REPORT

Mamatwan Manganese (Pty) Ltd

ENVIRONMENTAL MANAGEMENT PROGRAMME

Portions 3, 8 and 18, as well as the remainder of the Farm Mamatwan No 331

NC 30/1/2/2/10031 MR

Submitted to:

Department of Mineral Resources
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	Originated By:	Reviewed By:	Approved By:
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Designation:	Environmental Consultant	Quality Reviewer	Senior Environmental Consultant
Signature:			
Date:	24/02/2014	26/02/2014	04/03/2014

ABBREVIATIONS

EIA - Environmental Impact Assessment

EMPR - Environmental Management Programme

I&APs - Interested and Affected Parties

NEMA - National Environmental Management Act, 1998 (Act No. 107 of 1998)

NEMBA - National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

NHRA - National Heritage Resources Act, 1999 (Act No. 25 of 1999)

NSBA - National Spatial Biodiversity Assessment

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

PM – Particulate Matter

SAHRA - South African Heritage Resources Agency

DEFINITIONS

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

Alluvial: Resulting from the action of rivers, whereby sedimentary deposits are laid down in river channels, floodplains, lakes, depressions etc.

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.

Ecology: The study of the interrelationships between organisms and their environments.

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

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

Environmental Management Programme: A legally binding working document, which stipulates environmental and socio-economic mitigation measures which, should be implemented by several responsible parties throughout the duration of the proposed project.

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

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

ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE PROPOSED MAMATWAN MANGANESE MINE

1. KEY PROJECT INFORMATION

DEA Reference number:	NC 30/1/2/2/10031 MR
Title:	Proposed Mamatwan Manganese Mine
Authors:	Monica Niehof
Client:	Mamatwan Manganese (Pty) Ltd
Report status:	Environmental Management Programme (EMPr) for submission to DMR
Farm Description:	The R/E of Portion 3, the R/E of Portion 8 , the R/E of Portion 18, as well as the R/E of the Farm Mamatwan No 331
21 Digit Surveyor General Code:	C04100000000033100003; C04100000000033100000; C04100000000033100008; and C04100000000331018

2. DETAILS OF ENVIRONMENTAL ASSESSMENT TEAM

2.1 Environmental Consulting Team

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Project team

Emile van Druten:

Emile started Environmental Assurance (Pty) Ltd in 2004 after having spent 12 years as an Environmental manager at various corporate institutions. His career started in the conservation field as an anti-poaching team member at the Kwa Zulu Natal Parks Board.

He then joined the mining industry where he served companies such as Kudu Granite, Anglo American and BHP (Ingwe mining); his most recent corporate move was to Telkom South Africa where he headed up the Environmental and Health department.

Emile holds a BSc Hon degree from the University of Potchefstroom (University of the North West); he complimented this with an Environmental training diploma from the University of Rhodes and a Masters' Degree in Project Management from the University of Pretoria [Management School].

He is a qualified ISO 14001 auditor having been appointed through an European based certification authority (TGA Germany). Emile is blessed with a family and his main hobby is art-lure fishing for which he has recently obtained provincial colours.

Judith Mlanda:

Judith is a seasoned sustainable development practitioner with a special interest in environmental and social sustainability. She holds a Masters' degree in Environment and Society from the University of Pretorias' Centre for Environmental Studies as well as a Bachelor of Arts degree in Sociology and Psychology obtained from the University of Namibia. She has over 9 years of experience and is EAPSA certified.

Judith has worked in the consulting industry on public and private sector projects. She has extensive experience and knowledge including but not limited to environmental and social impact assessments integrated water and waste management, environmental auditing and monitoring, carbon management and climate change.

Monica Niehof:

Monica has seven years' experience in the environmental field and 13 years work experience overall in a variety of fields including the tourism industry. She is currently studying towards a BSc. (Hons) degree in Environmental Management.

Her experience in the environmental field include Environmental Impact Assessments (EIAs'), Environmental Management Programmes (EMPs'), Public Participation Processes (PPPs') and Environmental Control and Monitoring for a variety of development projects including residential, retail, commercial and infrastructure projects.

3. 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 R/E of Portion 3, R/E of Portion 8 and R/E of Portion 18 as well as the R/E of the Farm Mamatwan 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 Ga Segonyana Local Municipality. The proposed mine will be located 21km north of Hotazel, 37km south of 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 worlds' known high-grade manganese.

This document is compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development (DEAT, 1992). IEM is a key instrument of the National Environmental Management Act (Act No. 107 of 1998) as amended [NEMA]. NEMA promotes the integrated environmental management of activities that may have a significant effect on the environment, while IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all stages of the development process. It advocates the use of several environmental management tools that are appropriate for the various levels of decision-making. One such tool is an Environmental Management Programme (EMPr).

The IEM guidelines intend to encourage a pro-active approach to sourcing, collating and presenting information in a manner that can be interpreted at all levels. The basic principles underpinning IEM are that there be:

- informed decision-making;
- accountability for information on which decisions are taken;
- accountability for decisions taken;
- a broad meaning given to the term environment (i.e. one that includes physical, biological, social, economic, cultural, historical and political components);
- an open, participatory approach in the planning of proposals;
- consultation with interested and affected parties;

- due consideration of alternative options;
- an attempt to mitigate negative impacts and enhance positive aspects of proposals;
- an attempt to ensure that the social costs of development proposals (those borne by society, rather than the developers) be outweighed by the social benefits (benefits to society as a results of the actions of the developers);
- democratic regard for individual rights and obligations;
- compliance with these principles during all stages of the planning, implementation and decommissioning of the proposals (i.e. from 'cradle to grave'); and
- the opportunity for public and specialist input in the decision-making process..

