion 3 as well as Portion 8 and Portion 18 and the Remaining Extent of the Farm Mamatwan No. 331 RD, John Taolo District, Joe Morelong Local Municipality, Northern Cape Province
COMMODITY	Manganese ore
ESTIMATED LIFE OF MINE	Estimated approximately 10 years

Table 4: Environmental Assessment Practitioner details and experience

NAME OF ENVIRONMENTAL CONSULTANCY	Environmental Assurance (Pty) Ltd ENVASS
REGISTRATION NO. OF APPLICANT	2004/02655/07
PROJECT TEAM	<u>ENVASS TEAM</u> Emile van Druten (Specialist, <i>Pr. Sci. Nat</i>) Judith Mlanda (WULA Specialist, EAP) Monica Niehof (Environmental Consultant) Nicolene Lotter (Assistant Public Participation Administrator) Vuyokazi April (Ecological specialist, <i>Pr. Sci. Nat</i>) Du Toit Wilken (Visual and Noise Specialist) Refer to Plan of Study for external specialist contact details.
EXPERTISE OF EAP	ENVASS has the necessary experience within our project team to carry out scoping procedures. Auditing, WULA, MPRDA and EIA (NEMA) projects has been completed for various mining companies throughout South Africa: Samancor Chrome Amari Resources South African Coal Mine Holdings Limited Tala Resources Afrimat Makoya Supply Chain Holdings Vunene Mining Coal of Africa Assmang BRMO Shanduka Coal
ENVIRONMENTAL CONSULTANT CONTACT	Monica Niehof / Judith Mlanda
PHYSICAL AND POSTAL ADDRESS	394, Tram Street, Brooklyn, Pretoria, 0181
TELEPHONE NUMBER	012 460 9768
FAX NUMBER	012 460 3071
CELL PHONE NUMBER	079 607 8719 / 082 758 7590
EMAIL	monica@envass.co.za / judith@envass.co.za

2. PROJECT DESCRIPTION

Mamatwan Manganese has obtained a new order prospecting right over the study area from the Department of Mineral Resources (DMR) on 10 July 2008. The study area is located in the Kalahari Manganese Fields (KMF) in the Northern Cape Province of South Africa. The KMF has the largest manganese deposit in the world, containing approximately 80% of the world's known high-grade manganese. More specifically, Portion 8 is underlain by the south-western part of the KMF. The stratigraphy of the mineralised succession in the area is well understood, and consists of three manganese beds named the Upper, Middle and Lower Manganese Ore bodies ("UMO", "MMO" and "LMO" respectively). According to the Resource Statement (Le Roux, April 2013), the Inferred Resource has been estimated for the LMO only as it is thick (between 3.70m and 16.29 m) with reasonable continuity between cored intersections which range in depth between 177m and 275 m in a structurally complex, folded area. The UMO and MMO are poorly developed within the Mamatwan project area. Prospecting drilling activities (15 boreholes) to confirm the presence of manganese has been completed

successfully. The results of the prospecting activities confirmed an economically viable manganese ore reserve in the study area. A concept study by Royal HaskoningDHV is being completed in support of the mining right application. Mamatwan Manganese therefore, subject to positive concept and feasibility studies, proposes to construct and operate an underground manganese mine producing approximately 1,200,000 tonnes of ore per annum.

The infrastructure proposed for the Mamatwan mining operations on the above-mentioned properties includes:

- Bulk water supply from the Vaal-Gamagarra pipeline;
- Surface storage and reticulation of raw potable water;
- Underground supply reticulation;
- Dirty water pumping and settling infrastructure;
- Pollution control;
- Bulk water supply from Eskom;
- Surface electrical reticulation;
- Underground electrical reticulation;
- Stand-by generators;
- Paved access and internal roads and parking areas;
- Storm water culverts and catchment dam ;
- Rail line siding extension and loop with rapid loading station;
- Admin offices and training centre;
- Workshops;
- Clinic;
- Stores and bulk fuel supply;
- Change house and laundry;
- Camp lamp, self rescuer and proto equipment storage and control;
- Sewage treatment and disposal;
- Core yard;
- Fire prevention;
- Potable and fire water distribution;
- Rescue chambers;
- Main ventilation fans;
- Underground workshops; and
- First aid facilities.

3. PROCESS TO ASSESS ALTERNATIVES

Identification of alternatives

According to the Western Cape Department of Environmental Affairs & Development Planning (WC DEADP) Guideline on alternatives: EIA Guideline and Information Document Series (2011) feasible and reasonable alternatives have to be identified for a development as required by the NEMA EIA Regulations and applicable to EIA. Each alternative is to be accompanied by a description and comparative assessment of the advantages and disadvantages that such development and activities will pose on the environment and socio-economy. When no feasible and/or reasonable alternatives could be identified and investigated in terms of a comparative assessment during the Scoping phase, the EIAR will then not contain a section with alternative. Alternatives forms a vital part of the initial assessment process through the consideration of modifications in order to prevent

and/or mitigate environmental impacts associated with a particular development. Alternatives are to be amended when the development's scope of work is amended. It is vital that original as well as amended alternative identification, investigation and assessment together with the generation and consideration of modifications and changes to the development and activities are documented.

The EIA Regulations (2010) defines alternatives as the 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.

Although an array of alternatives could be investigated for each project, such alternatives will not necessarily be applicable to each project and/or project phase. However there must always be strived to seek alternatives that maximises efficient and sustainable resource utilisation and minimise waste production.

