MAMATWAN MANGANESE (PTY) LTD

FINAL SCOPING REPORT

PROPOSED MAMATWAN MANGANESE MINE AND ASSOCIATED INFRASTRUCTURE ON THE REMAINING EXTENT AS WELL AS THE REMAINING EXTENT OF PORTION 3 AND PORTION 8 AND 18 OF THE FARM MAMATWAN NO. 331, NORTHERN CAPE PROVINCE

NC/EIA/10/JTG/GA/MAM/203
NC/30/5/1/2/2/ 10031 MR

Submitted to:
The Northern Cape Department of Nature Conservation (NC DENC)
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REPORT

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Distribution:	
1 x Copy	**Mamatwan Manganese (Pty) Ltd**
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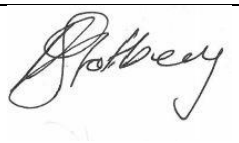
Signature:				
Date:	2014/03/14	2014/03/24	2014/04/04	2014/04/04

EXECUTIVE SUMMARY

Introduction and project description

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 of Portion 3 as well as Portion 8 and Portion 18 and the Remaining Extent 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.

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.

Legislative requirements

National Environmental Management Act, 1998 (Act 108 of 1998) [as amended)

The proposed mine development and operations requires compliance with the EIA Regulations of 2010, promulgated in terms of the National Environmental Management Act, Act 107 of 1998 (as amended). The proposed activity requires a Scoping and EIA process as listed activities 9,11, 13 18, 22, 37, 47 & 53 under Government Notice No R. 544 as well as listed activities 15 and 20 of Government Notice No R. 545 of the EIA 2010 Regulations are triggered.

National Water Act, 1998 (Act 36 of 1998)

The proposed mine development and operations further also requires compliance with the National Water Act, 1998 (Act 36 of 1998). An application for an integrated water use licence in terms of Section 21 to undertake the following activities will be applied for:

(a) taking water from a water resource;
(b) storing water;
(c) impeding or diverting the flow of water in a watercourse;
(i) altering the bed, banks, course or characteristics of a watercourse;
(g) Disposing of waste in a manner which may detrimentally impact on a water resource;

The requirements of the following legislation have also been considered in this Application for environmental authorisation:

- Constitution of South Africa (Act No. 108 of 1996);
- National Biodiversity Act (Act No.10 of 2004);
- National Environmental Management Air Quality Act (Act No. 39 of 2004);
- National Environmental Waste Management Act (Act No. 59 of 2008);
- National Heritage Resources Act (Act No. 25 of 1999);
- National Forests Act (Act No. 84 of 1998) as amended;
- Conservation of Agricultural Resources Act (Act No. 43 of 1983);
- Minerals and Petroleum Resources Development Act (Act No. 28 of 2002); and
- Mine Health and Safety Act (Act No. 29 of 1996)
- Northern Cape Nature Conservation Act (Act No. 9 of 2009) (NCNCA)
- National Veld and Forest Fire Act (Act No. 101 of 1998) (NVFFA)

Alternatives

Alternatives are defined in the NEMA EIA Regulations (2010) as "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; and (e) the operational aspects of the activity and (f) the option of not implementing the activity".

For the purpose of this application, the following Alternatives will be considered:

- 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).

Impact statement

The following key issues and potential impacts (direct and cumulative), was identified during the Scoping phase, which will together with potential cumulative impacts, be assessed during the Environmental Impact Assessment phase of the project and appropriate mitigation measures to reduce the identified impacts will be proposed.

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}
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

IMPACT	
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
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

IMPACT	
	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 paleonthological features

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	SURFACE WATER	Cumulative loss of surface water functionality as a result of an increase in pollutants
		Cumulative impact of hydrological modifications and stormwater
	GROUNDWATER	Cumulative impacts on groundwater quality due to seepage from stockpiles and mining operations
		Cumulative impacts on groundwater levels and availability of water to the surrounding landowners
ECOLOGICAL		Cumulative impact of vegetation loss including sensitive vegetation
		Cumulative impact of destruction and or deterioration of biodiversity
		Cumulative impact of faunal habitat and displacement
		Cumulative impact on natural migratory routes and faunal dispersal patterns
VISUAL		Cumulative impact of visual disturbances

IMPACT	
NOISE, VIBRATION AND SHOCK	**Cumulative impact of construction and operational noise as well as noise due to blasting, vibrations and shocks**
	Cumulative impact of vibration and shocks
SOCIO-ECONOMICAL	**Positive - Development and upliftment of the surrounding communities and infrastructure**
	Development of the economic environment by job provision and sourcing supplies for and from local residents and businesses
	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
	Cumulative impact on resources due to the need for services e.g. water, electricity and sewerage systems
	Cumulative impact of decrease in value of surrounding properties

Public Participation

A joint Public Participation Process (PPP) is undertaken for the proposed mining development. The process is undertaken to ensures compliance with regard to the requirements in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), the National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended], National Water Act, 1998 (Act No. 36 of 1998) and the Environmental Impact Assessment Regulations (2010).

The PPP tasks conducted to date includes:

1. *Identification of key interested and affected parties (affected and adjacent landowners) and other stakeholders (organs of state and other parties)*

   Interested and Affected parties (I&APs) representing the following sectors of society has been identified:

   - National, provincial and local government;
   - Agriculture, including local landowners (affected and adjacent);
   - Community Based Organisations (CBO);
   - Non-Governmental Organisations (NGO);
   - Water bodies;
   - Tourism;
   - Industry and mining;
   - Commerce; and
   - Other stakeholders.

2. *Formal notification of the application to interested and affected parties (including all affected and adjacent landowners) and other stakeholders*

The project was announced as follows:

Newspaper advertisement

Publication of media advertisements (Afrikaans and English) in the Kalahari Bulletin Newspaper on 01 August 2013.

Site notice placement

In order to inform surrounding communities, affected and adjacent landowners of the proposed development, site notices were erected on site and at visible locations close to the site.

Written notification

I&AP's and other key stakeholders, who included the above-mentioned sectors, were directly informed of the proposed development by e-mail on 30 July 2013. The Background Information Document (BID) and Registration and Comment sheets were also supplied to all parties. I&APs were given 30 days to comment and / or raise issues of concern regarding the proposed development. The commenting period expired on the 5th of September 2013.

3. *Consultation and correspondence with I&AP's and stakeholders*

All I&AP registrations and comments that have been received from stakeholders is formerly recorded in the Comments and Responses Report.

4. *Distribution of Draft Scoping Report and Plan of Study*

The Draft Scoping Report (DSR) and Plan of Study (POS) were released for public review and comment for 40 calendar days (20 December 2013 to 21 February 2014). Additional days were attended to the commenting period in order to compensate for the December festive period and public holidays. Hardcopies of the DSR were submitted to all Organs of State and relevant authorities. In addition copies were placed at the Ge-Segonyana Public library (OASIS) (C/o Voortrekker and Skool Streets, Kuruman) and were also available for download on the ENVASS website (www.envass.co.za).

A Public Meeting / Open Day is planned to take place in after completion of the Scoping Phase. It is anticipated that this meeting will take place in April 2014.

Conclusion

A variety of mitigation measures have been identified that will serve to mitigate the scale, intensity, duration or significance of the potential negative impacts identified. These include guidelines to be applied during the construction and operational phases of the project. The Environmental Management Programme (EMPr) will contain more detailed mitigation measures and will be incorporated into the Environmental Impact Report (EIR).

The proposed mitigatory measures, if implemented, will reduce the significance of the majority of the identified impacts. It is therefore the recommendation of Environmental Assurance, based on the assessment of the current available information, is that the Scoping Report for the proposed manganese mine should be accepted by the Competent Authority. This authorisation should be in line with sensitive planning, design and good environmental management. The proposed construction and operation of the manganese mine will have significant positive social and economic impacts on local, provincial and national scales.

LIST OF ABBREVIATIONS

AIA	Archaeological Impact Assessment
ASAPA	Association of Southern African Professional Archaeologists
BA	Basic Assessment
BID	Background Information Document
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CSA	Constitution of South Africa (Act No. 108 of 1996)
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism (currently known as DEA)
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989)
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ENVASS	Environmental Assurance (Pty) Ltd
GN	Government Notice
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IEM	Integrated Environmental Management
IWULA	Integrated Water Use License Application
IWWMP	Integrated Water and Waste Management Plan
KMF	Kalahari Manganese Fields
LMO	Lower Manganese Ore
MHSA	Mine Health and Safety Act (Act No. 29 of 1996)
MMO	Middle Manganese Ore
MPRDA	Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (as amended)
NC DENC	Northern Cape Department of Environment and Conservation
NCNCA	Northern Cape Nature Conservation Act (Act No. 9 of 2009)
NEMA	National Environmental Management Act, 1998 (Act no 107 of 1998, as amended)
NEMAQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NFA	National Forests Act (Act No. 84 of 1998) as amended;
NHRA	National Heritage Resource Act, 1999 (Act No. 25 of 1999)
NVFFA	National Veld and Forest Fire Act (Act No. 101 of 1998)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PPP	Public Participation Process
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SR	Scoping Report
UMO	Upper Manganese Ore

GLOSSARY OF TERMS

Anthropogenic: Change induced by human intervention.

Applicant: Any person who applies for an authorisation to undertake an activity or undertake an Environmental Process in terms of the Environmental Impact Assessment (EIA) Regulations – National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA] as contemplated in the scheduled activities listed in Government Notice (GN) No 543, 544 and 545.

Archaeological resources: This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which South African Heritage Resources Agency (SAHRA) considers to be worthy of conservation; features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Biodiversity: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

Cultural significance: This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Cumulative Impact: In relation to an activity, cumulative impact means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Environment: All physical, chemical and biological factors and conditions that influence an object.

Environmental Impact Assessment: In relation to an application, to which Scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of the application.

Environmental Impact Assessment Report: In-depth assessment of impacts associated with a proposed development. This forms the second phase of an EIA and follows on the Scoping Report (SR).

Heritage resources: This means any place or object of cultural significance. See also archaeological resources above.

Precipitation: Any form of water, such as rain, snow, sleet, or hail that falls to the earth's surface.

Red Data species: All those species included in the categories of endangered, vulnerable or rare, as defined by the International Union for the Conservation of Nature and Natural Resources.

Riparian: The area of land adjacent to a stream or river that is influenced by stream induced or related processes.

1. INTRODUCTION

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 of Portion 3 as well as Portion 8 and Portion 18 and the Remaining Extent 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 (refer to Figure 1 below). 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.

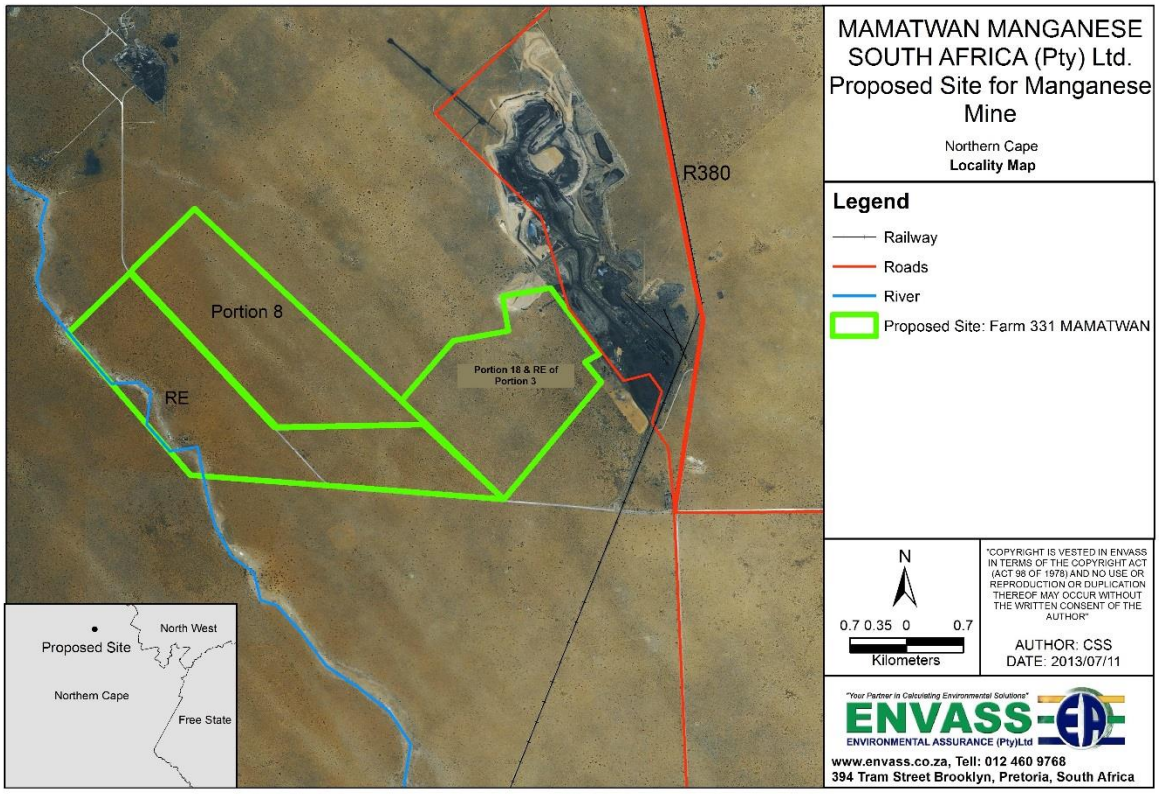


Figure 1: Locality map of proposed Mamatwan Mine

Mamatwan Manganese has obtained a new order prospecting right over the study area from the Department of Minerals and Energy (DME) 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 177 m 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 – see Figure 2 below) 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. As part of the mining right application in terms of the MPRDA an environmental scoping report was submitted to the DMR and accepted. An Environmental Impact Assessment Report / Environmental Management Programme and supporting documentation was submitted to the DMR on 10 March 2014. The DMR will now consider the EIA and supporting documentation and if approved, issue a mining right to the applicant. 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.