These principles are in line with NEMA, which has repealed a number of the provisions of the Environment Conservation Act, 1989 (Act No. 73 of 1989) [ECA], and is focussed primarily on co-operative governance, public participation and sustainable development. The Environmental Impact Assessment Regulations, June, 2010, promulgated in August 2010 as corrected and amended, regulate the procedures and criteria for the submission, processing, consideration and decision on applications for environmental authorisation of listed activities.

This EMPr has been compiled to comply with Section 24N (2) of NEMA and with Regulation 33 of the EIA Regulations, 2010 as corrected and amended.

3.1 Objectives of this EMPr

The EMPr has been compiled to provide recommendations and guidelines according to which compliance monitoring can be undertaken during the all phases of the development, including the construction, operational and decommissioning and rehabilitation phases of the Mamatwan Manganese operations as well as to ensure that all relevant factors are considered to ensure an environmentally responsible development.

This EMPr informs all relevant parties (the proponent, the site manager, the contractor, the environmental site officer, the environmental control officer and all other staff employed on site) as to their duties in the fulfilment of the legal requirements for the construction, operation and decommissioning of the infrastructure with particular relevance to the prevention and mitigation of anticipated potential environmental impacts.

All parties should note that obligations imposed by the EMPr are legally binding in terms of the environmental authorisation granted by the relevant environmental permitting authority.

The objectives of the EMPr are to:

- Ensure compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and / or international;

- Ensure that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities (mitigation measures) are consistent with the significance of the projects' impacts;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events;
- Provide feedback for continual improvement in environmental performance;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant level;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Identify measures that could optimise beneficial impacts;
- Create management structures that addresses the concerns and complaints of the I&APs with regards to the development;
- Establish a method of monitoring and auditing environmental management practises during all phases of the activity;
- Ensure that safety recommendations are complied with; and
- Specific time periods within which the measures contemplated in the final environmental management programme should be implemented, where appropriate.

The point of departure for this EMPr is to ensure a pro-active rather than re-active approach to environmental performance by addressing potential problems before they occur. This will limit corrective measures needed during the decommissioning phase of the project. Therefore the purpose of an EMPr is to provide management measures that should be implemented by Developers, Engineers and Contractors alike to ensure that the potential impacts of a proposed development are minimised. It should also be ensured that the EMPr is maintained and upheld as a dynamic document in order for the project team to add or improve on issues that might be considered left out or not relevant to the project. In such instances the approving authority may authorise the environmental control officer (ECO) to make such changes.

3.2 Form and function of the EMPr

An EMPr is focussed on sound environmental management practices, which will be undertaken to minimise adverse impacts on the environment through the lifetime of a development. In addition, an EMPr identifies what measures will be actioned to manage any incidents and emergencies that may occur during the operational phase.

As such the EMPr provides specifications that should be adhered to, in order to minimise adverse environmental impacts associated with the development of the Mamatwan Manganese mining area.

The content of the EMPr is consistent with the requirements in terms of Section 24 N (2) of NEMA as listed in Regulation 33 of the EIA regulations, 2010 as corrected and amended stated below.

Table 1: Regulation 33 of GN R543 Environmental Management Programme Content

According to Regulation 33 of GN R 543, an environmental management programme should include:

a) Details of:
   i. The person who prepared the environmental management programme; and
   ii. The expertise of that person to prepare an environmental management programme;

b) Information to any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –
   i. Planning and design;
   ii. Pre-operations and operational activities;
   iii. Operation of undertaking of the activity;
   iv. Rehabilitation of the environment; and
   v. Closure where relevant.

c) A detailed description of the aspects of the activity that are covered by the draft environmental management programme;

d) An identification of persons who will be responsible for the implementation of the measures contemplated in paragraph (b);

e) Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;

f) As far as reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally acceptable principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures;

g) A description of the manner in which it intends to –
   i. Modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
   ii. Remedy the cause of pollution or degradation and mitigation of pollutants;
   iii. Comply with any prescribed environmental management standards or practices;
   iv. Comply with any applicable provisions of the Act in terms of closure where applicable;
   v. Comply with any provisions of the Act regarding financial provisions or rehabilitation, where applicable;

h) Time frames within which the measures contemplated in the Draft environmental management programme should be implemented;

i) The process for managing any environmental damage, pollution , pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;

j) An environmental awareness plan describing the manner in which: -
   i. The applicant intends to inform his or her employees of any environmental risk which may result from their work; and
   ii. Risks should be dealt with in order to avoid pollution or the degradation of the environment.

k) Where appropriate, closure plans, including closure objectives.

4. LEGAL REQUIREMENTS

Construction and operation should be according to the best industry practices, as identified in the project document. This EMPr, which informs an integral part of the contract documents, informs the contractor as to his duties in the fulfilment of the project objectives, with particular relevance to the prevention and mitigation of environmental impacts caused by construction activities associated with the project. All role players should note that obligations imposed by the approved EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter shall prevail.

All role players shall identify and comply with all South African national and provincial environmental legislation, including associated regulations and all local by-laws relevant to the project. Key legislation currently applicable to the design, construction, implementation and decommissioning phases of the project should be complied with. The list of applicable legislation provided below is intended to serve as a guideline only and is not exhaustive: -

- The Constitution of South Africa (Act 108 of 1996);
- National Environmental Management Act (Act 107 of 1998) as amended [NEMA];
- National Environmental Management: Protected Areas Act (Act 57 of 2003);
- National Environmental Management: Biodiversity Act (Act 10 of 2004) NEMBA];
- National Forests Act (Act 84 of 1998);
- National Water Act (Act 36 of 1998);
- Conservation of Agricultural Resources Act (Act 43 of 1983) [CARA];
- National Veld and Forests Fire Act (Act 101 of 1989);
- Hazardous Substances Act (Act 15 of 1973);
- National Heritage Resources Act (Act 25 of 1999);
- National Environmental Management: Air Quality Act (Act 39 of 2004) [NEMAQA];
- National Environmental Management: Waste Act (Act 58 of 2009) [NEMWA];
- Health Act (Act 63 of 1977);
- Occupational Health and Safety Act (Act 85 of 1993) [OSHA];
- Mineral and Petroleum Resources Development Act (Act 28 of 2002);
- Mine Health and Safety Act (Act 29 of 1996); and
- All relevant provincial legislation, municipal by-laws and ordinances.