The following alternatives will be investigated and feasible alternatives to be assessed in the EIA phase:

- Access roads and railway loop (Routing and Layout alternatives);
- Screening plant (wet vs. dry screening) (Design alternatives);
- Recycling (Technology alternatives);
- Energy savings (Technology alternatives); and
- Proceed without the mine (No – Go alternative).

Table 5: Alternatives

TYPE OF ALTERNATIVE:	ALTERNATIVE EXPLANATION:
Location	<i>Develop on an alternative property</i> <i>Develop on alternative sites on the same property/properties</i>
No alternatives have been investigated in terms of location due to the manganese ore which underlies the study area and should the proposed mine be relocated to another location the applicant will not be able to utilise the resource.	
TYPE OF ALTERNATIVE:	ALTERNATIVE EXPLANATION:
Activity	<i>Develop an alternative activity ex. Incineration of waste vs. landfill disposal, abstraction of water vs. re-use/recycling of water.</i>
The method adopted for this Scoping Study is room and pillar, the standard method is used throughout the KMF where underground mining is required. Owing to the average height or thickness of the ore body of 11 m it is possible that in the steeper areas drift open stoping could be considered as an alternative if the project proceeds to the PFS level.	

TYPE OF ALTERNATIVE: Design	ALTERNATIVE EXPLANATION: <i>Adapt architectural and/or engineering designs.</i>
<p>A crushing and screening plant will be required, to produce a -75+6 mm product. The -6+1 mm product will be stockpiled. The screening plant could either make use of wet screening or dry screening. It is a requirement of Transnet that manganese ore transported by rail should be wet screened. This is due to the fact that the products from a wet screening plant contain less fine material than the dry screened products. Also the wet screening plant produces significantly less dust than a dry screening plant. No dust emanates from the wet screening operation, and the minimal dust coming from the crushers can be controlled by water sprays. If Transnet did not require wet screening of the lump product, then the cyclone, thickener and tailings dam would not be required. In addition, the product sizing screen would be a single deck screen, with a 6mm aperture screen deck. The downside of using dry screening is that significant dust abatement measures would be required around the screens and the product and fines stockpiles.</p>	
TYPE OF ALTERNATIVE: Layout	ALTERNATIVE EXPLANATION: <i>Adapt spatial configurations of an activity on any particular site ex. Locate manure dams away from water resources.</i>
<p>To date, trade off options have not been considered for the concept design phase. However, it is assumed that the mine will have its own dedicated rail siding for the purposes of loading manganese ore to transport to port for export. The location and design of the rail siding and access routes will be investigated.</p>	
TYPE OF ALTERNATIVE: Technological	ALTERNATIVE EXPLANATION: <i>Adapt methods or processes that can be implemented to achieve the same goal ex. Introduction of bacteria rather than chemicals to waste water.</i>
<p>Recycling:</p> <p>The mine will in its operational phase implement recycling policies and measures for optimal utilisation of resources and minimisation of waste generation.</p> <p>Water:</p> <p>Water utilisation will be maximised through internal recycling of dirty water within the process operations.</p> <p>Energy:</p> <p>Fuel types for the sinter plant will be investigated.</p>	
TYPE OF ALTERNATIVE: Demand	ALTERNATIVE EXPLANATION: <i>The demand for products and/or services can be met by other means ex. The demand for paper can be met through deforestation or rather by efficient and viable recycling.</i>
<p>A lump product in the size range between 6 and 75 mm will be produced for immediate sale. In addition, a fines product in the size range between 1 and 6 mm will be produced. There may be a market for this material, alternatively it will be stockpiled until either a market is found, or until a sinter plant is constructed to convert the fines into a sinter product.</p>	

TYPE OF ALTERNATIVE: Input	ALTERNATIVE EXPLANATION: <i>Implement different input materials and/or sources ex. Utilisation of woodchips for fuelling boilers rather than electricity.</i>
No input alternatives were investigated since it is not applicable to this development.	
TYPE OF ALTERNATIVE: Routing	ALTERNATIVE EXPLANATION: <i>Implement alternative routes for linear developments such as power line servitudes, transportation and pipeline routes ex. Elongate and divert a railway line to exclude a sensitive environment.</i>
The rail option considered for the proposed development consists of a line that takes off the Middelplaats siding which is currently connected to Mamatwan mine. The siding goes over the farm Shirley 367 to enter the property of the mine in the southwest corner. This is the shortest option considered and was chosen to obviate the need to cross over any existing provincial roads. A loading loop will be provided with a rapid loading station on the north western side of the loop.	
TYPE OF ALTERNATIVE: Scheduling and Timing	ALTERNATIVE EXPLANATION: <i>Adapt the order and/or scheduling of a number of measures which plays a part in a program as it will influence the overall effectiveness of the end result.</i>
This alternative is not applicable to the proposed development.	
TYPE OF ALTERNATIVE: Scale	ALTERNATIVE EXPLANATION: <i>Adapt the scale of an activity ex. 15 vs. 35 housing units, 12m² vs. 0.5km². <u>P.S. Scale and magnitude is inter related.</u></i>
At this stage, no alternatives in terms of scale will be investigated.	
TYPE OF ALTERNATIVE: Magnitude	ALTERNATIVE EXPLANATION: <i>Adapt the magnitude which is directly related to the extent of an activity. <u>P.S. Scale and magnitude is inter related. An activity may be very small scale but can pose an extensive magnitude ex. Destroying an extremely sensitive wetland on a very small scale could result in a magnitude of such as destroying the whole wetland and/or ecological system.</u></i>
At this stage, no alternatives in terms of magnitude will be investigated.	
TYPE OF ALTERNATIVE: No-Go	ALTERNATIVE EXPLANATION: <i>The option of not undertaking and implementing the activity at all.</i>
The local, regional and national socio-economic environment will not be able to benefit from the manganese mining activities, which pose a significant advantage through job creations and international exports.	