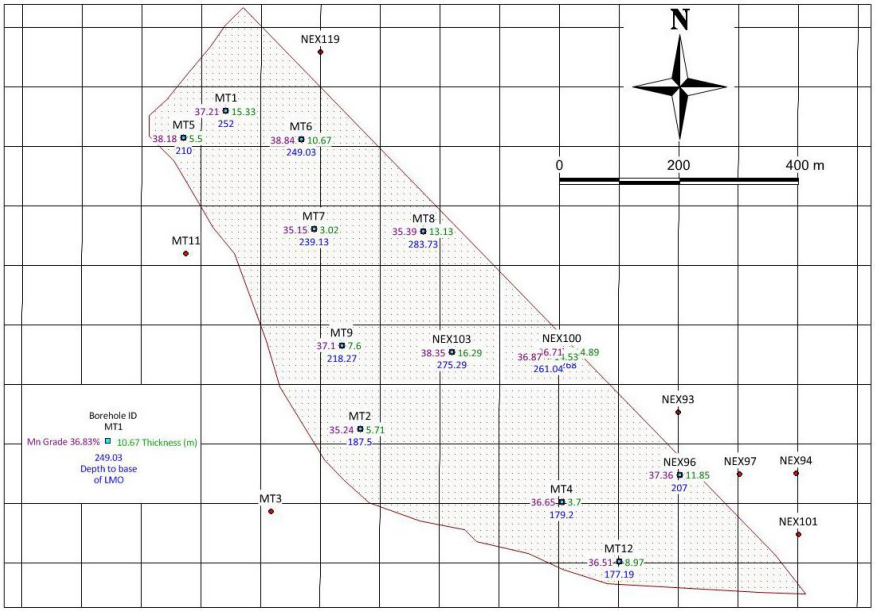


Figure 2: Boreholes drilled as part of the prospecting activities (Resource Statement, Le Roux 2013)

2. APPLICANT AND ENVIRONMENTAL PRACTITIONER DETAILS (REGULATION 28 (1) (a) (i-ii))

Table 1: Applicant details

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 Birnam Park Johannesburg 2015
PHYSICAL ADDRESS	The Reserve 1st 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 2: Environmental Assessment Practitioner details and experience

NAME OF ENVIRONMENTAL CONSULTANCY	Environmental Assurance (Pty) Ltd ENVASS
REGISTRATION NO. OF APPLICANT	2004/02655/07
PROJECT TEAM	ENVASS TEAM Emile van Druten (Specialist, *Pr. Sci. Nat*) Judith Mandla (WULA Specialist, EAP) Monica Niehof (Environmental Consultant) Nicolene Lotter (Assistant Public Participation Administrator) Vuyokazi April (Ecological specialist, *Pr. Sci. Nat*) 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

3. DESCRIPTION AND LOCATION OF THE PROPOSED ACTIVITY (REGULATION 28 (1) (b))

The proposed Mamatwan Manganese Mine (underground operation) will produce approx. 1,200,000 tonnes of ore per annum. The properties associated with the proposed development are in private and company ownership:

Table 3: Affected properties and landowner information

PORTION	FARM	REGISTRATION DIVISION	SIZE	OWNER
R/E	Mamatwan	RD	439.25	Mr Dries van der Berg
R/E of 3	Mamatwan	RD	295.27	Hotazel Manganese Mines (Pty) Ltd
Portion 8	Mamatwan	RD	342.61	Tshipi E Ntle Manganese Mines (Pty) Ltd
Portion 18	Mamatwan	RD		Tshipi E Ntle Manganese Mines (Pty) Ltd

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.

The site is located within the municipal boundaries of the John Taolo Gaetsewe District and the Joe Morolong Local Municipality. The site borders the Gamagara Local Municipality and is in close proximity to the Ga-Segonyana Local Municipality. The site will be located adjacent to the west of the existing Mamatwan Mine (owned by Samancor) and the R380. The surrounding area is dominated by agricultural and mining activities.

Most of the mining activities within the Joe Morelong and Gamagara areas are connected to the Sishen-Saldanha route. To this effect, mining and exploration activities occurring within the surrounding area includes *inter alia*:

- Wessels Mine (underground operation);
- Tshipi Mine (opencast mining);
- Mamatwan Mine (opencast mining);
- UMK Mine (opencast mining) and
- Kudumane (opencast mining).

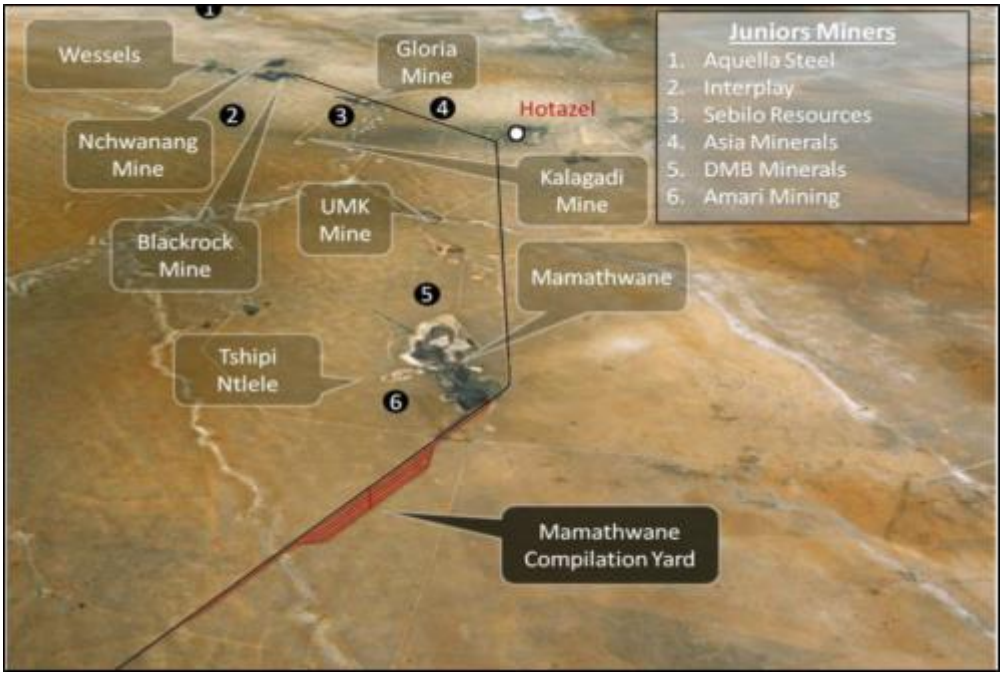


Figure 3: Surrounding mining activities (Carstens, 2013)

4. LEGISLATIVE FRAMEWORK (REGULATION 28 (1)(f))

4.1 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:

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)

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) 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 thes coping 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 coping 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 4: 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 storm water - 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: a) Such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or b) Where such construction will occur within urban areas but further than 32 meters from a	Bulk water supply infrastructure exceeding 1000 metres in length is required for the mining operations and will be constructed.

		watercourse, measured from the edge of a watercourse.	
544	11	The construction of: 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: 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.	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	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 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 - but excluding where such infilling, depositing, dredging, excavation, removal or moving a) is for maintenance purposes	Infilling, depositing, dredging, excavation, removal or moving of soil / material (in excess of 5 cubic metres) from a watercourse, might occur.

		undertaken in accordance with a management plan agreed to by the relevant environmental authority; or b) occurs behind the development setback line.	
544	22	The construction of a road outside urban areas - i) With a road reserve wider than 13,5 meters; ii) Where no reserve exists where the road is wider than 8 meters or 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.	Roads (outside an urban area), wider than 8m will be constructed.
544	53	The expansion of railway lines, stations or shunting yards where there will be an increased development footprint – Excluding: i) Railway lines, shunting yards and railway stations in industrial complexes or zones; ii) Underground railway lines in mines; and iii) Additional railway lines within the reserve of an existing railway line.	Expansion of the existing Middelplaats siding (currently connected to the existing Mamathwane mine) is envisaged. A railway siding with railway loop for the purpose of loading and transport of manganese ore will be constructed.
544	37	The expansion of facilities or infrastructure for the bulk transportation of water, sewage or storm water where: a) The facility or infrastructure is expanded by more than 1 000 meters in length; or b) Where the throughput capacity of the facility or infrastructure will be increased by 10% or more – excluding where such expansion: i) Relates to transportation of water, sewage or storm water within a road reserve; or ii) Where such expansion will occur within urban areas but further than 32 meters from a watercourse, measured from the edge of the watercourse.	Facilities and infrastructure will have to be expanded for purposes of bulk transportation of water from the existing Vaal Gamagarra pipeline to the mine.

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 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) to be and this 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 the 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 the 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 Resources 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). The 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 m^2 in extent; or
  (ii) Involving three or more existing erven or subdivisions thereof; or
  (iii) Involving three or more erven or divisions thereof which have been consolidated within the past 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 m^2 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

A Phase 1 AIA generally involves 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 the 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 Forests Act, 1998 (Act 84 of 1998)

The purposes of the National Forests 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: A*cacia erioloba* (commonly known as Camel Thorn or Kameel Doring)*, Acacia haematoxylon* (commonly known as Grey Camel Thorn) and *Boscia albitrunca* (commonlyknown 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.

4.2 PROVINCIAL LEGISLATIVE FRAMEWORK

Table 5: 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 Conservation Act, 9 of 2009	The proposed development will conform to the objectives, provisions and requirements of the Northern Cape Nature Conservation Act, 9 of 2009.	Northern Cape Provincial Administration	2009
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

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THIS PROJECT	ADMINISTERING AUTHORITY	DATE
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	CapeNature	2006

5. PROJECT MOTIVATION: NEED AND DESIRABILITY (REGULATION 28 (i))

PROJECT MOTIVATION

Economic:

South Africa has one of the world's largest manganese reserves. The highest concentration of manganese mines who produce predominant high and mid grade ores, are located in the Kalahari Manganese Basin. These predominant high grade ores are the most common export commodity in the Northern Cape. Research also indicates that the manganese industry will experience an even stronger export demand within the next 10 years. The proposed Mamatwan Manganese Mine will ensure that the Northern Cape and South Africa will benefit from

the projected growth of the manganese industries. This growth will is based on the increasing global need for steel manufacturing, as well as ensuring higher steel grades through altering the steel product mix.

Socio-economic:

Unemployment is a major problem within the John Taolo Gaetsewe District. The proposed Mamatwan Manganese Mine will have a significant positive impact on the baseline socio-economic conditions of the local communities involved. The mine will create several employment opportunities and preference will be given to the locally unemployed wherever possible. The mine will contribute towards the socio-economic development of the region as a whole through social upliftment and job creation as primary agents. The mine will as part of the Infrastructure and Poverty Alleviation projects (IPAPS) help address the needs of the municipality identified, which includes:

- Infrastructure (water provision of communities with no water)
- Income generation (facilities for tourists where local communities can generate income)

NEED AND DESIRABILITY

According to the Western Cape Department of Environmental Affairs and Development Planning's (WC DEADP) Guideline on Need and Desirability: EIA Guideline and Information Document Series (2011), to describe the need for a development, it must be determined whether it is the right *time* for locating the type of land use and/or activity being proposed. To describe the desirability for a development, it must be determined) whether it is the right *place* for locating the type of land use and/or activity being proposed. Need and desirability can be equated to the concept of *wise use of land which can be determined through* the question of what is the most sustainable use of land. In light of the above, the need and desirability of an application must be addressed separately and in detail answering *inter alia* the following questions:

Table 6: Need and desirability considerations

<table>
<tr><th colspan="3">A) NEED (TIMING)</th></tr>
<tr><td colspan="2">QUESTION A1: Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority?</td><td rowspan="2">The project is aligned with the objectives of the municipal Spatial Development Framework (SDF) and Integrated Development Plan (IDP) and will not compromise the integrity of these respective forward planning documents. Specific reference is made to the Provincial Strategic Priorities identified for the Northern Cape:
✓ Job Creation
✓ Investment Creation
✓ Rural/Urban Development
✓ Infrastructure Development
✓ Combating Crime
✓ Skills Development.
✓ Combating the impact of HIV/AIDS
✓ Poverty Alleviation
The mine development and associated operational activities and impacts are aligned with these provincial priorities and will contribute in achieving the strategic priorities set for the province.</td></tr>
<tr><td>YES X</td><td>NO</td></tr>
<tr><td colspan="2">QUESTION A2: Should development, or if applicable, expansion of the town/area concerned in terms of this land use</td><td>Kathu is the closest town to the proposed manganese mine. Kathu is a town in South Africa, and the iron ore capital of the Northern Cape Province.</td></tr>
</table>

(associated with the activity being applied for) occur here at this point in time?		South Africa has one of the world's largest manganese reserves. The highest concentration of manganese mines who produce predominant high and mid-grade ores, are located in the Kalahari Manganese Basin. These predominant high grade ores are the most common export commodity in the Northern Cape. Research also indicates that the manganese industry will experience an even stronger export demand within the next 10 years. The proposed Mamatwan Manganese Mine will ensure that the Northern Cape and South Africa will benefit from the projected growth of the manganese industries. This growth is based on the increasing global need for steel manufacturing, as well as ensuring higher steel grades through altering the steel product mix.
YES **X**	NO	
QUESTION A3: Does the community/area need the activity and the associated land use concerned (is it a societal priority)?		Unemployment is a major problem within the Taolo Gaetsewe District. The proposed Mamatwan manganese mine will have a significant positive impact on the baseline socio-economic conditions of the local communities involved. The mine will create several employment opportunities and preference will be given to the locally unemployed, wherever possible. The mine will contribute towards the socio-economic development of the region as a whole through social-upliftment and job creation as primary agents. The mine will as part of the Infrastructure and Poverty Alleviation projects (IPAPs) help address the needs of the municipality identified, which includes: • Infrastructure (water provision of communities with no water) and • Income generation (facilities for tourists where local communities can generate income).
YES **X**	NO	
QUESTION A4: Are the necessary services with the adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?		Current access roads have to be widened, a connection with the Vaal Gamagara Pipeline needs to be established and electrical power supply will have to be increased. Access to the railway facilities need to be developed.
YES	NO **X**	
QUESTION A5: Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?		No municipal infrastructure will be required for the study area.
YES	NO **X**	
QUESTION A6: Is this project part of a national programme to address an issue of national concern or importance?		
YES	NO **X**	

<table>
<tr><th colspan="3">B) DESIRABILITY (PLACING)</th></tr>
<tr><td colspan="2">QUESTION B1: Is the development the best practicable environmental option for this land/site?</td><td rowspan="2">The study area has been transformed to some degree. Alternative land uses for the site would include grazing and farming activities. However, the study area is underlain by a belt containing manganese which will be utilised to improve social and economic environments. Leaving the area in its current state could potentially, if not adequately managed, result in degradation and transformation due to further overgrazing. Through implementing good practice environmental management measures and mitigation measures, it will ensure that both human and environment benefit from the development.</td></tr>
<tr><td>YES X</td><td>NO</td></tr>
<tr><td colspan="2">QUESTION B2: Would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF as agreed to by the relevant authorities?</td><td rowspan="2">The project is aligned with the objectives of the municipal Spatial Development Framework (SDF) and Integrated Development Plan (IDP) and will not compromise the integrity of these respective forward planning documents.</td></tr>
<tr><td>YES</td><td>NO X</td></tr>
<tr><td colspan="2">QUESTION B3: Would the approval of this application compromise the integrity of the existing environmental management priorities of the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?</td><td rowspan="2"></td></tr>
<tr><td>YES</td><td>NO X</td></tr>
<tr><td colspan="2">QUESTION B4: Do location factors favour this land use (associated with the activity applied for) at this place, etc.)?</td><td rowspan="2">No location alternatives are applicable to this project since the manganese is contained in an underlying belt in the development area. Locating the development in another area will result in the ore not being utilised and the economy and society not benefitting from the Mamatwan Manganese Mine.</td></tr>
<tr><td>YES X</td><td>NO</td></tr>
<tr><td colspan="2">QUESTION B5: Will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?</td><td rowspan="2">The proposed site for the mine is located within an area which is already severely disturbed as a result of agricultural and extensive mining activities. The proposed mine will be located adjacent to the west of the existing Mamatwan Mine. As a result of the anthropogenic influences evident in the area, it is highly unlikely that any environmental or cultural effects of high significance are existent within the study area. In addition, the mining method proposed will be underground; therefore areas of natural or cultural significance could be identified and maintained as no-go areas.</td></tr>
<tr><td>YES</td><td>NO X</td></tr>
<tr><td colspan="2">QUESTION B6: Will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?</td><td rowspan="2">Noise, dust and odours will increase but with the proper mitigation measure and good practice environmental management measures, it will result in minimal impacts.</td></tr>
<tr><td>YES X</td><td>NO</td></tr>
</table>

QUESTION B7: Will the proposed land use result in unacceptable cumulative impacts?		As already mentioned, through the implementation of good practice environmental management measures as well as mitigation measures, all direct and cumulative impacts which may result from the proposed development will be addressed and ensure that the environment is affected to the minimum.
YES	NO **X**	

6. DESCRIPTION OF THE BASELINE ENVIRONMENT (REGULATION 28 (e))

6.1 CLIMATE, TEMPERATURE, RAINFALL, WIND AND EVAPORATION

Climate can influence the potential for environmental impacts and related mine design. Specific issues are listed below:

- Rainfall could influence erosion, evaporation, vegetation growth, rehabilitation planning, dust suppression, and surface water management planning;
- Temperature could influence air dispersion through impacts on atmospheric stability and mixing layers, vegetation growth, and evaporation which could influence rehabilitation planning; and
- Wind could influence erosion, the dispersion of potential atmospheric pollutants, and rehabilitation planning.