4.1 Environmental Authorisation

In accordance with the requirements of the National Environmental Management Act (Act 107 of 1998) as amended [NEMA], and relevant EIA regulations, June 2010 made in terms of this Act and promulgated in August 2010 (Government Notice R 543), and listed activities under (Government Notice R 544, 545, 546) as corrected

and amended. The proposed underground manganese mining is subject to an Environmental Impact Assessment process.

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

Table 2: Listed activities applied for in Terms of NEMA EIA Regulations

GOVERNMENT NOTICE	ACTIVITY	ACTIVITY DESCRIPTION	PROJECT RELEVANCE
544	9	The construction of facilities or infrastructure exceeding 1 000 metres in length for the bulk transportation of water, sewage or stormwater - 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 stormwater 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 watercourse, measured from the edge of a watercourse.	Bulk water supply infrastructure exceeding 1000 metres in length is required for the mining operations and will be constructed.
544	11	The construction of: i) Canals; ii) Channels; iii) Bridges; iv) Dams; v) Weirs; vi) Bulk stormwater 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	Infrastructure (associated with the mining operations) exceeding 50 square meters might be constructed within in 32m of the edge of a watercourse.

GOVERNMENT NOTICE	ACTIVITY	ACTIVITY DESCRIPTION	PROJECT RELEVANCE
		watercourse excluding where such construction will occur behind the development setback line.	
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 undertaken in accordance with a management plan agreed to by the relevant environmental authority; or b) Occurs behind the development setback line.	Infilling, depositing, dredging, excavation, removal or moving of soil / material (in excess of 5 cubic metres) from a watercourse, might occur.
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.

GOVERNMENT NOTICE	ACTIVITY	ACTIVITY DESCRIPTION	PROJECT RELEVANCE
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 Mamatwan mine) is envisaged. A railway siding with railway loop for the purpose of loading and transport of manganese ore will be constructed.
544	37	The expansion of facilities or infrastructure for the bulk transportation of water, sewage or stormwater 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 stormwater 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.

GOVERNMENT NOTICE	ACTIVITY	ACTIVITY DESCRIPTION	PROJECT RELEVANCE
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.

5. PROPOSED ACTIVITY

According to the regulation 33 of GN R543, an environmental management programme should include:

(c) A detailed description of the aspects of the activity that are covered by the Draft environmental management programme;

5.1 Description of proposed project

The proposed Mamatwan Manganese Mine (underground operation) will produce approximately 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
R/E of 8	Mamatwan	RD	342.61	Tshipi E Ntle Manganese Mines (Pty) Ltd
R/E of 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 Sedibeng Water managing the Vaal Gamagarra Scheme;
- 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.

The site is located within the municipal boundaries of the John Taolo Gaetsewe District Municipality and borders the Ga Segonyana, Joe Morolong and Gamagara Local Municipalities. 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 and Sishen-PE railway routes. 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).

6. SCOPE OF THE EMPr

In order to ensure a holistic approach to the management of environmental impacts during the manganese mining, this EMPr sets out the methods by which proper environmental controls are to be implemented by the Contractor and all other parties involved.

The EMPr is a dynamic document subject to influence and changes as are wrought by variations to the provisions of the project specifications.

6.1 Layout of the EMPr

The EMPr is divided in four phases of development. Each phase has specific issues unique to that period of the manganese mining process and associated infrastructure. The impacts are identified and a brief description is given. The four phases of the development are then identified as below:

i. Planning and design Phase

The '***pre-construction***' section of this EMPr, refers to the period of time leading up to and prior to commencement of construction activities, and is included to ensure pro-active environmental management measures with the goal of identifying avoidable environmental damage at the outset and sustain optimal environmental performance throughout the construction phase. Most impacts will occur during the construction phase and should be mitigated through the contingency plans identified in the pre-construction phase.

ii. Construction Phase

The bulk of environmental impacts will have immediate effect during the '***construction***' phase (e.g. noise, dust, and water pollution). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the measures outlined in this section, together with a commitment to sound environmental management from the project team.

The '***construction***' section refers to all construction and its operation-related activities that will occur within the approved area and access roads, until the project is completed. This "construction" section is divided into three functional areas, namely "materials"; "plant"; and "construction". Each of these functional areas within the EMPr contains specific mitigation requirements and requested contractor method statements stipulated where required.

iii. Operational and Maintenance Phase

This section of the EMPr provides management principles for the operation and maintenance phase of the project. Environmental audits, procedures and responsibilities are required from Mamatwan Manganese (Pty) Ltd during the operational and maintenance phase as specified.

iv. Closure and decommissioning Phase

This section includes principles for the decommissioning and closure phase of the project. This section will be required to be re-evaluated and updated at the time of decommissioning.

7. ROLES AND RESPONSIBILITIES

According to the regulation 33 of GN R543, an environmental management programme should include:

(d) An identification of persons who will be responsible for the implementation of the measures contemplated in paragraph (b).

Overall responsibility for the implementation of the EMPr lies with Mamatwan Manganese (Pty) Ltd, through the appointed site manager who will:

- Notify DMR of changes in the projects resulting in significant environmental impacts;
- Maintain a register of complaints and queries by members of the public; and
- Assistance with the implementation of the EMPr and the resolution of any problem areas will be the responsibility of the ESO (Environmental Site Officer), as will the design and review of the monitoring program.