4. METHODOLOGY OF THE EIA PROCESS

4.1 Approach to the EIA

An Environmental Impact Assessment (EIA) is a good planning tool. It identifies the environmental impacts of a proposed development and assists in ensuring that a project will be environmentally acceptable and integrated into the surrounding environment in a sustainable way.

The EIA for this project complies with the National Environmental Management Act (1998) (as amended) and the NEMA EIA Regulations (2010) of the Department of Environmental Affairs (DEA). The guiding principles of an EIA are listed below.

Box 1. Definition of the term "environment"

The term "environment" is used in the broadest sense in an environmental impact assessment. It covers the physical, biological, social, economic, cultural, historical, institutional and political environments.

4.2 Guiding principles for an EIA

The EIA must take an open participatory approach throughout. This means that there should be no hidden agendas, no restrictions on the information collected during the process and an open-door policy by the proponent. Technical information must be communicated to stakeholders in a way that is understood by them and that enables them to meaningfully comment on the project.

There should be ongoing consultation with interested and affected parties representing all walks of life. Sufficient time for comment must be allowed. The opportunity for comment should be announced on an on-going basis. There should be opportunities for input by specialists and members of the public. Their contributions and issues should be considered when technical specialist studies are conducted and when decisions are made (Refer to **Error! Reference source not found..**)

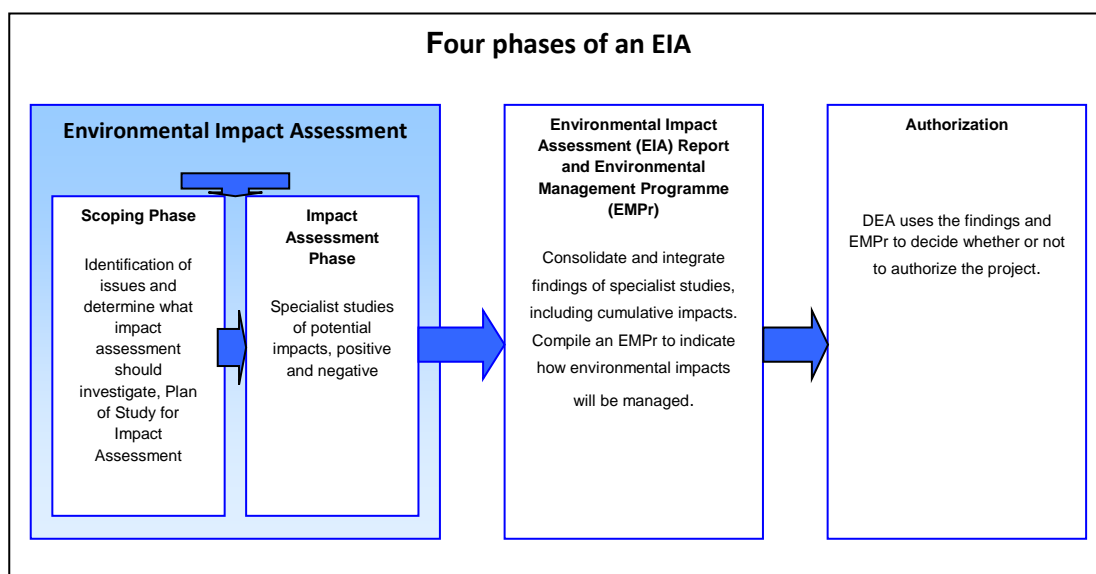


Figure 2: Four phases of the EIA.

4.3 Information gathering

Early in the EIA process, the EAP identified the information that would be required for the impact assessment and the relevant data were obtained. In addition, available information about the receiving environment was gathered from reliable sources, interested and affected parties, previous documented studies in the area and previous EIA Reports. The project team then visited the site to gain first-hand information and an understanding of the existing operations and the proposed project.

4.4 Description of impacts identified during the scoping phase

Table 6: Potential Direct Impacts identified

		IMPACT
HYDROLOGICAL	SURFACE WATER	Alteration of the characteristics of a water course i.e. Vlermuisleegte Watercourse Hydrological modification on stormwater flow and watercourses
		Altered drainage patterns and runoff flows
		Deterioration of water quality
		Contaminated runoff from concrete mixing and sediment release including spills and leaks of chemicals such as Hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles and other chemicals from construction activities e.g. paints, may lead to the infiltration of toxicants into the groundwater
		Subsidence, slumping and flooding of mining areas
		Contamination of surface water by seepage and effluent discharges
	GROUNDWATER	Impact on dewatering of the groundwater aquifer due to mining operations
		Contaminated runoff from concrete mixing and sediment release including spills and leaks of chemicals such as Hydrocarbon-based fuels and oils or lubricants spilled from construction vehicles and other chemicals from construction activities e.g. paints, may lead to the infiltration of toxicants into the groundwater
		Deterioration of water quality - Seepage from the tailings stockpiles and from mining operations causes a contamination plume deteriorating water quality
	AIR QUALITY	Dust impacts on air quality during the construction and operational phases
Windborne dust and vehicle fumes may decrease the air quality		
Dust settling on the surrounding area		
Spreading of Particulate Matter PM ₁₀		