To understand the basis of these potential impacts, a brief baseline situational analysis is described below. More detailed and updated information will be provided in the EIA phase.

Climate:

The Northern Cape is mainly semi-desert, its weather typical of desert and semi-desert with fluctuating temperature and varying topography. The annual rainfall is sparse ranging from 50-400 mm per annum mainly between January and April, whilst the summer temperature in the afternoon ranges from 34-40˚C and may even peak above the 40˚C mark. Winter days are favourably warm while nights are characterised by dew and frost. Mean annual temperatures range between 16 and 20°C. The mean annual minimum/maximum temperatures are estimated to range between 8 and 28°C. The seasonal temperature patterns for Kuruman is expected to be predominantly representative of the larger area around Kuruman including the proposed mining area, as well as the highest recorded maximum and lowest recorded minimum temperatures per month.

The topography of the KMF in particular Kuruman, is predominately flat-lying at <1 100m elevation, with relatively low relief. The area is characterised by several vegetated northwest to southeast-trending red sand dunes, up to 10 m in height, up to 200 m wide and tens of kilometres in length. The regional drainage pattern is broadly northwards but water-flows in the streams are generally very rare. The topography of the mining area is also relatively flat and therefore it is expected that the climate of Kuruman is predominantly representative of the proposed mining area.

Rainfall:

The annual rainfall in the area is sparse ranging from 50-400 mm per annum mainly between January and April. The monthly average rainfall values ranging between 16 and 19 mm, whilst the lowest rainfall records are recorded for the months of June, July and August, with monthly average rainfall values ranging between 0 and 3

mm (EIA Kalahari Manganese Mine, SEF 2007). The rainfall erosivity for the site is estimated at 501-600mm per year (Figure 4 below).

The topography of the KMF is predominately flat-lying at <1 100m elevation, with relatively low relief. The area is characterised by several vegetated northwest to southeast-trending red sand dunes, up to 10 m in height, up to 200 m wide and tens of kilometres in length. The regional drainage pattern is broadly northwards but water-flows in the streams are generally very rare. The rainfall patterns of Kuruman are expected to be predominantly representative of the larger area around Kuruman including the proposed mining area.

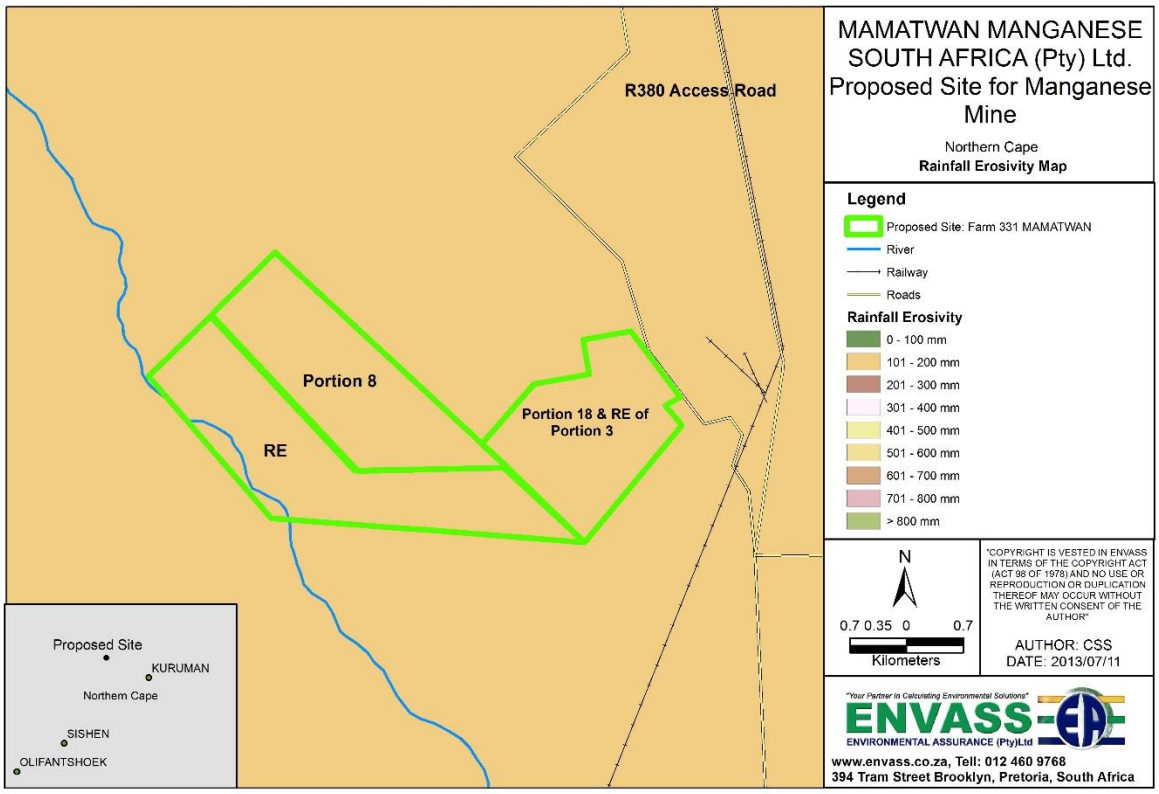


Figure 4: Rainfall Erosivity Map

Wind and evaporation:

The predominant wind direction in the Kuruman region is south-easterly (12 to 17 %) (See Figure 5 below) with frequent winds also occurring from the North West (8 %). Less frequent winds (~6 % of the time) are from the north-easterly and south-westerly sectors. Calm conditions (wind speeds < 1 m/s) occur for ~12 % of the time. Wind roses for day / night periods and seasonal wind roses are included below (SA Weather Bureau and Airshed 2006). The annual evaporation rate at the site is estimated at a range between 2201 and 2400mm (See Figure 6 below).

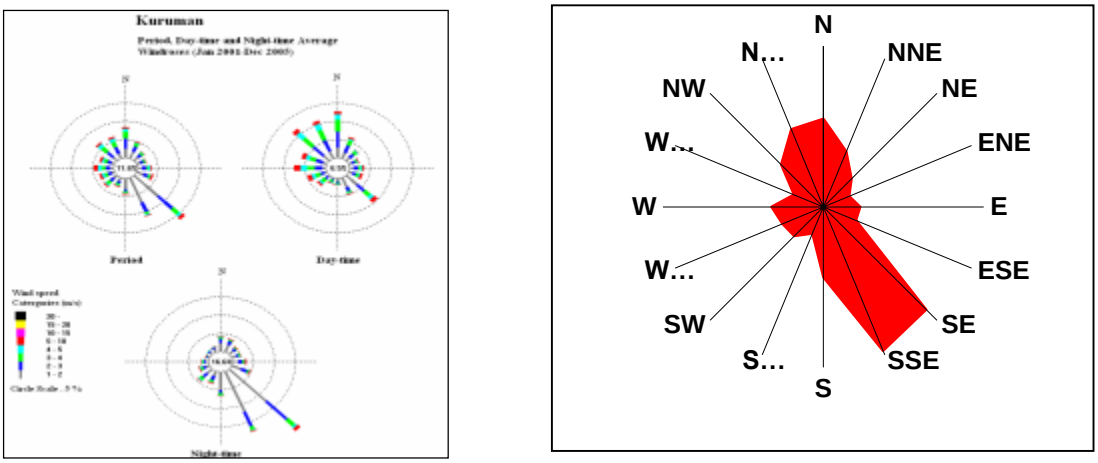


Figure 5: Total wind frequency distribution at Kuruman

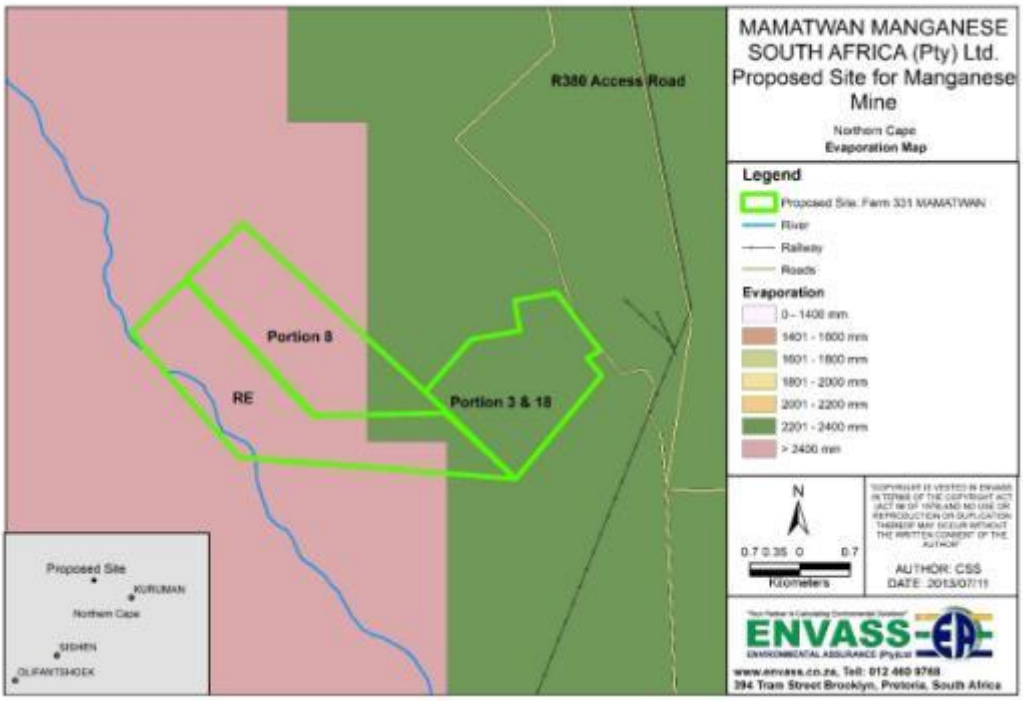


Figure 6: Evaporation for the study area

6.2 TOPOGRAPHY AND ELEVATION

The topography of a particular area will determine the following factors:

- Flow of surface and groundwater;
- Depth of soils and the potential for soil erosion, dependent on the slope of the study area;
- Type of land use;
- Aesthetic appearance of the area and
- Climatic factors such as wind speeds and direction (which might be influenced by the topography of an area).

Changes in the topography caused by the mining activities could therefore alter all of the above-mentioned aspects of the environment. Project-related activities have the potential to alter the topography of the site through the establishment of both temporary and permanent infrastructure.

The topography of the KMF is predominately flat-lying at <1 100m elevation, with relatively low relief. The area is characterised by several vegetated northwest to southeast-trending red sand dunes, up to 10 m in height, up to 200 m wide and tens of kilometers in length. The regional drainage pattern is broadly northwards but water-flows in the streams are generally very rare.

6.3 GEOLOGY AND SOILS

The study area is underlain by the south-western part of the KMF. The manganese deposits are in the Hotazel Formation at the top of the Transvaal Supergroup. The stratigraphy (Figure 8 below) of the ore-bearing succession in the area consists of three manganese beds named the Upper (UMO), Middel (MMO) and Lower Manganese (LMO) Ore bodies. The LMO has been subdivided (Nel 1984) on the basis of mineralogical composition which is often manifested by visual mineralogical differences (Figure 7 below). The mineralised bodies are hosted by altered banded iron-formation (BIF) and jaspilites of the Hotazel Formation, which unconformably overlies the Ongeluk Lava. The deposits are overlain by younger, mainly dolomitic and chert-bearing lithologies of the Olifantshoek Group, which are in turn overlain by the Karoo-age Dwyka Group, represented by a succession of glacial diamictites deposited on an uneven paleosurface. Recent Kalahari Sand and other poorly consolidated sediments cover the entire sequence to approximately 70 m below surface (Mucina, 2006).

The area is characterised by Kalahari Bushveld, parallel red sand dunes, dry Savanna, sandy soils and a lack of water resources. The region forms the southern rim of the Great Kalahari Desert. The surface is characterised by Kalahari sands (to the depth of 80 m) and limestone outcrops (Figure 9 below). The water table is situated within the Kalahari sand layer beneath which there are rock pebbles and clay layer before intersecting the Dwyka. The topography of the area consists of the flat sand plains between the Korannaberg Mountains and Kuruman River. It is characterised by two sand dunes with one situated on the south east corner of the farm and another situated along the banks of the non-perennial Ga-Magara River, a tributary of the Kuruman River (Mucina, 2006).

The region soil is red sand which is freely drained due to its weak structure and limited amount of clay in the soil. The majority of the site is located within land type Af 28 with dunes composed of the soil forms Gaudam (Hu31) and Roodepoort (Hu30). The soil forms (Hu31 and Hu30) are fine to medium textured with low clay content of 1-2% and have a low fertility making them prone to drainage. Due to the poor soil type typical agricultural practices on the site and the neighbouring areas are limited to livestock farming and game ranching. The key elements are the target manganese reefs situated beneath the Dwyka. The surface is characterized by Kalahari sands (to the depth of 80 m) and calcrete outcrops. The water table is situated within the Kalahari sand layer beneath which there are rock pebbles and clay layer before intersecting the Dwyka (Mucina, 2006).