DMR will be responsible for approving the Environmental Impact Assessment Report and EMPr for this project.

7.1 Site manager and environmental site officer (ESO)

A site manager will be appointed by Mamatwan Manganese (Pty) Ltd to assume the responsibility for implementing the management guidelines contained in this document.

It is also recommended that a suitably qualified person (environmental site officer (ESO)) be appointed internally by the proponent to undertake site evaluation, monitoring and implementation of the EMPr. The environmental site officer (ESO) should conduct regular site visits (at every second week) during the construction phase and every month for the first year of operation, then quarterly to audit the project and to ensure the success of the EMPr. The ESO should have the authority to stop any activity deemed to be in contravention of this EMPr.

The ESO will:

- Know the background of the project, and monitor the implementation of EMPr;
- Act as a guide and advisor to the construction team on environmental issues during preparation and operation;
- Conduct periodic auditing of the project for adherence to the EMPr, identification of problem areas and provision of action plans to avoid costly stoppages and/or further environmental damage;

- Ensure that open communication lines exists to the Department of Mineral Resources (DMR) or other identified authorities and the external Environmental Control Officer (ECO) for reporting of any significant environmental incidents and rapidly resolving any problems or complaints from the public;
- Ensure that any proposed changes are communicated in writing to the authorities for approval; and
- Ensure the protection and rehabilitation of the surrounding environment during the construction, operational and decommissioning phases as prescribed in the EMPr.

7.2 Environmental Control officer (ECO)

Monitoring should be undertaken by the contractor at work sites during construction, under the direction and guidance of an external ECO who is responsible for reporting the monitoring to the implementing agencies.

The ECO will:

- Conduct regular site visits (Monthly) during the construction, operational and decommissioning phases, to be able to report and respond to any environmental issues;
- Report compliance and non-compliance issues to the municipal representative and authorities as applicable;
- Advise the Contractor on environmental issues within the defined work areas;
- Review access and incidents records that may pertain to the environment and reconcile the entries with the observations made during site inspection, monitoring and audit;
- Recommend corrective actions when required for aspects of non-compliance with the EMPr;
- Take immediate action on site where clearly defined and agreed “No-Go” areas are violated or in danger of being violated and to inform the Mamatwan Manganese (Pty) Ltd representative of the occurrence immediately and to take action;
- Be contactable by the public regarding matters of environmental concern as they relate to the operation of the works;
- Take immediate action on site when prescriptive conditions are violated, or in danger of being violated and to inform Mamatwan Manganese (Pty) Ltd representative of the occurrence and action taken; and
- Compiling monthly audit reports and submitting them to the Competent Authority (CA) should it be required.

7.3 Contractor

The contractor is responsible for the overall execution of the activities envisioned in the construction phase including the implementation and compliance with recommendations and conditions of the EMPr. The Contractor should therefore ensure compliance with the EMPr at all times during the construction activities and maintain an environmental register which keeps a record of all environmental incidents which occur on site during the manganese mining operations. The incidents may include:

- Public involvement / complaints;
- Health and Safety incidents;
- Incidents involving hazardous materials stored on site;
- Pollution incidents; and
- Non-compliance incidents.

The Contractor is also responsible for the implementation of corrective actions issued by the site manager, ECO and / or ESO within a reasonable agreed period of time.

7.4 The proponent

The proponent is the applicant who originally applied for all authorisations and to whom these authorisations are issued. The proponent is ultimately responsible for the implementation of this document as well as any conditions contained within the authorisations issued.

8. ENVIRONMENTAL MANAGEMENT PROGRAMME

According to the regulation 33 of GN R543, an environmental management programme should include:

(b) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by the Regulations, including environmental impacts or objectives in respect of –

i. Planning and design;
ii. Pre-operations and operational activities;
iii. Operation of undertaking of the activity;
iv. Rehabilitation of the environment; and
v. Closure where relevant.

f) As far as reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally acceptable principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures;

g) A description of the manner in which it intends to –

a. Modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
b. Remedy the cause of pollution or degradation and mitigation of pollutants;
c. Comply with any prescribed environmental management standards or practices;
d. Comply with any applicable provisions of the Act in terms of closure where applicable;
e. Comply with any provisions of the Act regarding financial provisions or rehabilitation, where applicable;

8.1 EMPr: Planning and Design phase

Policy Compliance: The mining should be in line with relevant legislation and / or policy e.g. NEMBA, NEMA, SDF etc.

Placement and design of the manganese mine operations:

- Ensure that as far as possible:
    - infrastructure should avoid sensitive environments i.e Vlermuisleegte watercourse and 200m buffer zone from the edge of the watercourse to protect the identified Late Stone Age (LSA) stone tools in the buffer zone and the watercourse;
    - no vegetation beyond the infrastructure footprint should be damaged or removed; and
    - no vehicle tracks may be designed for slopes steeper than 1:6 where practicable;
- Appropriate and effective stormwater management plans, especially for the access road associated with the Mamatwan Manganese (Pty) Ltd infrastructure, should be included into the final engineering design;
- A stormwater management plan and or stormwater attenuation should be designed for the site such that the stormwater is not allowed to flow freely off the site and into the general area without storm attenuation measures in place;
- Appropriate stormwater routing attenuation should be implemented to avoid onsite erosion and downstream sedimentation;
- Retain and incorporate topographic site features that promote infiltration and storage of stormwater;
- Direct the location of buildings and roads away from critical areas and soils that can effectively infiltrate stormwater;
- Minimize building footprints, and road widths and lengths to reduce impervious surfaces; and eliminate effective impervious surfaces;
- Approval should be obtained from DWA for any activities that require authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). A water use licence have been applied for, for the following activities in terms of Section 21 of NWA:
    (a) Taking water from a water resource;
    (g) Disposing of waste in a manner which may detrimentally impact on a water resource; 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;