IMPACT	
SOIL, GEOLOGY AND MINERAL RESOURCE	Impact of vegetation clearance on soil erosion and surface water runoff during the construction and operational phase
	Soil pollution, compaction and loss of topsoil during the construction and operational phases
	Mining of resource underlying the site
TOPOGRAPHY	Alteration of the surrounding topography
ECOLOGICAL	Destruction and removal of vegetation, including sensitive, protected species and species of special concern
	Destruction and or deterioration of biodiversity on the study and surrounding area
	Destruction of faunal habitat and faunal displacement
	Reduction in natural migratory routes and faunal dispersal patterns
	Increase in alien invasive species and bush encroachment
VISUAL	Impact on the visual character and or 'Sense of Place' of the area as a result of the establishment of mining infrastructure and related structures as well as waste dumps and stockpiles
	Decreased aesthetic appeal of the study area and surrounding areas
NOISE, VIBRATION AND SHOCK	Disturbance due to vibrations caused by vehicles and blasting
	Nuisance and health risks caused by an increase in the ambient noise level as a result of mine workings including: blasting activities; drilling, loading and hauling
	Nuisance and health risks caused by an increase in the ambient noise level as a result of waste dumps when rocks are falling while being dumped
	Nuisance and health risks caused by increased traffic on an adjacent to the study area including cars, busses and other heavy vehicles
TRAFFIC	The change in the traffic patterns as a result of traffic entering and exiting the new mine on the surrounding road infrastructure and existing traffic
	Impact on existing road infrastructure and increased need for maintenance

IMPACT	
SOCIO-ECONOMICAL	Positive - Development and upliftment of the surrounding communities and infrastructure
	Positive - Development of the economic environment by job provision and sourcing supplies for and from local residents and businesses
	Positive- Creation of medium to long term employment during all the phases of mining for local residents and skills transfer to unskilled and semi-skilled unemployed individuals
	Impact on value of the surrounding properties
	Veld fires
	Safety and injury or loss to workers or other persons on site
	Increased risk to public health and safety
	Trespassing of labour on other properties
	Influx of migrant workers to the area
	Need for services e.g. water, electricity and sewerage systems
HERITAGE	Alteration of archaeological, historical and paleontological features

Table 7: Potential Cumulative Impacts identified

IMPACT	
TRAFFIC	Increased traffic volumes within the mine and surrounding communities.
AIR QUALITY	Decrease in air quality in the immediate surroundings of the mine.
HYDROLOGICAL	Cumulative loss of surface water functionality as a result of an increase in pollutants.

IMPACT	
	Cumulative impact of hydrological modifications and stormwater.
ECOLOGICAL	Cumulative destruction of sensitive habitat.
	Cumulative impact of faunal habitat and displacement.
	Cumulative impact on natural migratory routes and faunal dispersal patterns.
VISUAL	Cumulative impact of visual disturbances.
NOISE, VIBRATION AND SHOCK	Cumulative impact of construction and operational noise as well as noise due to blastings, vibrations and shocks.
	Cumulative impact of vibration and shocks.
SOCIO-ECONOMICAL	Positive - Cumulative impact of development on the surrounding communities.
	Positive - Cumulative impact of development on the economic environment.
	Positive - Cumulative impact of the employment opportunities provided.

4.6 Specialist Assessments

Based on the impacts identified during the Scoping Phase, the following specialist studies have been identified to be completed and form part of the EIA. The main objective of the specialist studies is to provide independent scientifically sound information on issues of concern relating to the project proposal.

Table 8: Specialist studies

Specialist Study		Specialist Information
1.	Ecological Assessment	V. April (ENVASS)
2.	Heritage Impact Assessment	T. Coetzee (ENVASS)
3.	Land capability Assessment	K. van der Merwe (Lantseka)
4.	Geohydrological Assessment	M. Burger (GPT)
5.	Surface Water Assessment	S. Taylor (SiVEST)
6.	Traffic Impact Assessment	C. Havenga (Corli Havenga Transportation Engineers)
8.	Visual Assessment	D. Wilken (ENVASS)

The findings of the various specialist studies undertaken will be incorporated into the Draft EIA Report. The Terms of Reference (ToR) for the various specialist assessments are as follows:

1. Ecological Assessment

The Terrestrial and Ecology Assessment will provide specialist advice on the issues relating to the potential biodiversity and ecological impacts. This will be achieved by means of detailed assessments on the floral and faunal components of the terrestrial and aquatic study areas. The final report shall have the relevant maps and data analysis which will cover following:

- Habitat assessments and their associated levels of biodiversity importance;
- Species lists for each habitat and the identification of “species of significance”;
- Identification of potential risks to biodiversity as a result of the planned development;
- The identification of potential mitigating or offset actions which may prevent/ reduce the loss of biodiversity;
- A suggested monitoring program to determine long term impacts of development and biodiversity; and
- All findings would be assessed in their relation to the relevant Provincial Biodiversity Assessment and the South African National Biodiversity Institute (SANBI) Guidelines.

Scope of work for the terrestrial component:

- Faunal diversity assessment (including mammalian, reptilian, amphibian, avian and invertebrate diversities);
 - Characterization of the faunal environment and habitat, related biota and the extent of site related effects; and
 - Determination of the current status of the faunal environment and an evaluation of the extent of site-related effects in terms of certain ecological indicators, as well as identification of specific important ecological attributes such as rare and endangered species, protected species, sensitive species and endemic species.