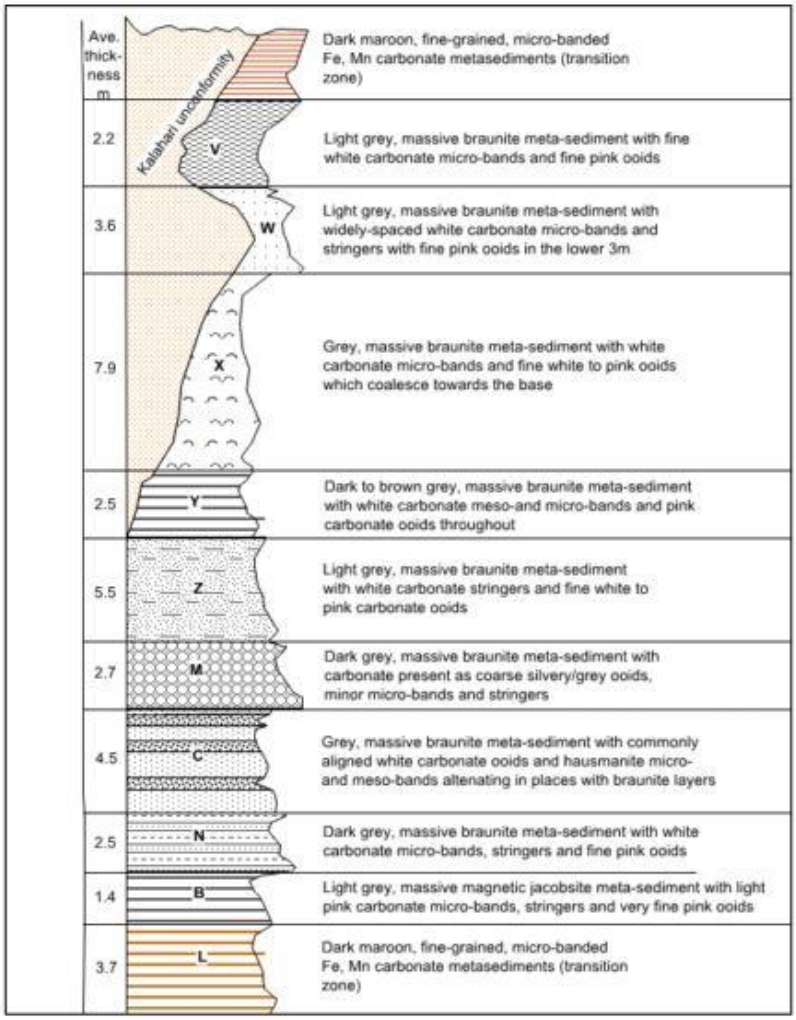


Figure 7: Lithostratigraphic sub division of the Mamatwan type LMO (Royal HaskoningDHV, 2013)

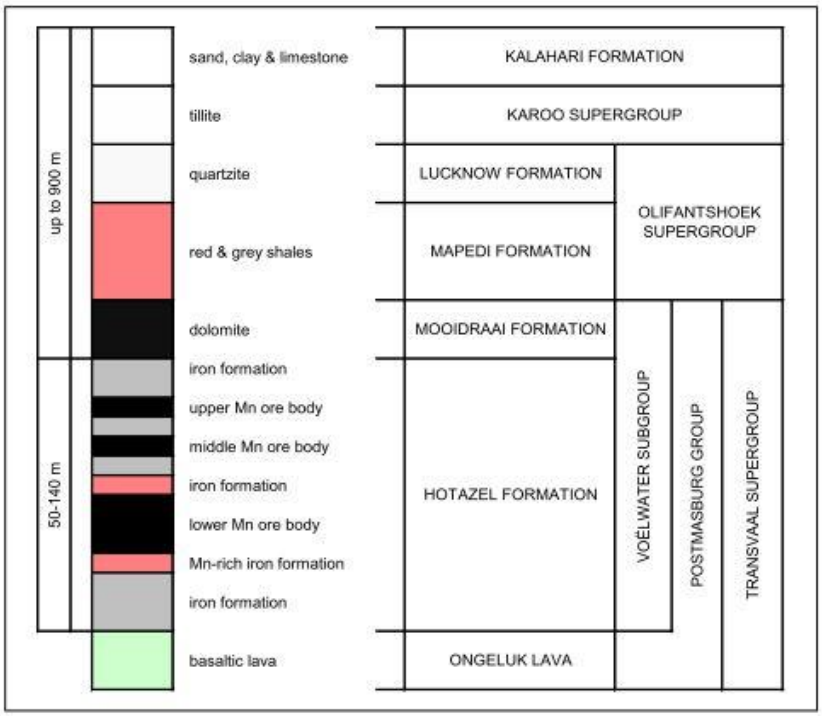


Figure 8: Stratigraphy of the Kalahari Manganese Field (Royal HaskoningDHV, 2013)

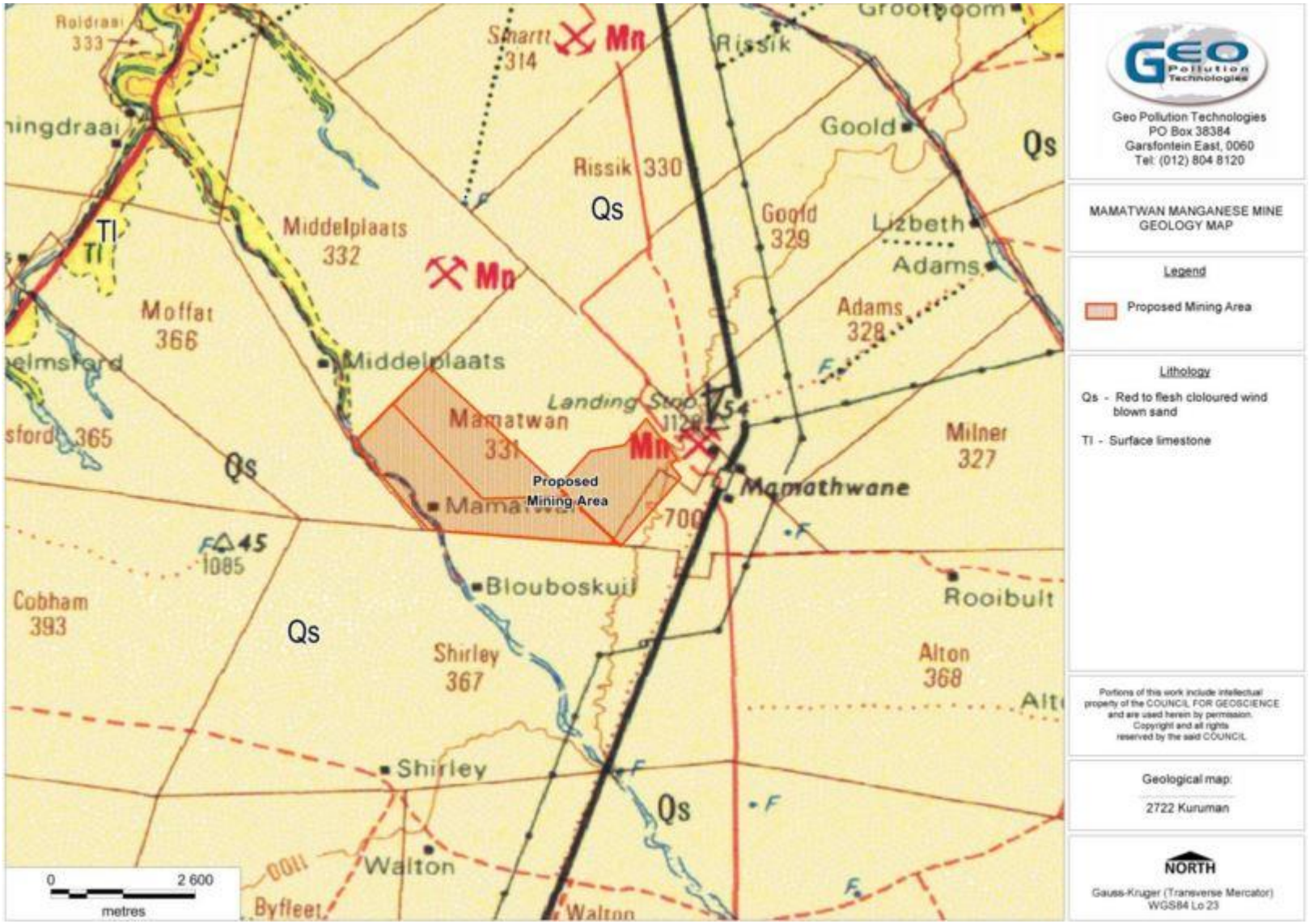


Figure 9: Geology Map of the proposed mining area

6.4 EXISTING LAND USE

In terms of the existing land use, the area is dominated by agricultural and mining activities. Agriculture and mining are the key economic activities in the municipal boundaries of the John Taolo Gaetsewe District Municipality. These major private sectors employ approximately:

- Mining (3 200 individuals)
- Agriculture (1 700 individuals)

The predominant agricultural activities comprise of cattle grazing as indicated in the land use map below. There are also game farms in the area.

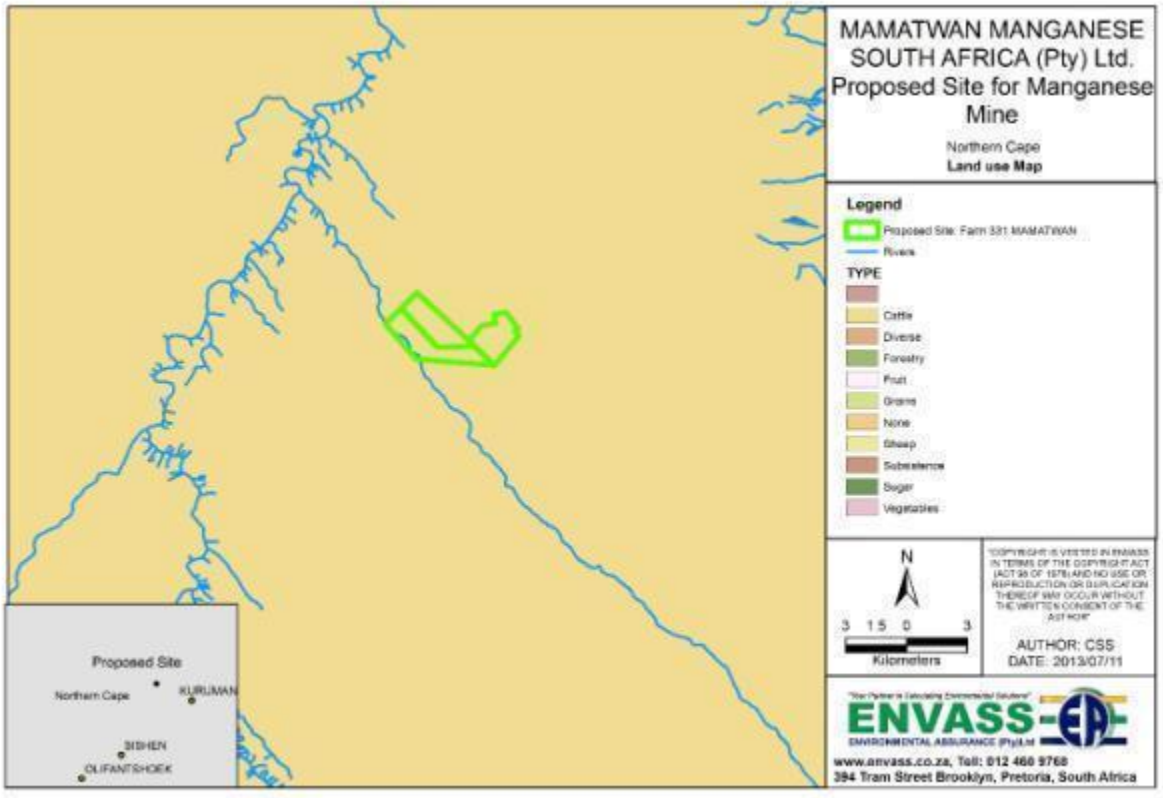


Figure 10: Northern Cape Land use Map

Extensive mining activities occur within the Joe Morelong and Gamagara areas which are connected to the Sishen-Saldanha route.

Current mining and exploration activities occurring within the surrounding area includes *inter alia*:

- Wessels Mine (underground operation);
- Tshipi Mine (opencast mining);
- Mamatwan Mine (opencast mining);
- UMK Mine (opencast mining) and
- Kudumane (opencast mining)

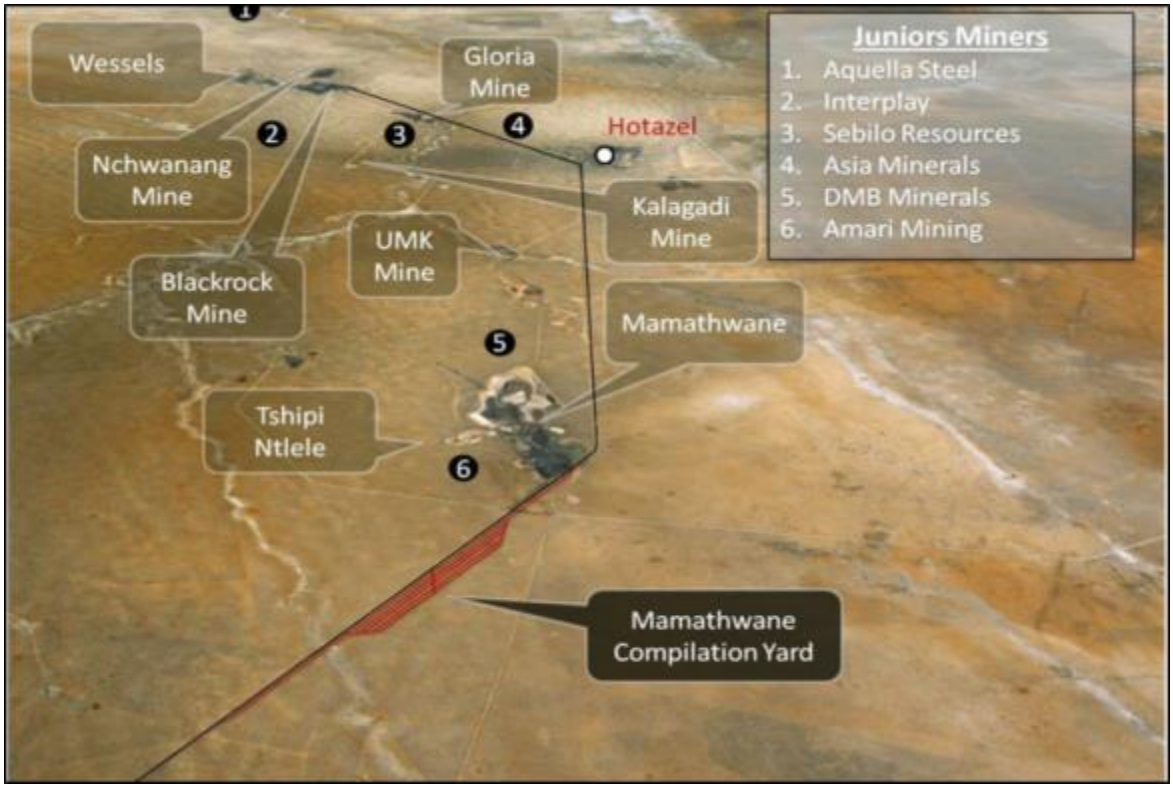


Figure 11: Surrounding mining activities (Carstens, 2013)

6.5 HYDROLOGY

According to the C-Plan Version 3 database, the site is located within the Lower Vaal: quaternary catchment D41K (*refer to Figure 12 below*), which in turn is located within the Orange Primary Catchment. No permanent surface water features such as dams or lakes are located within the boundaries of the study area. The episodic Vlermuisleegte drainage line runs to the west of the site (*refer to Figure 13 below*). The ephemeral Kuruman River runs approximately 30 km to the southeast of the site. A large catchment of approximately 13 780 km^2 feeds the Kuruman River, and consequently when the river is in flood, flows can become considerable. The Kuruman River is, however, considered ephemeral as the river only produces surface flows during periods of heavy precipitation. The Kuruman catchment is large but sparsely vegetated and features freely draining soils which indicates that minor rainfall events would infiltrate to groundwater as opposed to generating significant volumes of runoff.