  The water use licence should be issued before any of the above mentioned activities are initiated;
- The historical homestead identified on the R/E of the farm Mamatwan 331 should be excluded from development;
- A conservation buffer of 20 m should be placed around the graveyard located in close proximity to the homestead;

- Should development and construction activities impact on the 200m buffer zone for the protection of the LSA stone tools a full Phase 2 Archaeological Impact Assessment (AIA) should be undertaken;
- A Mamatwan Manganese (Pty) Ltd and community representative should walk through the finalised site layout and point out or indicate any sensitive heritage artefacts (graves) that may not have been identified already and the outcome of the consultation should be send to SAHRA Burial Grounds and Graves Unit for final assessment (info@sahra.org.za);
- Planning of access routes should be undertaken in conjunction with the Contractor, Mamatwan Manganese (Pty) Ltd and the Landowner. All agreements reached shall be documented in writing and no verbal agreements should be made. The condition of the existing access routes to be used shall be documented with photographs;
- Once the proposed final layouts are made available by the contactor(s), the sites should be evaluated in detail and specific mitigation measures to prevent noise pollution designed into the system;
- The building textures and colours should blend in with the backdrop of colour and textures provided by the landscape. The natural setting and colours of buffs, olive greens, dark browns should be respected and where possible, these should be incorporated into the materials used in the exteriors of the building and landscape;
- Colours of new infrastructure should be matt and not glossy, so as to reduce reflection and glare fromthe surfaces. This is important when considering the night scene and reflected light;
- Infrastructure should be chosen such that they provide the smallest footprint and visual impact; and

The *Acacia erioloba*, *Acacia heamoxtylon* and *Boscia albitrunca* trees occurring on the study area are endangered species. These trees are considered important and nationally protected under the National Forests Act, 1998 (Act No. 84 of 1998). A tree removal license should be applied for at the department of Agriculture, Forestry and Fisheries, for the protected species should the proposed project be authorised.

8.2 EMPr: Construction Phase

Site Establishment:

- The Contractor shall establish his construction camp, offices, workshops and other infrastructure as per the agreed site layout plan in a manner that does not adversely affect the environment;
- The Contractor shall submit a method statement for site clearance for approval by the Site Manager in consultation with the ESO and ECO. Site establishment shall take place in an orderly manner and all required amenities shall be installed at the camp site before the main workforce move onto site;
- The Construction camp shall have the necessary ablution facilities with chemical toilets (one for every 10 workers) at commencement of construction activities to the satisfaction of the Site Manager. The Contractor shall inform all site staff to make use of the supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities;
- Safe drinking water for human consumption shall be available at the site offices and other convenient

locations on site. All water used on site should be taken from a legal source and comply with the recognised standards for drinking and other uses;

- The Contractor shall provide adequate facilities for his staff so that they are not encouraged to supplement their comforts on site by accessing what can be taken from the natural surroundings;
- No fires will be allowed outside of the construction camp. Activities which may pose a risk of fire should be identified and suitable measures should be put in place to prevent any possible damage by fire. Contractors should inform the staff of the risk of fires and fire prevention and emergency procedures in the event of fire. Fire-fighting equipment shall be supplied by the Contractor at suitable locations. The National Veld and Forests Act, 1998 (Act 101 of 1998) applies;
- The Contractor shall ensure that energy sources are available at all times for construction and supervision personnel for heating and cooking purposes; and
- The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at a municipal registered landfill. A certificate of disposal shall be obtained by the Contractor and kept on file. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. The disposal of waste shall be in accordance with relevant legislation. Under no circumstances may solid waste be burnt on site.

Site Clearing:

- Site clearing should take place in a phased matter, as and when required. Areas which are not to be affected by construction within two months of time, should, in order to reduce erosion risk, not be cleared. The area to be cleared should be clearly demarcated and this footprint strictly maintained;
- Spoil that is removed from the site should be removed to an approved spoil site or municipal registered landfill site;
- Silt fences and erosion control measures should be implemented in areas where these risks are more prevalent e.g. close to the watercourse;
- Topsoil removed should be neatly stockpiled in stockpiles of no higher than 1.5 m adjacent to the excavations ready for backfill when required;
- The Contractor shall ensure that all work is undertaken in a manner which minimises the impact on vegetation outside the immediate area of the Works. No tree or shrub outside the area of the Works shall be felled, topped, cut or pruned until it has been clearly marked for its purpose by the Site Manager. The method of marking will be specified by the Site Manager, and the Contractor will be informed in writing; and no tree outside the area of the Works shall be burned for any purpose;
- The *Acacia erioloba*, *Acacia heamoxtylon* and *Boscia albitrunca* trees occurring on the study area are endangered species. These trees are considered important and nationally protected under the National Forests Act, 1998 (Act No. 84 of 1998). A tree removal license should be applied for at the department

of Agriculture, Forestry and Fisheries, for the protected species should the proposed project be authorised;

- Where possible these trees should be replanted adjacent to the proposed activity site on the same property; and
- Should relocation of trees not be possible these trees should be replaced by trees of the same species or other indigenous and endemic trees and planted in an area adjacent to the mining operations or within the landscaping of the mining offices.