- Plant diversity assessment:
 - The assessment of the current status of the habitat components and its conservation status; and
 - Identification the floral species on site and to recommend steps to be taken should a Red list or protected species be found.

2. Heritage Impact Assessment

Phase 1 Heritage Assessment must be undertaken in order to assess the impacts and significance in terms of cultural and heritage and the proposed mitigation measures. The assessment shall be undertaken in accordance with the requirements of Section 38 (3) of the National Heritage Resources Act (Act 25 of 1999), including:

- Conducting a detailed desktop level investigation to identify all known archaeological, cultural and historical facilities on the property;
- Undertake fieldwork to verify results of desktop investigation;
- Undertake an assessment of the Aesthetic / Architectural compatibility of the proposed mine;
- Document using GPS co-ordinates and maps all sites, objects and structures identified on the proposed site;
- Undertake any required consultation with the relevant Department; and
- Compile a report which would include:
 - Identification of all possible archaeological, cultural and historic sites on the property;
 - Evaluation of the potential impacts of construction, operation and decommissioning of the proposed mining activities on archaeological, cultural and historical resources, in terms of the scale of the impact (local, regional, national), magnitude of impact (low, medium, high) and the duration of the impact (construction, up to 10 years after construction, more than 10 years after construction); and
 - Recommendations for mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

3. Land capability Assessment

Comparative land use assessment must be undertaken. This study will involve the classification of the land capability using either the Chamber of Mines (2007) or the Department of Agriculture systems:

- Pre-mining land capability surveys; and
- Recommendations towards post-mining land uses.

The potential of the land will be determined according to the "CRITERIA FOR HIGH POTENTIAL AGRICULTURAL LAND IN SOUTH AFRICA" Report nr. GW/A/2002/21. This involves:

- Determine effective soil depth, texture and soil structure as well as soil type.
- Chemical analysis of the soil was also used to determine agricultural potential.

- Identify and assess all potential impacts (direct, indirect and cumulative) and economic consequences of the proposed development on soils and agricultural potential.
- Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers).
- Describe the slope of the site.
- Determine the agricultural potential of the site.
- Describe current land use as well as possible alternative land use options.
- Nominate a preferred alternative for consideration in the EIA phase.
- Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines.

4. Geohydrological Assessment

- A geohydrological assessment must be undertaken and this study will aim to contain and relate to the following objectives:
 - Description of the pre-mining geohydrological environment.
 - Prediction of the environmental impact of the proposed mining activity on the geohydrological regime of the area. This includes the description of possible negative impacts during mining, construction, decommissioning and after closure.
 - Design and implementation of rehabilitation measures based on physical, hydraulic and hydro-geochemical information as gathered and predicted in the preceding phase.
 - Compilation of all the relevant data and recommendations in a geohydrological report, structured in such a way that it can be incorporated into the final Environmental Management Program document.
- The methodology of the geohydrological assessment will include the following:
 - Detailed site inspection, mapping of relevant geohydrological features and gathering of existing information from topographical maps, ortho-photos, geological maps, hydrological information, meteorological information, previous groundwater studies in the area, discussions with relevant mine personnel, etc.
 - Execution of a borehole/spring census in the area to assess groundwater utilisation by neighbours (this part of the study will be crucial). Based on the information, gathered during the hydrocensus, the groundwater potential (quality & quantity) of the area will be evaluated. The data gathered during this phase will assist in the development of a groundwater-monitoring program. If suitable boreholes exist in the study area they will be incorporated into the monitoring program.
 - Groundwater flow and transport modeling to predict the long term impacts on the receiving environment. The impacts, associated with mining activities, can normally be subdivided into two aspects, namely the de-watering of the surrounding aquifer system and the deterioration of the water quality in the receiving aquifer system. Both these aspects will be addressed.

- Inflow into the mining areas from groundwater will be calculated. This underground water balance will also address possible decanting over time.
- Acid base accounting of material associated with the coal seams and overburden will also be undertaken in this study, if exploration drilling cores can be supplied by the mining company.
- Available data will be interpretation and collation for the prediction of the possible environmental impact and to conceptualise mitigation measures.
- Recommendation of a groundwater monitoring network will be made and standard operational procedures for groundwater monitoring and management supplied.

5. Surface Water Assessment

A hydrological and surface water assessment (including water and salt balances) will be required. This assessment shall include:

- Describe all the surface water impacts and then propose mitigation measures as normally required for and EIA/EMP. This should be done for the construction, operational, decommissioning and post closure phases;
- A Storm Water Management Plan (SWMP) as prescribed by the Best Practice Guideline G1: Storm Water Management by DWAF, 2006. All recommendations must be in line with Regulation 704 of the NWA, 1998 and must include the following:
 - Catchments' characteristics i.e. catchments' boundaries (clean and dirty water), rainfall, water bodies (pans, dams, etc.), slope and drainage directions;
 - Determination of the impact of all water retention infrastructure (pit, dirty water areas, etc.) on the Mean Annual Runoff (MAR);
 - Determine the storm water flows and volumes (1:50 & 1:100 year recurrence intervals) for both the dirty and clean water areas together with the infrastructure engineer.
 - For storm water containment purposes the volumes for longer storm durations (24 hours) should also be
 - determined;
 - Identify and delineate the clean and dirty water areas on a map. The mine to supply a mining plan and infrastructure map as compiled by the infrastructure engineer;
 - Confirm the indicated placement of berms, channels and pollution control dams to divert clean water around the dirty water area as well as infrastructure needed for the dirty water system;
 - All water diversion berms and conveyances for the mine area must be developed to coincide with the mining plan to ensure the movement of these infrastructures as mining progresses (A map showing the berms and conveyances on a yearly time step will suffice);
 - Conceptual storm water designs by an approved civil engineer would be required for the mining infrastructure and operations area;
 - Identify suitable lining options for the potential ROM stockpiles; and
 - Investigate the placement of a dirty water containment facility (pollution control dam).
- Develop operational and post closure water balances as prescribed by the Best Practice Guideline G2: Water and Salt Balances by DWAF, 2007. This must include the following:

- The operational and post closure water balances should be done for summer, winter, dry and wet seasons;
 - Recommend pumping rates required to ensure that the water reticulation system is effective;
 - Determine the saturation index for the process water reticulation system;
 - The decant water in a post closure scenario should also be included in the post closure water balance; and
 - Identify possible water treatment options operational as well as post closure to enable the mine to successfully implement water reclamation in the operational phase and to treat water post closure.
- Develop a surface and groundwater monitoring programme as prescribed by the Best Practice Guideline G3: Monitoring by DWAF, 2007.
 - Background water quality information on both upstream and downstream water bodies (both groundwater and surface water). The following parameters must be sampled for:
 - _ pH, EC and TDS;
 - _ anions NO₃, SO₄, F and Cl;
 - _ cations Na, Ca and K;
 - _ suspended solids;
 - _ ICP scan for heavy metals;
 - _ COD;
 - Evaluate the required parameters to be monitored as well as the frequency of monitoring and the logical placement of such monitoring points to identify any impacts caused by this project.
 - Provide a clear map that can assist the mine in sampling the required monitoring points.

6. Traffic Impact Assessment

The traffic impact assessment must be undertaken in accordance with the South African Guidelines for Traffic Impact Studies. The objective and scope of study for the traffic impact investigation shall entail the following:

- Collection of traffic information to determine the status quo;
- Determination of the trip generation resulting from the activities of the mine, including capacity evaluation of existing routes (number of lanes and type of intersection control);
- Assessing the impact of transportation aspects related to the mining activities;
- The capacity analysis of the major routes, including the intersection analysis.
- Safety Statement: an assessment relevant Geometrical standards in terms of the vertical and horizontal alignment to accommodate more trucks; and a further investigation and determination if additional climbing lanes may be needed for the major access roads
- Investigation of the public transport and pedestrian activities that might be impacted by the mine traffic or activities; and
- A detailed proposal of site specific mitigations which include any road network upgrading and specifications on preferred routes.

7. Visual Assessment

The visual impact assessment to be undertaken shall comprise off:

A. Viewshed Analysis:

The viewshed analysis that will be undertaken in context of information with regard to the project design. The viewshed analysis determines the areas of possible visibility.

B. Viewer incidence and viewer perception

Areas of high viewer incidence (i.e. main roads, towns, tourism areas, etc) are identified, captured into GIS and classified, to quantify the perceived perception of the observers in these identified areas. This is done in order to focus attention on areas where the perceived visual impact of the proposed project will be the highest and the perception of affected observers will be negative. Related to this data set, is a land use character map, that further aids in identifying sensitive areas and possible critical features

C. Observer Proximity

The observer's proximity to the facility also plays a role in determining the visual impact. Buffer radii are created in order to model the reduced impact over distance and to identify the point where the impact becomes negligible.

D. Visual Absorption Capacity

The visual absorption capacity of the environment surrounding the proposed development will be determined in terms of existing landscape features, which includes natural as well as transformed landscapes. This will, together with the slope elevation of the topography, be incorporated with the previously mentioned facets of the visual assessment and will aid in the evaluation of the visual impact.

E. Visual Impact Index

The above datasets, both spatial and alphanumeric entities, are merged in order to calculate the weighted totals of the visual impact indexes. The visual impact index identifies the areas where the likely impact would occur and where the viewer perception would be negative.

F. Severity of impact

Once the areas of likely impact have been identified, the severity of impact for each area will be determined by adding non-spatial criteria to the equation. An example of non-spatial criteria, that would influence the severity of the visual impact, for instance, could be the potential to mitigate or reduce the impact through the utilisation of vegetation screening. Each area of visual impact would have to be evaluated according to its own opportunities and constraints for mitigation. Special circumstances that might further aggravate or mitigate the impact of the proposed development would also be identified during this phase of the visual impact assessment.

5. Environmental Impact Assessment Methodology

A “**significant impact**” is defined as it is defined in the EIA Regulations (2010): “*an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect of one or more aspects of the environment*”. The objective of this EIA methodology is to serve as framework for accurately evaluating impacts associated with current or proposed activities in the biophysical, social and socio-economical spheres. It aims to ensure that all legal requirements and environmental considerations are met in order to have a complete and integrated environmental framework for impact evaluations.

The process of determining impacts to be assessed is one of the most important parts of the environmental impact assessment process. It is of such high importance because the environmental impacts identified can and are often linked to the same impact stream. In this method all impacts on the biophysical environment is assessed in terms of the overall integrity of ecosystems, habitats, populations and individuals affected, for example the removal of groundcover for the sloping or scraping of an embankment. This leads to higher amounts of water runoff which increases the rate of erosion. Further down in the river the amount of sediment increases because of the increased erosion. A number of fish species cannot endure the high amount of sediment and moves off. The habitat is thus changed or in the process of changing. Thus one needs to understand that the root of the problem (removal of groundcover) is assessed in terms of the degree of change in the health of the environment and/or components in relation to their conservation value. Thus if the impact of removal of groundcover of a definable system is high and the conservation value is also high then the impact of removal of groundcover is highly significant.