Surface water resources include drainage lines and paths of preferential flow of stormwater runoff. Project-related activities have the potential to alter the drainage of surface water through the establishment of both temporary and permanent infrastructure and/or result in the contamination of the surface water resources through seepage and/or spillage of potentially polluting materials, non-mineralised waste (general and hazardous) and mineralised wastes.

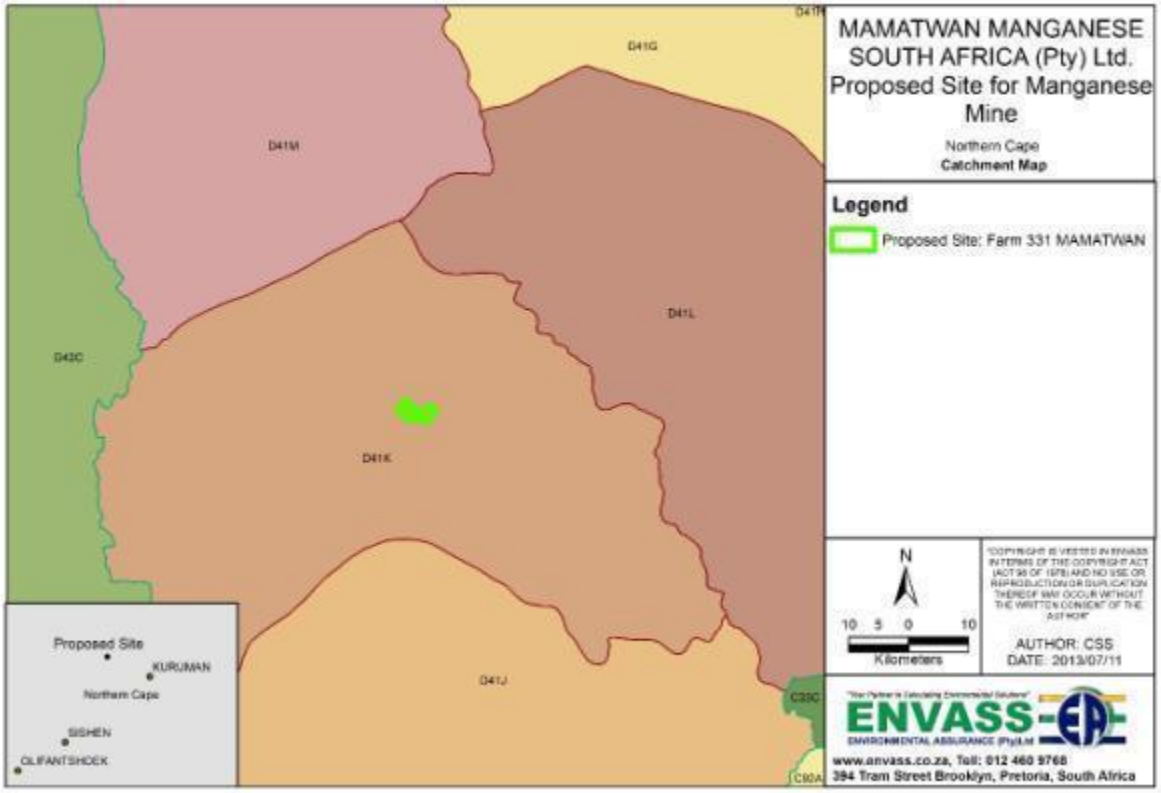


Figure 12: Water catchment areas

6.6 GEOHYDROLOGY

Groundwater is a valuable resource and is defined as water which is located beneath the ground surface in rock pore spaces and in the fractures of lithologic formations. As a baseline, this section provides a brief description of the pre-mining groundwater conditions to facilitate an understanding of the potential for dewatering cones of depression and pollution plumes to occur as a result of project-related activities.

Regional Geohydrology

It is likely that the geohydrological regime in the study area is made up of two aquifer systems; these being the unconsolidated Kalahari Formation (primary aquifer) and the underlying fractured bedrock (secondary aquifer).

The area is covered with Kalahari Formation sand to an average depth of about 90 m, with a clay layer residing at a depth of 50 m. While the sands could have a relatively reasonable hydraulic conductivity, the clay must be assumed to be relatively impermeable. The upper sand layer is a primary perched aquifer and occurs in the calcrete or on contact with the underlying Kalahari clay formation. This aquifer usually sustains the livestock and domestic water supply. The clay layer form an aquitard and where thick clay layers are developed in this aquifer, a recharge lag time to the underlying aquifer(s) often occurs.

Following this at depth is tillite, quartzite, shale, dolomite and several successions of banded iron stone and manganese ore bearing layers. This second, deeper secondary aquifer is associated with fractures, fissures

and joints and other discontinuities within the older hard rock geology of the Transvaal Supergroup and associated intrusives. Of all these lithologies, only the dolomite could potentially hold large volumes of water.

Theoretically, water entering the system will migrate vertically downwards, until a perched aquifer is encountered and the majority will continue to migrate downwards into the saturated one. From there it will migrate in the direction of the hydraulic gradient until it eventually enters surface water bodies (i.e. rivers or springs) from where it will flow out as surface water.

Local Hydrogeology:

As mentioned above the area is covered with Kalahari Formation sand to a depth of 90 m. Locally the Kalahari Formation sand in this area is present as two layers of 40 m thickness each, separated by a clay layer with a thickness of 5 to 15 m at a depth of about 50 m. The clay layer is considered as an aquitard on which groundwater can perch, and hydrogeologically separate the sand layer into two distinct aquifers.

At depth a secondary aquifer is present in the bedrock formations. These formations consist of non-conductive hard rock and hydraulic conductivity is solely dependent on secondary faults and fractures. The exception is the dolomite, but no evidence of significant dissolution cavities exist in the available exploration data.

The local effect of discontinuities, such as faults, fractures and intrusions was not taken into consideration as the exact location and characteristics of these structures are unknown. On a large enough scale the effect of these structures become less important and can be considered as part of the homogeneous aquifer.

Based on this the following assumptions were made regarding the local hydrogeology and the subsurface in the proposed mining area were envisaged to consist of the following four distinct hydrogeological layers:

- a 40 m upper unit of unconsolidated Kalahari sand;
- a 10 to 15 m impermeable clay layer;
- a 40 m poorly consolidated Kalahari sand layer; and
- the final unit consist of fractured bedrock.

6.7 BIODIVERSITY

Biodiversity forms one of the most crucial environmental considerations of a development and it is used to formulate decisions pertaining to activities with significant environmental impacts. The inclusion of biodiversity in decision making has been aimed to bridge a gap between economic development and land destruction, thus mitigating the environmental effects these developments may pose while still maintaining a functioning biodiversity. Therefore, as part of the EIA guidelines it is important to assess the potential impact of these proposed activities as they can impact directly or indirectly on the receiving environment. In general, biodiversity represents the variety of species within a specified ecosystem and can thus be used to assess the ecosystem health.

Flora

The porposed site falls within the Savanna Biome (Figure 13 below) which is characterised by Kalahari Bushveld vegetation and Khathu Bushveld vegetation unit. The vegetation unit is presented by scattered tall trees such as *Acacia erioloba* and a variety of sparse shrubs such as *Boscia albitrunca*, *A. heamoxtylon* and *A. mellifera* with variable gramnoid cover dominated by *Stipagrostis ciliate*. The proposed project area is significantly transformed; most portions and the adjacent areas are mainly used as livestock pasture. Note that protected trees, such as *Acacia erioloba*, *Acacia haematoxylon* and *Boscia albitrunca* are known to occur in the area. These trees are considered important and protected under the National Forests Act (Act No. 84 of 1998). An application for the removal of protected trees will be applied for.

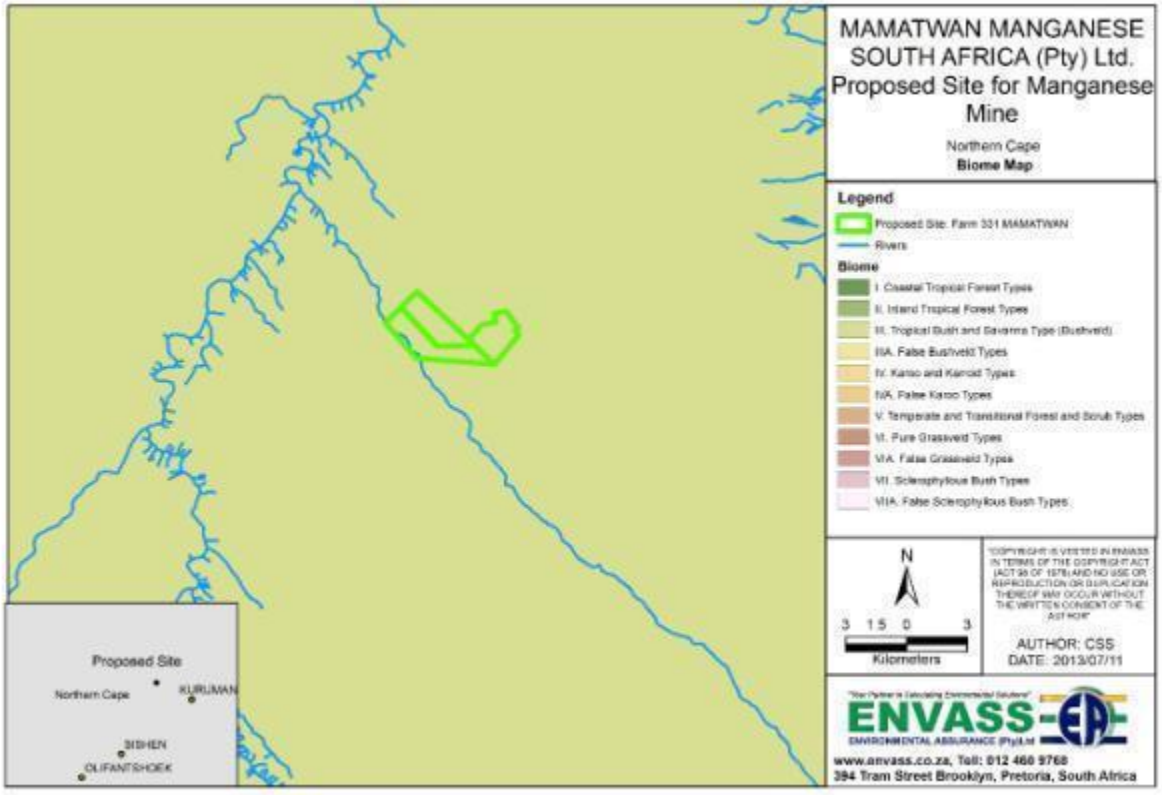


Figure 13: Biome Map

Table 6 below summarizes the vegetation types found in the Northern Cape province.

Table 6: Types of vegetation and the size of the province it occupies.

VEGETATION TYPE	SIZE IT OCCUPIES
Gordonia Duneveld	149 613.5 (13.99%)
Gordonia Plains Shrubland	62 287.4 (5.82%)
Kathu Bushveld	517 310.3 (48.37%)
Koranna-Langeberg Mountain Bushveld	6681.4 (0.62%)
Kuruman Mountain Bushveld	14 473.7 (1.35%)
Kuruman Thornveld	40 694.1 (3.81%)
Molopo Bushveld	201 283 (18.82%)
Olifansthoek Plains Thornveld	4 205.9 (0.39%)
Southern Kalahari Mekgacha	71 620.4 (6.7%)
Southern Kalahari Salt Pans	1 042.2 (0.1%)

Statistically, the most of the vegetation types of Northern Cape have been extensively degraded, however the degradation and transformation is often localized, thus making the province percentage of transformation low (about 4%). In terms of biodiversity the Northern Cape Province boasts a total of 4 864 of taxa of which 1 302 are only recorded to be endemic to the province with 23.5% of the country's flora occurring within the province making North Cape the province with the fourth highest percentage of floral occurrence. However, 295 of the taxa found within the province is threatened with 236 of the threaten taxa being endemic, listing NC as the province with third highest number of threaten flora. Only 739 of all the taxa within the province are of conservation concern of which 584 is endemic. This makes the Northern Cape the province with the second highest number of species or taxa of conservation concern (April, 2012).

Fauna

The study area is likely to have a low faunal carrying capacity due to its dry nature, which is characterised by Thorn Bushveld with poor grass cover and moderate shrub and tree development. Furthermore, the area in which the proposed activity falls, has been used for livestock farming which has an impact on the faunal species likely to occur on site. However, *Table 7 lists the faunal species likely to occur in the study area.*

Table 7: Faunal species that are likely to occur in the study area

Order	Species name	Common Name	Occurrence
Scincidae	Trachylepis spilogaster	Kalahari tree skink	Low
Agamidae	Agama aculeata	Common ground agama	Low
Elapidae	Naja nivea*	Cape Cobra	High likely
Colubridae	Pseudaspis cana	Mole snake	High
Viperidae	Bitis arientas	Puff adder	Likely
Colubridae	Dispholidus typus	Brown boomslang	Likely
Colubridae	Boadon capensis	Brown house snake	High
Pieridae	Colotis lais	Colotis butterfly	High
Cordylidae	Karusasaurus polyzonus	Karoo girdled lizard	Likely
Bovidaee	Sylvicarpa grimmia*	Common duiker	High
Pieridae	Colotis evenina*	Orange tip colotis	High
Testudinidae	Psammobates oculifer	Serrated tent tortoise	High
Colubridae	Psammophis brevirostris	Short snorted grass snake	Likely
Varanidae	Varanus albigularis	Rock monitor	Low
Boidae	Python natalensis	Rock python	High

6.8 HERITAGE RESOURCES

A number of archaeological sites / resource of significance are likely to be distributed across the study area. These will most likely include graves, homesteads and other resources of the Late Stone Age (LSA). Furthermore, it is important to note that since archaeological artefacts generally occur below surface, the possibility exists that culturally significant material and skeletal remains may be exposed during the development and construction phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist (See National Heritage and Resources Act, 25 of 1999 section 36 (6)).

A Heritage Impact Assessment will be undertaken as part of the EIA. This assessment determines the archaeological significances of all the identified resources as well as the possible impacts that the proposed development might have.

6.9 SOCIO-ECONOMIC BASELINE AND DEMOGRAPHICS

Reference is made to the Social and Labour Plan (Annexure 5) compiled by Dr. Martin Carstens for the baseline socio-economic information. The study area is located within the municipal boundaries of the John Taolo Gaetsewe (formerly Kgalagadi) District Municipality. The John Taolo Gaetsewe District municipality occupies a sizable 27 283km^2 (square kilometres) of the northern part of the Northern Cape Province. Employment opportunities are concentrated around Kuruman and the mines situated around Kathu, Hotazel and Black Rock.

The John Taolo Gaetsewe District Municipality comprises of three Local Municipalities:

Joe Morolong Local Municipality (previously Moshwaneng). The municipal area of the Joe Morolong has the following characteristics:

- Approximately 20 172 km^2 in size;
- Includes the settlements/towns of Hotazel, Santoy and Van Zylsrus;
- Includes approximately 152 residential areas;
- An approx. population 89 530 and about 23 707 households and
- A population growth of 0.90% per annum and an unemployment rate of 38.60%.

Gamagara Local Municipality which is located in Kathu which has the following characteristics:

- An area of 2 619 km^2;
- A Category B municipality located in Kathu with the Central Business District (CBD) located here;
- The other four towns within this municipal boundaries includes Sesheng (just outside Kathu), Dingleton, Dibeng and Olifantshoek and
- A population of approx. 41 617 (households: 10 808), with a population growth of 5.84% per annum and an unemployment rate of 17.70%.