For areas of specific importance as identified by the specialists, the Contractor shall:

- Identify and demarcate the extent of the site and associated Works Areas as indicated on the approved Site plan using danger type with steel droppers;
- In sensitive environments, or where access into no-go areas takes place, then a proper perimeter fence should be erected around the works area. The fence should be 1.8m high. Signs should also be erected to indicate no-go areas and that no pedestrian or vehicle access is allowed;
- Maintain site demarcations in positions until completion of construction works;
- Maintain animal movement corridors as indicated in the specialist report and / or as specified on site by the ECO;
- Maintain the demarcation line, and ensure that no personnel or construction material move outside the demarcated site;
- Do not establish any activities or operations that, in the opinion of the ECO are likely to adversely affect the aesthetic quality of the environment;
- In the event that such activities and operations are deemed to be necessary, then ameliorate actions to reduce the adverse effects should be taken. Actions will be specified by the ECO; and

Do not paint or mark any natural feature. Marking for surveying and other purposes should be undertaken using pegs, beacons or rope and droppers.**Soil impacts:**

1. **Topsoil**

- The full depth of topsoil should be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This should include the building footprints, working areas and storage areas. Topsoil should be reused where possible to rehabilitate disturbed areas;
- Care should be taken not to mix topsoil and subsoil during stripping; and
- Polluted topsoil should be disposed of at a licensed landfill site.

2. **Soil stripping**

- No soil stripping should take place on areas within the site that the contractor does not require for construction work, or on areas of retained vegetation;
- Subsoil and overburden should, in all construction and lay down areas, be stockpiled separately to be returned for backfilling in the correct soil horizon order; and

- Construction vehicles should only be allowed to utilise existing road or pre-planned access routes.

3. Stockpiles

- Stockpiles should not be positioned such that they obstruct natural water pathways and drainage channels;
- Stockpiles should not exceed 1.5m in height;
- If stockpiles are exposed to windy conditions or heavy rain, they should be covered by impermeable material to prevent loss of topsoil;
- Stockpiles should further be protected by the construction of berms or low brick walls around their bases; and
- Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.

4. Fuel storage

- Topsoil and subsoil to be protected from contamination;
- Fuel and material storage should be away from stockpiles;
- Any storage tanks containing hazardous materials should be placed in bunded containment areas with sealed surfaces. The bund walls should be high enough to contain 110% of the total volume of the stored hazardous material;
- Vehicles and equipment requiring fuel should preferably be refuelled offsite or if onsite in a demarcated area on an impermeable surface or placing drip-trays underneath to prevent ground surface and water pollution; and
- Contaminated soil should be contained and disposed of offsite at an approved landfill site.

5. Concrete mixing

- No vehicles transporting concrete to the site may be washed on site;
- Cement, concrete and chemicals should be mixed on an impermeable surface and provisions should be made to contain spillages or overflow into the soil; and
- If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Untreated run-off from the batch plant should not be allowed to get into the stormwater system, the watercourse or existing erosion channels.

6. Earthworks

- To take into consideration:
    - Soils compacted during the mining operations and the associated infrastructure should be deeply ripped at least to a depth of 300mm to loosen compacted layers and re-graded to even running levels. Topsoil should be spread over landscaped areas. According to specifications by a landscape architect the area should be re-vegetated upon completion of construction

7. **Erosion:**

- Wind screening and stormwater control should be undertaken to prevent soil loss from the site;
- All erosion control mechanisms need to be regularly maintained;
- Retention of vegetation where possible to avoid soil erosion;
- Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time;
- Preserve permeable, native soils and restore disturbed soils with compost and other amendments to infiltrate and store stormwater;
- Re-vegetation of disturbed areas and surfaces should occur immediately after the construction activities are completed; and
- No impediment to the natural water flow other than approved erosion control works is permitted.

Air quality:

1. **Dust control**

- Damping down the un-surfaced and un-vegetated areas during windy periods is required;
- Retention of vegetation where possible will reduce dust travel;
- Excavation and other clearing activities should only be undertaken during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas;
- The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the Landowners or neighbouring communities;
- A speed limit of 30km/h on dirt roads (if any) should not be exceeded; and
- Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor and recorded in the complaints register as well as any actions taken to remedy dust pollution and respond to the complaint.

2. **Emissions control:**

- Regular servicing of vehicles in order to limit gaseous emissions (to be done offsite);
- Regular servicing of onsite toilets to avoid potential odours; and
- Allocated cooking areas should be provided.

3. **Fire prevention**

- All cooking shall be done in demarcated areas that are safe in terms of runaway or uncontrolled fires;
- The Contractor shall have operational fire-fighting equipment available on site at all times. The level of fire-fighting equipment should be assessed and evaluated through a typical risk assessment process. It may be required to increase the level of protection, especially during the winter months.

Water quality:

1. **Sanitation**

- The contractor is responsible for providing all sanitary arrangements for his and the sub-contractors team. A minimum of one chemical toilet should be provided per 10 persons;
- The facilities should be regularly serviced by a reputable company to reduce the risk of topsoil, surface or groundwater pollution;
- Sanitary arrangements should be to the satisfaction of the ECO, ESO and the local authority. Toilets should be of the chemical type. The contractor should keep the toilets in a clean, neat and hygienic condition. The contractor should supply toilet paper at all toilets at all times. Toilet paper dispensers should be provided in all toilets;
- Toilets provided by the contractor should be easily accessible and a maximum of 50m from the works area to ensure they are utilised. All toilets will be located within the contractors' camp. Should toilets be needed elsewhere, their location should first be approved by the ESO. No toilets should be allowed within the 200 m buffer zone of the watercourse;
- The contractor (who should use reputable toilet-servicing company) should be responsible for the cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) should ensure that all toilets are cleaned and emptied before the builders' or other public holidays; and
- Toilets out on site should be secured to the ground and have a sufficient locking mechanism operational at all times.

2. **Water resources**

- Site staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction related activities;
- Bulk water supply provided by Sedibeng Water from the Vaal Gamagarra pipeline (or another source approved by the ESO and ECO) should be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc.;
- Compaction of backfilled material should attain low soil permeability;
- The tailings dam and stockpiles should be lined in order to prevent pollutions during the operation phase;
- Site design and operation should ensure that surface- / stormwater be diverted away from excavation trenches; and
- Backfilling of trenches should be undertaken in such a way that water ponding and erosion of the backfilled trench be avoided.