5.1 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) 2010 REQUIREMENTS

The Environmental Impact Assessment (EIA) 2010 Regulations promulgated in terms of Sections 24 (5), 24M and 44 of the National Environmental Management Act (NEMA) (Act 107 of 1998) requires that all identified potential impacts associated with the proposed project be assessed in terms of their overall potential significance on the natural, social and economic environments. The criteria identified in the EIA Regulations (2010) include the following:

- **Nature of the impact;**
- **Extent of the impact;**
- **Duration of the impact**
- **Probability of the impact occurring;**
- **Degree to which impact can be reversed;**
- **Degree to which impact may cause irreplaceable loss of resources;**
- **Degree to which the impact can be mitigated; and**
- **Cumulative impacts.**

ENVASS has developed an impact assessment methodology (as defined in point 2 below) whereby the **Significance** of a potential impact is determined through the assessment of the relevant temporal and spatial scales determined of the **Extent**, **Magnitude** and **Duration** criteria associated with a particular impact. This method does not explicitly define each of the criteria but rather combines them and results in an indication of the overall significance.

5.2 ENVASS IMPACT ASSESSMENT METHODOLOGY

a) Nature of the impact

The NATURE of an impact can be defined as: “a brief description of the impact being assessed, in terms of the proposed activity or project, including the socio-economic or environmental aspect affected by this impact”.

b) Extent of the impact

The EXTENT of an impact can be defined as: “a brief description of the spatial influence of the impact or the area that will be affected by the impact”.

EXTENT Extent or spatial influence of impact	Footprint	Only as far as the activity, such as footprint occurring within the total site area
	Site	Only the site and/or 500m radius from the site will be affected
	Local	Local area / district (neighbouring properties, transport routes and adjacent towns) is affected
	Region	Entire region / province is affected
	National	Country is affected

c) Magnitude of the impact

The MAGNITUDE of an impact can be defined as: “a brief description of the intensity or amplitude of the impact on socio-economic or environmental aspects”.

MAGNITUDE Magnitude / intensity of impact (at the specified scale)	Zero	Natural and/or social functions and/or processes remain <i>unaltered</i>
	Very low	Natural and/or social functions and/or processes are <i>negligibly</i> altered
	Low	Natural and/or social functions and/or processes are <i>slightly</i> altered
	Medium	Natural and/or social functions and/or processes are <i>notably</i> altered
	High	Natural and/or social functions and/or processes <i>severely</i> altered

d) Duration of the impact

The DURATION of an impact can be defined as: “a short description of the period of time the impact will have an effect on aspects”.

DURATION Duration of the impact	Short term	Construction phase up to 3 years after construction
	Medium term	Up to 6 years after construction
	Long term	More than 6 years after construction

e) Probability of the impact occurring

The PROBABILITY of an impact can be defined as: “the estimated chance of the impact happening”.

PROBABILITY	Unlikely	<i>Unlikely</i> to occur (0 – 25% probability of occurring)
	Possible	<i>May</i> occur (26 – 50% chance of occurring)
	Probable	<i>Likely</i> to occur (51 – 75% chance of occurring)
	Definite	Will <i>certainly</i> occur (76-100% chance of occurring)

f) Degree to which impact can be reversed

The REVERSIBILITY of an impact can be defined as: “the ability of an impact to be changed from a state of affecting aspects to a state of not affecting aspects”.

REVERSIBILITY	Reversible	Impacts can be reversed through the implementation of mitigation measures
	Irreversible	Impacts are permanent and can't be reversed by the implementation of mitigation measures

g) Degree to which impact may cause irreplaceable loss of resources

The IRRIPPLACEABILITY of an impact can be defined as:” the amount of resources that can(not) be replaced”.

IRRIPLACEABILITY Irreplaceable loss of resources	No loss	No loss of any resources
	Low	<i>Marginal</i> loss or resources
	Medium	<i>Significant</i> loss of resources
	High	<i>Complete</i> loss of resources

h) Degree to which the impact can be mitigated

The degree to which an impact can be MITIGATED can be defined as: “the effect of mitigation measures on the impact and its degree of effectiveness”.

MITIGATION RATING	MITIGATED Degree impact can be mitigated	High	<i>Impact 100% mitigated</i>
		Medium	<i>Impact >50% mitigated</i>
		Low	<i>Impact <50% mitigated</i>

i) Confidence rating

CONFIDENCE in the assessment of an impact can be defined as the:” *level of certainty of the impact occurring*”.

CONFIDENCE RATING	CONFIDENCE	Unsure	Amount of information on and/or understanding of the environmental factors the potentially influence the impact is <i>unlimited and sound</i>
		Sure	Amount of information on and/or understanding of the environmental factors the potentially influence the impact is <i>reasonable and relatively sound</i> .
		Certain	Amount of information on and/or understanding of the environmental factors the potentially influence the impact is <i>limited</i>

j) Cumulative impacts

The effect of CUMULATIVE impacts can be described as:” the effect the combination of past, present and “reasonably foreseeable” future actions have on aspects”.