Ga-segonyana Local Municipality located in Kuruman.

- A municipal area of 4,492 km^2;
- Category C municipality which was established in 2000 through the amalgamation of Kuruman and Mothibistad municipalities and includes sections of the Bophirima District municipality;
- Approx. 80% of the population reside in rural villages;
- The area is administered through a traditional authority system with two paramount chiefs and headmen;
- Towns/settlements are Bankhara-Bodulong and Mothibistad and
- A population of 93 651 (approximately 26 816 households) with a population growth of 2.85% per annum and an unemployment rate of 33.70%.

The proposed Mamatwan Manganese Mine will have a significant positive impact on the baseline socio-economic conditions of the local communities, since unemployment is a major problem within the districts. The mine will create several employment opportunities and preference will be given to the locally unemployed wherever possible. Employment should be sourced from the local community and the IPAP be implemented.

7. SERIVCE INFRASTRUCTURE (REGULATION 28 (1) (b))

7.1 ROADS

Existing access to the site and internal roads will have to be upgraded to support the additional traffic on the site. The internal haul roads proposed will be approximately 8m wide. The existing access road to the mine site is wide enough for access to the site. However, it is envisaged that approximately 3km of access road will need to be developed from the existing public road onto the mine site. An additional 2km (approximately) of roads will be required within the mine site.

7.2 ELECTRICITY

An estimated peak maximum demand of 4,7 MVA will be required. The bulk power supply will be provided by Eskom, at 11 kV, to the main surface substation from where it will be reticulated to the load centres. It is envisaged that the main reticulation voltage will be 11 kilo volt (kV) with LV reticulation being at 525 Volt (V) and 400 V. Eskom has been requested to provide an indicative cost for the bulk power supply as well as an indication of the availability of the required supply.

7.3 WATER SUPPLY

Very limited ground water inflow or surface run-off water is expected. Assuming that the inflow will only be enough to off-set losses to ventilation, air and entrapment in mined rock from underground, then the estimated make-up water requirement will be about 41,000 m³ per month for a 100 000 tpm mine. Bulk water supply from the existing 300mm Vaal Gamagarra Pipeline (which runs from the Vaal Gamagarra Scheme to Blackrock in the north) is envisaged. This pipeline runs adjacent to the proposed site at Mamatwan. Note that the capacity of this pipeline is currently fully allocated, but plans are being implemented to upgrade the line. Sedibeng Water (who manages the line) has been requested to add this project's requirements to their planning.

8. PROPOSED MINING DESIGN, METHODOLOGY AND INFRASTRUCTURE (REGULATION 28 (1) (i-ii))

Mining methods vary widely and depend on the location, type and size of mineral resources. Typical mine infrastructure includes haul roads; spoil dumps; surface and underground facilities (e.g. offices, workshops, car parks and warehouses); tailings and waste rock disposal areas; transport and service corridors (e.g. roads, pipelines, conveyers, power and water corridors); product stockpiles; chemicals and fuel storage and housing facilities (AEPA, 1996).

UNLESS OTHERWISE STATED, THE INFORMATION CONTAINED BELOW REGARDING THE MINING DESIGN, METHODOLOGY AND INFRASTRUCTURE PROPOSED FOR THE MAMATWAN MANGANESE MINE, HAS BEEN EXTRACTED DIRECTLY FROM THE LATEST CONCEPT ENGINEERING STUDY (ROYAL HASKONINGDHV, 2013 – Annexure 6).

8.1 MINING DESIGN AND METHODOLOGY

Table 8 below illustrates the mine design criteria applied in the latest concept study (Royal HaskoningDHV, 2013).

Table 8: Mine design criteria

Key Design Criteria	Values
Production	100,000 tpm
Primary access	Trackless Twin Decline,
Secondary access	On reef decline
Rock Hoisting	Truck
Men and Material movement	Trackless Decline
Stoping method	Room and Pillar
Shift system	5 day week
Labour	Gate wage
Service water tonnes per tonne of rock	1 for stoping, 0.6 for development
Ventilation (allowance for methane)	6 m³/sec/kiloton/month
Support	2 m Full column resin bolts at 2.5 m² per bolt
Dilution	0% (ore body is thicker than the mining cut)

The current mining method adopted for the proposed project is room and pillar; the standard method utilised throughout the KMF where underground mining is required. The room and pillar method adopted is based on mining the rooms and splits to spans of 7 m in 2 cuts, a 5 m high top cut and 6 m high bench. The pillars are sized at 8 m x 8 m to cater for the overall mining height of 11 m.

The mining operation will be divided into 9 room sections covering a total section extent of 127 m; which caters for two main design requirements:

- The geotechnical requirement for 20 m wide regional pillars at a maximum spacing of 135 m and
- The 9 room section optimises the utilisation of the equipment suite for the blast hole drilling, support, rock handling and peripheral activities in the section. Previous experience at the neighbouring Middelplaats Manganese operation averaged 3 blasts per day per section.

It is proposed to mine a 5 m high top cut followed by benching the 6 m to the final 11 m height. It is intended to employ horizontal drilling on the benches to standardise the drilling equipment. Each blast in the top cuts and benches are expected to produce 530 t and 604 t respectively from face advances of 4.2 m from 4.6 m blast holes. The Mamatwan manganese ore body is ideally suited to utilising top of the range drilling and rock handling equipment. This will allow the production of 100 000 tonnes per month from 4 suites of equipment in 2 top cuts and 1 bench section with the 4th suite used in advancing the ramp access and providing back up for the other suites. It is planned to blast 3 faces per day on 21 days (5 day week) per month to produce 32 000 tonnes and 36 000 tonnes per top cut and bench section respectively.

8.1.1 Life of Mine Schedule (Primary and Secondary Access)

Primary: A single boxcut to access both declines will be established and will take approximately three months to establish. The two declines (6 m by 6 m in section) will be developed through the over burden and will take. This will take approximately 17 months, at an average advance rate of 40 m per month to access the ore body. A maximum advance rate of 80 m per month through good ground conditions is anticipated whilst a minimum advance rate of 20 m per month through the poor ground conditions (clay) has been factored into the development schedule. It is assumed that the necessary surface infrastructure will be established in conjunction with the sinking of the declines. This includes a blind sink ventilation shaft which will be required for mine ventilation requirements.

Secondary: On completion of the two declines through the waste material, the on-reef development access will begin in month 21 with the concurrent development of two ore declines and two ledging drives, one on either side of the ore declines. All four development ends will be 5 m in width and 5.3 m in height. It is assumed that these ends will advance together at 40 m per month. The processing plant will take approximately 12 months to construct. This construction will take place in parallel with the build-up of ore production. The processing plant will be completed prior to the mining operation achieving its full production rate.

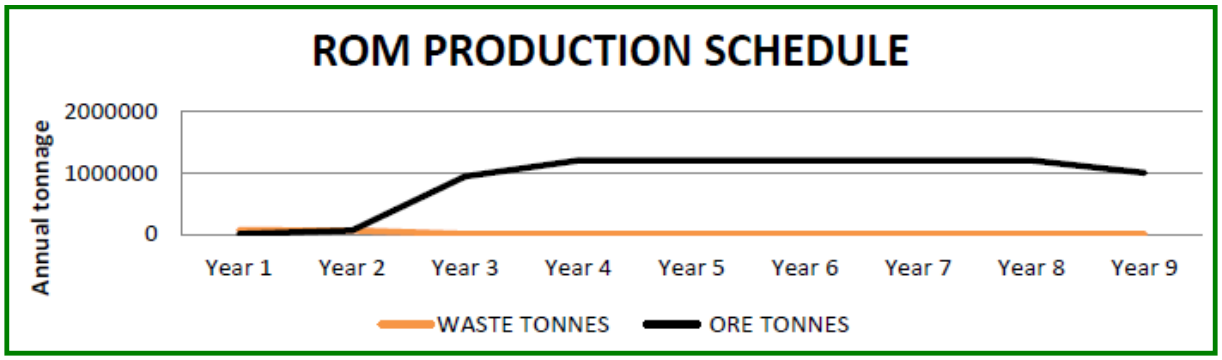


Figure 14: Rom Production Schedule

8.1.2 Production build-up

At the 40 m per month development rate, the reef access declines and ledging development will open up the first production section in approximately four months. The subsequent two ore production sections will be available to produce by production month ten. The combination of three sections and the reef access development will produce 100 000 tonnes per month. In summary , it will take 20 months to develop declines through the waste material underground to get to the manganese reef, and a further 10 months to get up to full production of 100 000 tonnes per month (see Figure 15 above).

8.1.3 Ventilation

Adequate ventilation systems will be installed. This system will be in line with the legal requirements of the Mine Health and Safety Act and Regulations. The purpose of ventilation is to provide fresh air for human respiration and to dilute and remove pollutants. In the case of shallower mechanised mines, the principal pollutants are diesel exhaust gases, heat in the proximity of diesel machines and dust generated from mining and transportation operations. Another pollutant that must be addressed is flammable gas.

During the design of the ventilation system due regard will be given to practicality, the safety of the workforce and equipment against pollutants, heat, the effects of a fire and to provide an acceptably short re-entry interval after blasting. A full Ventsim computer simulation model of the mine would be constructed to determine accurate airflows, cross over sizes and accurate fan operating points. The ventilation system is designed to cater for the following:

- Initial development of the surface declines;
- Production rate of 100 000 tonnes per month based upon the active diesel powered fleet; and
- Leakage allowance appropriate for Room and Pillar mining.

8.2 UNDERGROUND INFRASTRUCTURE

8.2.1 Primary access

The primary access is via a twin ramp system that is established from the highwall of a single, open, boxcut excavation. The ramp is inclined at 9.5 degrees and the portal position is approximately 20 metres below surface. The time to excavate and construct the boxcut is estimated to be 6 months and the total length of the ramp is approximately 680 metres. A conventional sink and line, 6 metre diameter, ventilation shaft has been provided for and which is planned to be constructed as a concurrent activity while the ramp system is developed. The depth of this shaft will approximately be 107 metres, with some 500 metres of off shaft development being carried out to reach the settler and dams positions and the main mining level breakaway position.

8.2.2 Logistics

All men, material and rock transport will be handled via the twin ramp system. The twin ramp system will be equipped with the appropriate electrical and water handling and pumping services. The dirty water pumping facility is based on the use of relay pump stations which are constructed as the ramp system is developed. Vehicle passing bays and truck loading bays have also been provided to expedite the overall development and to ensure that the truck hoisting capability is achieved by preventing congestion in the decline.

8.2.3 Service water

Mining service water is to be fed from a reservoir on surface, situated adjacent to the portal, and will be piped to the various working faces in a 150 NB steel column, fitted with pressure reducers where required. Spent service water, together with ground water inflow will be picked up from the footwalls with submersible pumps, which will pump it to a nearby sump equipped with a vertical spindle pump, which in turn will deliver this dirty water to a main pump station. Four main pump stations are proposed throughout the life of the mine. Two settling ponds will be excavated on surface, so that duties can be alternated between them, to facilitate regular cleaning out of mud. Clarified water will be pumped back into the service water reservoir. Any excess of water from underground, will be pumped to the process plant for make-up there. Should there however be a short fall, it would have to be made up from an external source such as the Vaal Gamagarra Water Scheme.

8.2.4 Potable water

Potable water lines will be installed from the reservoir on surface to the portal, and also to the underground area. There will be a main potable water column in the decline with branches and small diameter gate valves / tee pieces at regular intervals to provide drinking water and fire protection, and to each refuge bay.

8.2.5 Underground workshops

Underground service workshops will be established for the daily servicing, maintenance and repairs of LHD's, drill rigs and roof bolters. There will also be a store and hydraulic service tyre storage areas. A wash bay and oil trap will also be installed.

8.2.6 Electrical reticulation

The underground electrical reticulation will be supplied from the main substation which is located on surface; the reticulation will be at 11 kV and will be supplied via cabling. Underground load points will be equipped with mini-substation units (MSU) suitably sized to cater for the specified electrical loads. The LV reticulation will be performed at 525 V and 400 V via motor control centres (MCC), gulley boxes and small power distribution boards.

8.3 PROCESS PLANT AND TAILINGS

The ore to be processed is from the Lower Manganese Ore body (LMO). The Upper and Middle Manganese Ore bodies in the lease area are not sufficiently mineralized to be considered for exploration. The sub-divisions of the LMO are divided into Z, M, C and N zones. Ore to be obtained from the into Z, M, C and N zones are considered to be of sufficient manganese grade to be direct shipping ore, without any upgrading being required.

Low phosphorus lump manganese ore will be stockpiled for sale to the market or it will be fed into a sinter plant. The generally required product is a lump with the size range of -75+6mm. The fraction finer than 6mm is generally screened at 1mm, with the -1 mm being discarded to a tailings dam and the -6+1 mm being stockpiled either for sale or as feed to a sinter plant.

A beneficiation plant is not required at this stage as the ROM will be of a sufficient manganese grade to be direct shipping ore. A crushing and screening plant will be required to produce the -75+6mm product. The screening plant could either make use of wet screening or dry screening. It is however a Transnet requirement that ore transported by rail should be wet screened, since wet screened material contains less fine materials than dry screened products. The dust impacts associated with a dry screening plant is also significantly higher.

Run-of-Mine ore will be delivered from underground and either fed directly onto the grizzly feeder ahead of the primary jaw crusher, or dumped onto the ROM stockpile ahead of the jaw crusher. During the times that ROM ore is not available from underground, ore can be reclaimed from the crusher stockpile with a front-end-loader and fed to the jaw crusher. Grizzly feeder oversize will be crushed by the jaw crusher. The grizzly feeder undersize will join the product from the jaw crusher and will be conveyed onto the secondary ore stockpile. This stockpile will have a live capacity equivalent to 12 hours of secondary crushing plant throughput, to take account of routine maintenance periods on the jaw crusher.

Ore will be withdrawn from the secondary crusher feed stockpile via vibrating feeders onto a conveyor and fed to the secondary screen feed bin. Ore will be withdrawn from the bin with a vibrating feeder and fed to a grizzly screen with a cut-point of 75 mm. Screen undersize will be conveyed to the product sizing screen feed bin and the oversize to the secondary crusher feed bin. Ore will be withdrawn from the secondary crusher feed bin with a vibrating feeder and fed to the secondary crusher. Secondary crusher product will be returned to the secondary screen feed bin.

Ore with a nominal top size of 75 mm will be withdrawn from the product sizing screen feed bin and fed to the product sizing screen. This double-deck screen has decks cutting at 6 mm and 1.5 mm. The screen will be operated as a washing screen to remove adhering fines from the product particles. The top-deck product will be the lump product, with a size range of -75 + 6 mm. The bottom deck oversize will be -6 + 1.5 mm and will be conveyed to the fines stockpile for either future sale or as possible sinter plant feed. Fines would be reclaimed from the fines stockpile with a front-end loader and loaded into road trucks for shipment.

The lump product will be conveyed to the lump product stockpile. Lump product will be withdrawn from this stockpile with vibrating feeders and fed to the rail load-out bin. Product from the load-out bin discharges into rail trucks underneath the bin. Should the lump product stockpile reach its maximum capacity, lump can be moved out to the side of the stockpile with a front-end loader. This material would then be reclaimed with a front-end loader and fed back onto the load-out bin feed conveyor as and when required.