3. Stormwater

- Impediments to or blockage of natural water flow should be avoided wherever possible;
- The ESO should assess whether regular water sampling of surface and or groundwater resources within the immediate and surrounding environment are necessary. Should this be the case, baseline data from sampling should be obtained relevant to the activity and sensitivity of the area. Regular sampling should then be carried out to determine deviations from the baseline data;
- Increased run-off during construction should be managed using berms and other suitable structures as required to ensure flow velocities are reduced; this should be done in consultation with the Resident Engineer (RE) as well as the ESO. Stormwater, wherever possible, should be allowed to soak into the land in the area on which the water fell;
- In the event of pollution caused as a result of construction activities, the contractor, according to section 20 of the National Water Act, 1998 (Act No. 36 of 1998) will be responsible for all costs incurred by organisations called to assist in pollution control and/or to clean up polluted areas;
- The contractor should ensure that excessive quantities of sand, silt and silt-laden water do not enter the stormwater system. Design of the stormwater drainage system should ensure that the local and surrounding natural systems are not negatively impacted. Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses should be taken. These measures should be reviewed and audited by the ESO and ECO;
- No wastewater may run freely into any of the surrounding naturally vegetated areas. Runoff containing high sediment loads should not be released into natural or municipal drainage systems or nearby watercourses. If this becomes a problem it is recommended that an attenuation pond be constructed to allow solids to settle prior to runoff leaving the site;
- A relevant specialist should be consulted prior to the demarcation of drainage lines and the watercourse buffer zone;
- "NO ENTRY" signs should be strategically placed along the watercourse buffer zone or other natural or man-made drainage lines which are in close proximity to access routes; and
- No roads are to be cut through river and stream banks as this may lead to erosion causing siltation of streams and downstream dams. Existing drifts and bridges should be used if the landowner gives his consent. Such structures should then be thoroughly examined for strength and durability before they are used.

Noise:

- Although it is expected that some noise will be generated during the construction phase it is not expected that this will cause a nuisance to any of the neighbour due to the distances;

- Construction site yards, workshops and other noisy fixed facilities should be located well away from noise sensitive areas. Once the proposed final layouts are made available by the contactor(s), the sites should be evaluated in detail and specific mitigation measures designed into the system;
- Heavy vehicle traffic should be routed away from noise sensitive areas, where possible;
- Noise levels should be kept within acceptable limits. All noise and sounds generated should adhere to SABS specifications for maximum allowable noise levels for construction sites. No pure tone sirens or hooters may be utilised except where required in terms of SABS standards or in emergencies;
- Blasting operations (if any) are to be strictly controlled with regard to the size of explosive charge in order to minimise noise and air blast, and timings of explosions. The number of blasts per day should be limited, blasting should be undertaken at the same times each day and no blasting may be allowed at night;
- With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the contractor and ECO should liaise with local residents and how best to minimise impacts, and the local population should be kept informed of the nature and duration of intended activities;
- The Contractor should take measures to discourage labourers from loitering in the area and causing noise disturbance;
- Noise generating activities should be restricted to between 06h00 and 18h00 Monday to Friday, and 06h00-13h00 on Saturdays and no work to be conducted on Sundays or Public Holidays, unless otherwise approved by the appropriate competent person in consultation with adjacent landowners or potentially affected persons;
- Noise impacts should be minimised by restricting the hours during which the offending activities are carried out and, where possible, by insulating machinery and/or enclosing areas of activity; and

Ecology and Biodiversity:

- Construction camps and ablution facilities are to be placed in currently impacted areas, at least 200 m away from the Vlermuisleegte watercourse;
- An appropriate waste management programme should be implemented throughout the mining phase; and
- Fires from cooking should be located within the enclosed, demarcated area. Fire-fighting equipment should be kept onsite in order to contain an accidental fire.
- Ensure that construction activities are limited to the proposed mining infrastructure area according to the layout;
- Construction activities should be geographically restricted; this should be achieved by demarcating the mining operations in agreement with the ESO and ECO. Vehicles may only move within demarcated areas;
- Construction staff should be prohibited to catch or kill any animals found or encountered during

construction;

- Only vegetation falling directly in demarcated access routes or project sites should be removed where necessary;
- Any animals rescued or recovered will be relocated in suitable habitat away from the mining operations and associated infrastructure;
- Cleared vegetation can be used to form wood piles and logs and stumps, dead or decaying wood piles should be created as these will provide valuable refuge areas especially due to the clearance of vegetation cover;
- Logs and stumps also provide important habitats for several reptile species as well as smaller mammals, amphibians etc. With time they will eventually be reduced to evaluable compost by several animal species. Dead trees and stumps will also be used for nesting purposes as well as perching or hunting platforms for birds species;
- Any lizards, snakes or monitors encountered should be allowed to escape to suitable habitat away from disturbance. No reptile should be intentionally killed, caught or collected during any phase of the project;
- General avoidance of snakes is the best policy if encountered. Snakes should not be intentionally harmed or killed and allowed free movement away from the area;
- Appropriate foot wear should be worn in the field;
- During construction activities wherever possible work should be restricted to one area at a time. This will give smaller birds, mammals, reptiles and amphibians an opportunity to move into undisturbed areas close to their natural habitat. The Contractor should ensure that no faunal species are disturbed, trapped, hunted or killed during the construction phase;
- No further vegetation clearance except for the removal of alien invasive species will be allowed. All remaining indigenous riparian vegetation should be conserved wherever possible;
- No roads shall be cut through river – and stream banks (riparian vegetation) as this may lead to erosion causing siltation of the rivers, streams, wetlands and pans in the immediate area;
- Construction camps and ablution facilities are to be placed in currently impacted areas, at least 200 m away from the Vlermuisleegte watercourse; and
- Vehicle access to Mamatwan Manganese should as far as possible be limited to existing roads.