CUMULATIVE RATING	CUMULATIVE EFFECTS	Low	<i>Minor cumulative effects</i>
		Medium	<i>Moderate cumulative effects</i>
		High	<i>Significant cumulative effects</i>

5.3 SIGNIFICANCE OF IMPACTS

The SIGNIFICANCE can be defined as:” the combination of the duration and importance of the impact, in terms of physical and socio-economic extent, resulting in an indicative level of mitigation required”.

SIGNIFICANCE RATING	SIGNIFICANCE	Neutral	<ul style="list-style-type: none"> • Zero magnitude with any combination of extent and duration
		Very low	<ul style="list-style-type: none"> • Very low magnitude with any combination of extent and duration except regional and long term • Low magnitude with a site specific extent and construction period
		Low	<ul style="list-style-type: none"> • Very low magnitude with a site specific extent and long term duration • Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Medium magnitude with a site specific extent and construction period duration • High magnitude with a site specific extent and construction period duration
		Medium	<ul style="list-style-type: none"> • Low magnitude with a regional extent and long term duration • Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term • High magnitude with either a local extent and construction period duration or a site specific extent and medium term duration • High magnitude with a regional extent and construction period or a site specific extent and long term duration • High magnitude with a regional extent and construction period or a site specific extent and long term duration • High magnitude with a local extent and medium term duration
		High	<ul style="list-style-type: none"> • Medium 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
		Very high	<ul style="list-style-type: none"> • High magnitude with a regional extent and long term duration • High magnitude with either a regional extent and long term duration

6 PUBLIC PARTICIPATION

6.1 Introduction

The section provides details about the proposed Public Participation Process (PPP) activities to be undertaken during the EIA phase. The PPP undertaken to date is summarized in the Scoping Report.

Public Participation is an integral part of the EIA and must be undertaken in accordance with the requirements stipulated in Regulation 54 of the EIA Regulations (2010). Furthermore, in terms of Section 24(4)(a) of NEMA, procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment must, *inter alia*, ensure with respect to every application for environmental authorisations:

- *Coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state;*
- *That the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in Section 2 of NEMA are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, plan or projects; consequences or impacts; and*
- *Public information and participation procedures which provide all interested and affected parties (I&AP's), including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures.*

6.2 Proposed Public Participation Process

The specific objects associated with the PPP for the EIA phase are to:

- *Provide all relevant stakeholders (organs of state and I&AP's) with appropriate opportunities to raise potential issues, concerns and queries relating to the proposed project and EIA process;*
- *Facilitate the distribution of information through suitable means to ensure that all relevant stakeholders and I&AP's are informed about the progress of the project and to give feedback and responses regarding queries and issues raised;*
- *Provide all relevant stakeholders and I&AP's the opportunity to be part of the decision-making process by means of providing them with an opportunity to comment on the findings of the specialist assessments and other relevant information contained in the EIA Reports; and*
- *Gather the relevant skills and local knowledge to inform and improve the EIA process and impact assessment.*

Steps to be completed for the PPP during the EIA phase:

A) Identification of Stakeholders and I&AP's

Various I&AP's and stakeholders have been identified to date. All were notified of the proposed project (please refer to Scoping Report). However, additional I&AP and stakeholder identification will be ongoing throughout the EIA process. All stakeholders will be kept informed on the progress of the EIA process and will be provided with an opportunity to comment on the Draft and Final EIA Reports.

B) Distribution of Draft and Final Scoping and EIA Reports availability for comment

The Draft and Final Scoping and EIA Reports will be distributed to all stakeholders and I&AP's for review and comment. The Draft Reports will be made available for comment for a period of 40 calendar days and the Final Reports for 21 calendar days.

The availability of these reports will be communicated and advertised to relevant stakeholders and registered I&AP's by means of:

- Personal letters, fax and emails to all the registered I&AP's and on the distribution list.

All reports will be made available for review and comment by the public at the Ga-Segonyana (Oasis) Library, Skool Street, Kuruman). The reports can also be obtained from the ENVASS website (<http://www.envass.co.za>). All relevant authorities will receive hardcopies and CD's of the reports.

C) Public Meeting / Open Day

Meeting or Open Day is proposed prior to the commencement of the EIA phase.

D) Feedback to stakeholders and I&AP's on comments and issues raised

All reports released to the public for comment shall contain a Comments and Responses Report where all comments and issues raised by stakeholders and I&AP's as well as the responses issued by EAP will be formally recorded.

E) Recordkeeping of PPP completed

Proof of all correspondence (comments and responses) and additional activities undertaken during the PPP will also be included in the EIA Reporting documentation.

7 EIA MILESTONES AND PROJECT PROGRAMME

The following key milestones and timeframes for the EIA phase have been identified:

- Distribution of the Draft EIR and EMPr for public comment – July 2014
- Distribution of the Final EIR and EMPr for public comment – August 2014
- Submission of the Final EIR and EMPr to Competent Authority for authorisation – Sept 2014

NOTE: THE PROPOSED PROGRAMME DETAILED ABOVE ARE PROVIDED AS GUIDANCE ONLY AND ARE SUBJECT TO CHANGE DEPENDING ON THE VARIOUS COMPONENTS AND EXTERNAL FACTORS THAT INFORMS AND INFLUENCES THE EIA PROCESS.

8 CONCLUSION

This PoS developed for the EIA Phase for the development proposal has been compiled to meet the requirements contained in Regulation 28 (n)(i-iv) of the EIA Regulations (2010). The proposed specialist assessments and PPP methodologies considered for the EIA is deemed to be adequate to inform the EIA Report and environmental process. The CA will therefore receive appropriate integrated information required to allow for informed decision-making on the application for authorisation.