The bottom screen deck undersize (- 1.5 mm) is tailings. This stream will be cycloned in a dewatering cyclone, to ensure that coarse material does not enter the thickener. The cyclone overflow will gravitate to a high density thickener. It will be necessary to add flocculent to the thickener feed to assist in settling of the slimes particles.

Thickener overflow will be returned to the plant water tank. The thickener underflow will join the cyclone underflow and be pumped to the tailings dam. The cyclone underflow could alternatively be deposited onto the fines stockpile, depending upon its manganese content.

It is not expected that any water will be recovered from the tailings dam penstock, except possibly during an exceptionally heavy rainstorm. Any penstock water recovered will pass to the return water dam and be pumped to the plant water tank at the beneficiation plant.

The proposed flow sheet is shown in Figure 16 below.

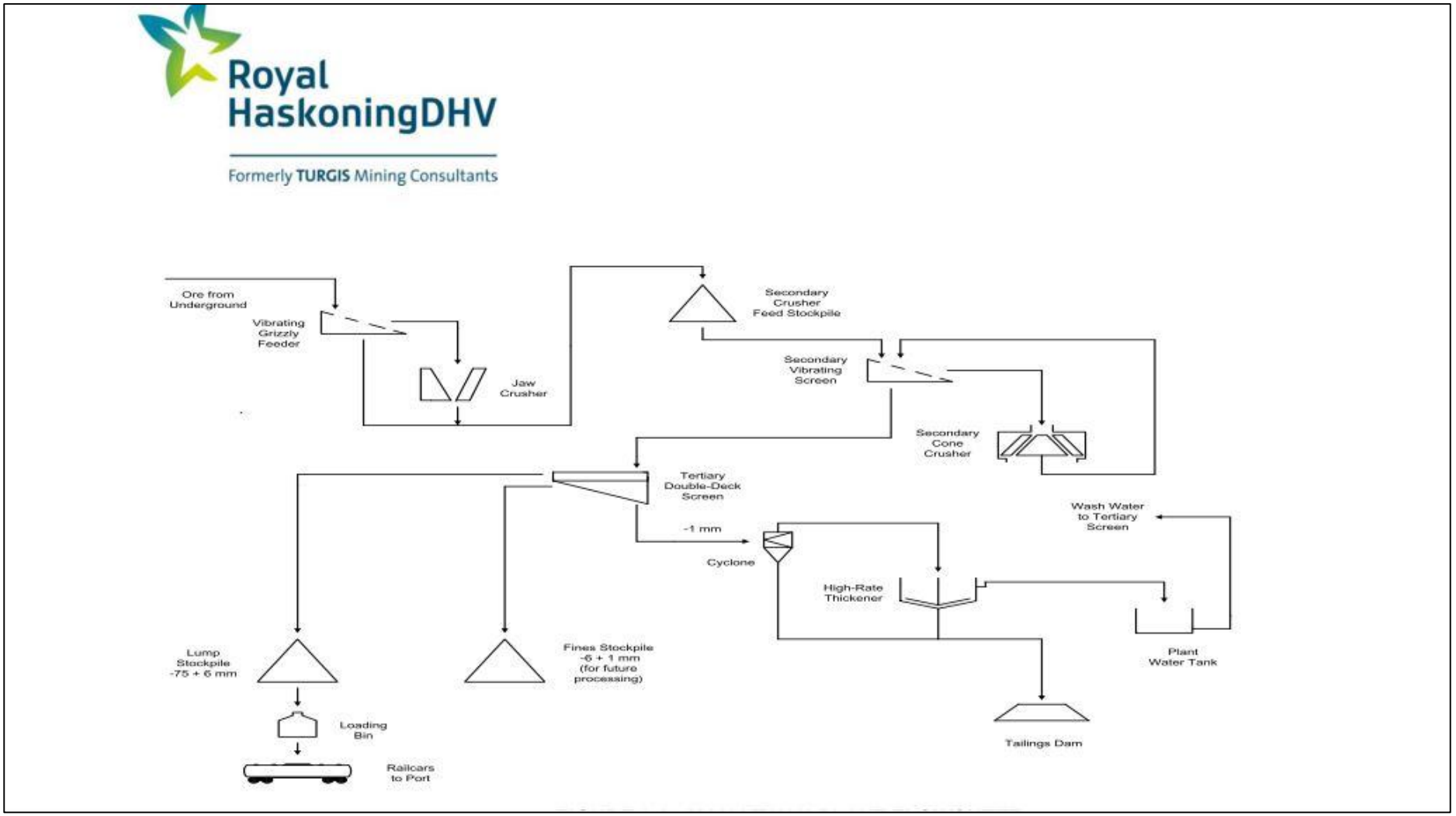


Figure 15: Proposed Flow Sheet

The plant is required to produce 1,000,000 tonnes per annum of lump product. The screening plant will also produce a -6+1 mm fines product and a -1 mm slimes fraction. Based on operating data from other plants the percentage of fines produced is expected to be between 14 and 21% of the ROM feed, with the higher numbers coming from an open pit operation in which the ore contains a significant quantity of clay minerals. A figure of 16% -6 mm material after crushing has been assumed. The ROM plant feed will therefore be 1,000,000 / (1 – 0.16) = 1,200,000 tonnes per annum. The slimes fraction reporting to the tailings dam will comprise 4% of the ROM feed and the fines fraction 12%. The water consumption in the plant will be minimal, apart from the water required for wet screening. It is expected that the slimes fraction of the ore will comprise 4 % of the ROM plant feed. Based on a ROM plant feed rate of 1,200,000 mtpa, the tailings dam capacity will be required to be 48,000 tonnes per annum. It has been assumed that due to the low quantity of water associated with the tailings that is pumped to the tailings dam, that no water will be recovered from the tailings dam, except after heavy rainstorms. A lining underneath the tailings dam is still required.

8.4 SURFACE INFRASTRUCTURE

8.4.1 Bulk supplies – Power

An estimated peak maximum demand of 4, 7 MVA has been calculated for the project. The bulk power supply will be provided by Eskom, at 11 kV, to the main surface substation from where it will be reticulated to the load centres. It is envisaged that the main reticulation voltage will be 11 kV with LV reticulation being at 525 V and 400 V. Eskom has been requested to provide an indicative cost for the bulk power supply as well as an indication of the availability of the required supply.

8.4.2 Bulk supplies – Water

Based on the experience of other mines in the vicinity, very limited ground water inflow or surface run-off water is expected. Assuming that the inflow will only be enough to off-set losses to ventilation, air and entrapment in mined rock from underground, then the estimated make-up water requirement will be about 41,000 m³ per month for a 100 000 tpm mine. The breakdown of make-up water required for the mine is summarised in Table 9 below.

Table 9: Breakdown of make-up water required for the mine

TABLE 10.2 - MAKE UP WATER REQUIRED			
Total make-up water required			
ROM		tpm	100,000
Water in tailings		m³/month	4,000
Water in lump product	6%	m³/month	5,040
Water in fines product	8%	m³/month	960
Water in air,mud, rock u/g	17%	m³/month	17,000
Potable water		m³/month	1,400
Other	10%	m³/month	12,840
Total make-up water required		m³/month	41,240
Days per month			26
Hours per day			22
Flow rate	m³/h		72
Flow rate	l/s		20

8.4.3 Surface infrastructure

Surface infrastructure proposed would comprise of the design and construction of all building structures, related earthworks and building services, electrical and mechanical and HVAC installations. This would include *inter alia*:

- Site clearing and storm water berms and trenches;
- Administration building and first aid;
- Change house and laundry;
- Lamp room, self-rescuer and proto room;
- Access control and security centre;
- TMM Maintenance workshop, services, lubrication, bays;
- Wash bay and oil skimmer;
- Bulk fuel storage area;
- Refuelling bay;
- Tyre storage, repair and pump area;
- LVD workshop;
- Fitting, electrical and boiler making workshop;
- Main stores and yard;
- Salvage yard;
- Fire and ambulance parking;
- External parking, shade ports and walkways;
- Electrical, water and sewage reticulation;
- Sewage treatment plant;
- Terraces, pavements, access, internal and haul roads;
- Perimeter and internal fencing; and
- Explosives off-loading, storage and distribution.

8.5 PRODUCT LOGISTICS

8.5.1 Rail facilities and operations

Trade off logistical alternatives have not been considered to date. It is assumed that the proposed Mamatwan mine will have its own dedicated rail siding for the purposes of loading manganese ore to transport to port for export. The rail option considered consists of a line that takes off the Middelplaats siding which is currently connected to the existing 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. A shunting locomotive will also not be required. The length of the rail loop will be approximately 9.7 km. A typical layout of the rail siding is indicated in Figure 16 below. Loading of a 104 truck train, carrying 6,650 tonnes of ore, will be done in less than 3 hours. The Transnet locomotives will move the train at creep speed (0.35 m/sec) through the loading station. Provision is made that the train can stop twice during the loading process for the load out silo to be re-filled. This loading procedure will reduce the loadable

capacity of the silo to 2,000 tonnes and the capacity of the conveyor from the re-claiming system of the stockpile to the silo to 2,000 tonnes per hour. The train and locomotives will not be separated during the loading process which eliminates the necessity of brake tests of the loaded train. Approximately one train will be loaded every second day at full steady state production.

Figure 16: Layout of rail way siding proposed for the site.

8.5.2 Rapid loading station

The rapid loading station consists of a feed conveyor from the product stockpile which feeds product into the silo, which in turn can load both train and road trucks. The silo capacity is 2,000 tonnes of manganese product. The silo discharges product into a loading flask designed to load rail trucks with a capacity of 63 tonnes each. The rapid loading station proposed will be able to load a train of 104 trucks in less than 3 hours. Alternatively 30 tonne road trucks can be loaded via a radial door controlled chute from the bottom of the silo. Since this operation is manually controlled, the loading rate will obviously be a lot slower.

The discharging of the ore from the loading flask to the rail/road truck will be performed either automatically with sensors detecting the presence of the rail/road truck, or manually via the MMI screen.

A PLC control system will be installed at the loading point to provide monitoring and control of the loading. Silo level detection will be installed to prevent overfilling and emptying of the silo. Two loading flasks complete with load cells will be installed to accurately weigh and dispense the correct mass of product into the carriages and trucks. One flask will be for the train loading and the other will be for the truck loading. The desired load per carriage or truck will be controlled with the PLC via a user inputted value on the MMI. The control system will operate the loading and unloading of the load flask.

9. ALTERNATIVES (REGULATION 28 (1) (j))

9.1 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 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).

9.2 Feasible alternatives

Table 10: Alternative analysis

TYPE OF ALTERNATIVE: **Location**	**ALTERNATIVE EXPLANATION:** ***Develop on an alternative property*** ***Develop on alternative sites on the same property/properties***
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: **Activity**	**ALTERNATIVE EXPLANATION:** ***Develop an alternative activity ex. Incineration of waste vs. landfill disposal, abstraction of water vs. re-use/recycling of water.***
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:** ***Adapt architectural and/or engineering designs.***
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.	
TYPE OF ALTERNATIVE: **Layout**	**ALTERNATIVE EXPLANATION:** ***Adapt spatial configurations of an activity on any particular site ex. Locate manure dams away from water resources.***
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.	
TYPE OF ALTERNATIVE: **Technological**	**ALTERNATIVE EXPLANATION:** ***Adapt methods or processes that can be implemented to achieve the same goal ex. Introduction of bacteria rather than chemicals to waste water.***
Recycling: The mine will in its operational phase implement recycling policies and measures for optimal utilisation of resources and minimisation of waste generation. ***Water:*** Water utilisation will be maximised through internal recycling of dirty water within the process operations. ***Energy:*** Fuel types for the sinter plant will be investigated.	

TYPE OF ALTERNATIVE: Demand	ALTERNATIVE EXPLANATION: ***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.***
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.	
TYPE OF ALTERNATIVE: Input	**ALTERNATIVE EXPLANATION:** ***Implement different input materials and/or sources ex. Utilisation of woodchips for fuelling boilers rather than electricity.***
No input alternatives were investigated since it is not applicable to this development.	
TYPE OF ALTERNATIVE: Routing	**ALTERNATIVE EXPLANATION:** ***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.***
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:** ***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.***
This alternative is not applicable to the proposed development.	
TYPE OF ALTERNATIVE: Scale	**ALTERNATIVE EXPLANATION:** ***Adapt the scale of an activity ex. 15 vs. 35 housing units, 12m^2 vs. 0.5km^2. P.S. Scale and magnitude is inter related.***
At this stage, no alternatives in terms of scale will be investigated.	
TYPE OF ALTERNATIVE: Magnitude	**ALTERNATIVE EXPLANATION:** ***Adapt the magnitude which is directly related to the extent of an activity. 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.***
At this stage, no alternatives in terms of magnitude will be investigated.	
TYPE OF ALTERNATIVE: No-Go	**ALTERNATIVE EXPLANATION:** ***The option of not undertaking and implementing the activity at all.***
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.	

10. ENVIRONMENTAL IMPACT ASSESSMENT PROCESS (REGULATION 28 (1) (n))

10.1 APPROACH TO EIA

An 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 NEMA (as amended) and the NEMA EIA Regulations (2010) of the DEA. The guiding principles of an EIA are listed below.

10.2 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 Applicant. 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. An EIA process comprises of 4 phases, which are set out and described in Figure 18 below. Each phase consists of its own objectives and timeframes as set out in the NEMA *(refer to Figure 19: General EIA process flow diagram).*

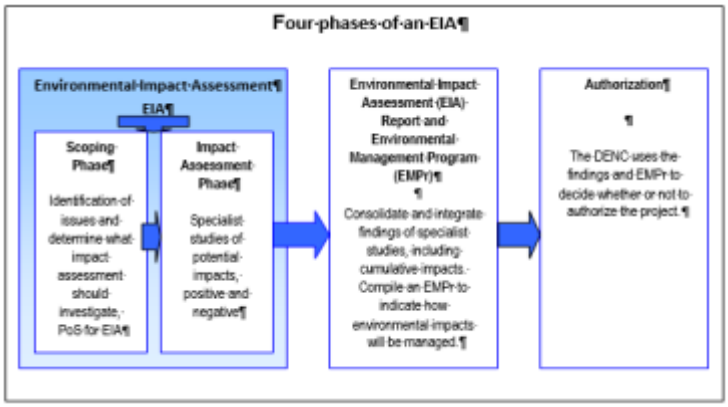


Figure 17: The four project specific phases of an EIA

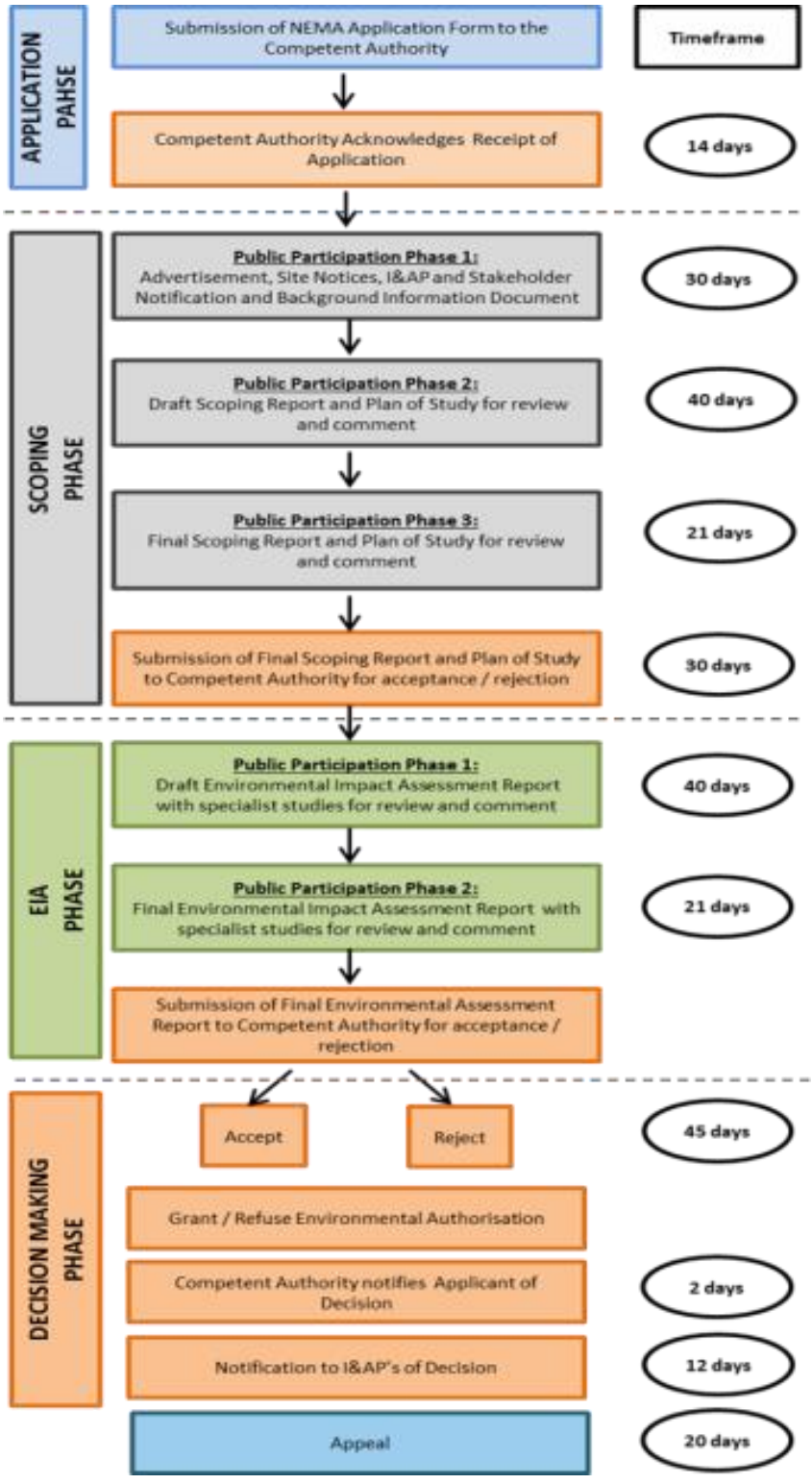


Figure 18: General EIA process flow diagram

10.3 CONSULTATION WITH AUTHORITIES

The NEMA application for environmental authorisation was submitted to the NC DENC on 23 July 2013. The department acknowledged the application with a formal letter in which the project was rewarded with NC/EIA/10/JTG/GA/MAM/2013 as the NC DENC project reference number. The Draft Scoping Report was submitted to the NC DENC on 21 January 2014 and the department acknowledged and accepted the Draft Scoping Report with a formal letter.

10.4 INFORMATION GATHERING

Early in the EIA process, the Environmental Assessment Practitioner (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 and specialist studies. The project team then visited the site to gain an understanding of the proposed project.

11. PUBLIC PARTICIPATION PROCESS (REGULATION 28 (1) (h; k- n); 54-57))

11.1 INTRODUCTION

Guideline 7 on "Public Participation in the Environmental Impact Assessment Process", published by Department of Environmental Affairs (DEA) in October 2012, states that public participation is one of the most important aspects of the environmental authorisation process. This stems from the requirement that people have a right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective public participation also facilitates informed decision-making by the Competent Authority and may result in better decisions as the views of all parties are considered.

The benefits of public participation include the following:

- Provides an opportunity for I&APs, EAPs and the competent authority (CA) to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;
- Provides I&APs with an opportunity to voice their support, concerns and questions regarding the project, application or decision;
- Provides I&APs with the opportunity of suggesting ways of reducing or mitigating negative impacts of an activity and for enhancing positive impacts;
- Enables the applicant to incorporate the needs, preferences and values of affected parties into the application;
- Provides opportunities for clearing up misunderstandings about technical issues, resolving disputes and reconciling conflicting interests;
- It is an important aspect of securing transparency and accountability in decision-making and
- Contributes toward maintaining a healthy, vibrant democracy.

All PPP undertaken is in accordance with the requirements of the EIA Regulations (2010) *[Refer to the Public Participation Report as per Annexure 3].*

11.2 PUBLIC PARTICIPATION ACTIVITIES TAKEN TO DATE

The following PPP tasks were conducted to date for the proposed Mamatwan Manganese mine:

- Identification of key Interested and Affected Parties (affected and adjacent landowners) and other stakeholders (organs of state and other parties);
- Formal notification of the application to key I&APs (all adjacent landowners) and other stakeholders;
- Consultation and correspondence with I&APs and Stakeholders and the addressing of their comments and
- Release of the Draft Scoping Report to I&APs and stakeholders for review and comment.

11.3 I&AP AND STAKEHOLDER IDENTIFICATION, REGISTRATION

Public Participation is the involvement of all parties who are either potentially I&AP by the proposed development. The principle objective of public participation is to inform and enrich decision-making. This is also its key role in this EIA process.

Interested and Affected parties representing the following sectors of society have been identified:

- National, provincial and local government;
- Agriculture, including local landowners;
- Community Based Organisations;
- Non-Governmental Organisations;
- Water bodies;
- Industry and mining;
- Historically disadvantaged groups, including women, youth and the disabled;
- Research; and
- Other stakeholders.

Key stakeholders, who included the abovementioned sectors, were directly informed of the proposed development by mail, e-mail and fax on 30 July 2013. *[Refer to the Public Participation Report as per Annexure 3].*

11.4 FORMAL NOTIFICATION OF THE APPLICATION

The project was announced as follows:

Newspaper advertisement

A newspaper advert was published in English and Afrikaans in the local newspaper (Kalahari Bulletin) on 02 August 2013.

Site notice placement

In order to inform surrounding communities and adjacent landowners of the proposed development, 6 site notices were erected on site and at visible and accessible locations close to the site. *[Refer to the Public Participation Report as per Annexure 3].*

Written notification

I&APs and other key stakeholders, who included the abovementioned sectors, were directly informed of the proposed development by mail and e-mail on Wednesday 30 July 2013.

The Background information document (BID) as well as the Registration and Comment sheets were supplied to all parties for 30 days (30 July – 05 September) wherein I&APs were given the opportunity to comment and / or raise issues of concern regarding the proposed development. *[Refer to the Public Participation Report as per Annexure 3].*

11.5 CONSULTATION AND CORRESPONDENCE WITH INTERESTED AND AFFECTED PARTIES

Interested and Affected Parties had the opportunity to raise issues either in writing, by telephone, fax and/or email. **A Public Meeting / Open Day is planned to take place in after completion of the Scoping Phase. It is anticipated that this meeting will take place in April 2014.** *[Refer to the Public Participation Report as per Annexure 3].*

11.6 RELEASE OF THE DRAFT SCOPING REPORT

The Draft Scoping Report (DSR) and Plan of Study (POS) were released for public review and comment for 40 calendar days (20 December 2013 to 21 February 2014). Additional days were attended to the commenting period in order to compensate for the December festive period and public holidays. Hardcopies of the DSR were submitted to all Organs of State and relevant authorities. In addition copies were placed at the Ga-Segonyana Public library (OASIS) (C/o Voortrekker and Skool Streets, Kuruman) and on the ENVASS website (www.envass.co.za).

11.7 RELEASE OF THE FINAL SCOPING REPORT

The Final Scoping Report (FSR) and Plan of Study (POS) were released for public review and comment for 21 calendar days (7 April 2014 to 8 May 2014). Additional days were attended to the commenting period in order to compensate for the school holiday and public holidays. Hardcopies of the FSR were submitted to all Organs of State and relevant authorities. In addition copies will be placed at the Ge-Segonyana Public library (OASIS) (C/o Voortrekker and Skool Streets, Kuruman) and on the ENVASS website (www.envass.co.za).

11.8 NEXT PHASES OF THE PUBLIC PARTICIPATION PROCESS

All stakeholders and registered I&APs will have the opportunity to review and comment on all the documents released in the Draft EIA and Final EIA phases respectively. The draft EIA will be released for 40 calendar days and the final EIA will be released for a period of 21 days for review and comment. During all the PPP phases, hardcopies and CDs of all reports and supporting documents will be submitted to the organs of state and relevant authorities. All the reports will be placed at the Public library (Voortrekker and Skool Streets, Kuruman) and will be available for download from the ENVASS website (www.envass.co.za).

12. ENVIRONMENTAL IMPACTS (REGULATION 28 (1) (g))

12.1 POTENTIAL ENVIRONMENTAL IMPACTS IDENTIFIED

Potential impacts resulting from the proposed manganese mine were identified using input from the following:

- Views of I&APs;
- Existing information;
- Site visit with the project team and
- Legislation.

The following potential impacts were identified:

- Impact on ground and surface water quality and quantify;
- Soil, geology and mineral resources;
- Agricultural potential and land capability;
- Biodiversity and sensitive habitats;
- Loss of flora and fauna;
- Socio-economic issues;
- Dust and noise impacts;
- Visual impacts;
- Waste products;
- Traffic; and
- Heritage features.

Table 11: Potential direct impacts identified

IMPACT		
HYDROLOGICAL	SURFACE WATER	Alteration of the characteristics of a water course i.e. Vlermuisleegte Watercourse Hydrological modification on storm water 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

IMPACT	
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}
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 12: 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	SURFACE WATER	Cumulative loss of surface water functionality as a result of an increase in pollutants
		Cumulative impact of hydrological modifications and stormwater
	GROUNDWATER	Cumulative impacts on groundwater quality due to seepage from stockpiles and mining operations

IMPACT	
	Cumulative impacts on groundwater levels and availability of water to the surrounding landowners
ECOLOGICAL	Cumulative impact of vegetation loss including sensitive vegetation
	Cumulative impact of destruction and or deterioration of biodiversity
	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 blasting, vibrations and shocks
	Cumulative impact of vibration and shocks
SOCIO-ECONOMICAL	Positive - Development and upliftment of the surrounding communities and infrastructure
	Development of the economic environment by job provision and sourcing supplies for and from local residents and businesses
	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
	Cumulative impact on resources due to the need for services e.g. water, electricity and sewerage systems
	Cumulative impact of decrease in value of surrounding properties

12.2 PROPOSED SPECIALIST STUDIES TO ASSESS THE IDENTIFIED ENVIRONMENTAL IMPACTS

The following specialist studies were identified to be undertaken during the EIA to assess the potential impacts identified:

- Geohydrological Assessment;
- Surface Water Assessment;
- Ecological Assessment;
- Traffic Impact Assessment;
- Land-use Capability Assessment;
- Heritage Impact Assessment;
- Baseline Visual and Noise Assessments and
- Baseline Air Quality Assessment.

13. EVALUATION AND RECOMMENDATIONS

13.1 KEY ENVIRONMENTAL IMPACTS

In general, it is recognised that the proposed mining development has the potential to pose various risks to the environment as well as to the residents or businesses in the surrounding area. Therefore, it is important that these possible risks and key issues are identified during the scoping phase of the EIA. These impacts, issues and risks will be addressed in consultation with the I&APs, through an internal process based on similar developments as well as with an EIA.

The risks and key issues identified include:

- Surface water quality;
- Water pollution and abstraction
- Storm water run-off;
- Groundwater quality and quantity;
- Agricultural potential and Land Capability;
- Rate of erosion;
- Fauna and flora in the area;
- Maintenance and improvement of road condition;
- Increase in crime e.g. farm attacks and theft of livestock
- Health and safety risks to employees and the public;
- Dust and noise;
- Aesthetic quality;
- Sense of place;
- Waste;
- Economic and employment status;
- Service infrastructure; and
- Heritage resources.

The purpose of this report is to scope and identify the potential impacts of the proposed development. Potential impacts were identified in consultation with I&APs and through the technical expertise and experience of ENVASS. The report sought to identify the impacts of the proposed development on the environment, of which humans are parts of, and the probability of the impacts occurring.

The mine infrastructure and associated operations can pose various risks to the environment as well as the residents in the vicinity of the development, although these risks will be limited in its extent. The issues related to the development were identified and will be assessed and evaluated during the EIA phase in terms of various criteria such as extent, duration, intensity and significance.

13.2 RECOMMENDATIONS

Our recommendation, based on the assessment of the available information so far, is that the application for the proposed development should be authorised. This authorisation should be in line with sensitive planning, design and good environmental management. If the concept of sustainable development is considered it is proposed that the mine will have a positive impact on the provision of social and economic criteria. With the recommended

guidelines which would be provided by the various specialists' studies; the ecological component can also be brought into balance.

14. ASSUMPTIONS AND LIMITATIONS

- All information provided to the environmental team by the applicant and I&APs was correct and valid at the time that it has been provided;
- The strategic level investigations undertaken by specialists prior to the commencement of the EIA process, indicated that the development site is suitable and technically acceptable;
- It is not always possible to involve all I&APs individually, however every effort has been made to involve as many affected stakeholders as possible;
- The information provided by the applicant and specialists was accurate and unbiased; and
- The scope of this investigation is limited to assessing the environmental impacts associated with the construction, operation and decommissioning of the proposed manganese mine.

15. REFERENCES

Australian Environmental Protection Agency (AEPA). 1996. Fuggle & Rabie, 1996; Ashton, 1999; Weaver & Caldwell, 1999).

April, V. 2012. Ecological assessment study for the proposed Kongoni shaft for Amari manganese (Pty) ltd. Environmental Assurance (ENVASS)

Carstens, M. 2013. Mamatwan Social and Labour Plan.

Council for Geoscience. 2013. Website: www.geoscience.org.za. Date accessed 20 September 2013.

Department of Environmental Affairs and Tourism 1992. ENPAT. Pretoria: DEAT

Kruger, G.P. 1983. Terrain Morphology Map of Southern Africa. Soil and Irrigation Research Institute, Department of Agriculture, Pretoria.

MUCINA, L. & RUTHERFORD, M.C. 2006. Reprint 2011. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Royal Haskoning DHV. 2013. Mamatwan Manganese Project Concept Study.

USGS (United States Geological Survey). 2007. Mineral Commodity Summaries 2007. Washington D.C: USGS).

Weather Bureau. 2013. Website: www.saweather.co.za. Date Accessed: 19 September 2013.

Western Cape Department of Environmental Affairs & Development Planning (WC DEADP). Guideline on alternatives: EIA Guideline and Information Document Series. 2011.

Western Cape Department of Environmental Affairs and Development (WC DEADP). Guideline on Need and Desirability: EIA Guideline and Information Document Series. 2011.