Control of plants prone to bush encroachment:

- The disturbed areas should be monitored and maintained to contain and prevent encroacher plants from spreading in the area. A three monthly inspection by the ECO and ESO should be executed in this regard.

Waste Management:

- The contractors should provide and maintain a method statement for "solid waste management". The method statement should provide information on proposed licensed facility to be utilised and details of proposed record keeping for auditing purposes;
- Waste should be separated into recyclable and non-recyclable waste, and should be separated as follows:
    - Hazardous waste: including (but not limited to) old oil, paint, etc.;
    - General waste: including (but not limited to) construction rubble;
    - Reusable construction material; and
    - Recyclable waste shouldshould preferably be deposited in separate bins. The contractor is advised that "Collect-a-Can" collect tins, including paint tins, chemical tins, etc. and "Consol" collect glass for recycling.;
- Any illegal dumping of waste should not be tolerated, this action will result in a fine and if required further legal action will be taken. This aspect should be closely monitored and reported on; proof of legal dumping should be produced on request;
- Bins should be clearly marked for ease of management;
- All refuse bins should have a lid secured so that animals cannot gain access;
- Sufficient closed containers should be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builders' wastes generated on the site;
- Subcontractor(s) should contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMPr. Proof of this undertaking should be issued to the ESO;
- All solid and chemical wastes that are generated should be removed and disposed of at a licensed waste disposal site. The contractor is to provide proof of such to the ESO;
- Chemical containers and packaging brought onto the site should be removed for disposal at a suitable site; and
- A skip, with a cover, should be used to contain refuse from campsite bins, rubble and other construction material.

Health and Safety

- Excavations for whatever purpose will only remain open for a minimum period of time and during this time they should be clearly demarcated and barriers and warning signs should be established to prevent accidental ingress of people, animals or vehicles as well as to prevent soil erosion;

1. Worker safety

- Implementation of safety measures, work procedures and first aid should be implemented on site;
- A health and safety plan in terms of the Occupational Health and Safety Act (Act 85 of 1983) and Mine Health and Safety Act (Act 29 of 1996); and should be drawn up to ensure worker safety;
- Contractors should ensure that all equipment is maintained in a safe operating condition;
- A record of health and safety incidents should be kept on site and made available for inspection;
- Any health and safety incidents should be reported to the Site Manager immediately;
- First aid facilities should be available on site at all times;
- Workers have the right to refuse work in unsafe conditions; and
- Material stockpiles or stacks should be stable and well secured to avoid collapse and possible injury to site workers.

2. Worker facilities

- Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness;
- Fires are not to be allowed, unless in a demarcated area identified by the ECO;
- Cigarette butts should be disposed of safely in buckets of sand or other method to prevent veld fires and safety hazards to workers;
- The contractors should provide and maintain a method statement for “fires”, clearly indicating where and for what fires will be utilised plus details on the fuel to be utilised;
- Absolutely no burning of waste is permitted;
- Fires will only be allowed in facilities especially constructed for this purpose within fenced Contractors’s’ camps. Wood, charcoal or anthracite are the only fuels permitted to be used for fires. The contractor should provide sufficient wood (fuel) for this purpose;
- Fires within the designated areas should be small in scale so as to prevent excessive smoke being released into the air;
- No wood is to be collected, chopped or felled for fires from private or public property as well as from no-go or sensitive areas within the site and any surrounding natural vegetation;
- Smoking should be prohibited in the vicinity of flammable substances;
- The proponent should ensure that fire-fighting equipment is available on site, in particular where flammable substances are being stored or used;
- All regulations contained in the Occupational Health & Safety Act apply and should be implemented;
- Any welding or other sources of heating of materials should be undertaken in a controlled environment wherever possible and under appropriate supervision, in such a manner as to minimise the risk of veld fires and/or injury to staff;

- Open fires for heating and cooking shall only be permitted in protected areas designated by the ESO for this purpose.
- The construction campsite or staff facilities need to be placed where these will cause the least impact on the biophysical and social elements of the area; this site needs to be approved by the ESO and site manager; and
- Skips or containers for refuse and litter will be provided, used and cleaned regularly by the contractor.

3. Protective gear

- Personnel Protective Equipment (PPE) should be made available to all staff and the wearing and use of PPE should be compulsory. Hard hats and safety shoes should be worn at all times and other PPE worn where necessary i.e. dust masks, ear plugs, hard hats, safety boots and overalls etc.;
- No person is to enter the site without the necessary PPE;
- The construction camp should remain fenced for the construction period;
- Potentially hazardous areas such as trenches are to be demarcated and clearly marked;
- Uncovered manholes and excavations should be clearly demarcated;
- Adequate warning signs of hazardous working areas and uncovered manholes and excavations should be erected in suitable locations;
- Emergencies numbers of the local police, fire department and the municipality should be placed in prominent areas;
- Fire-fighting equipment should be placed in prominent positions across the site where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank;
- A speed limit of 30 km/h should be adhered to by all vehicles and machinery.

4. Hazardous Material Storage

- Proper storage facilities should be provided for the storage of chemicals and any hazardous materials to be used during operation (if applicable);
- The contractor should provide method statements for the “handling & storage of oils and chemicals”, “fire”, and “emergency spills procedures”;
- Spill kits should be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits should be made up of material/product that is in line with environmental best practice (SUNSORB is a recommended product that is environmentally friendly);
- These storage facilities (including any containers) should be stored on an impermeable surface, in order to ensure that accidental spillage does not pollute soil or water resources;

- An inventory of all chemicals and other substances should be kept on site, along with a description of possible ill effects and treatment of health-related afflictions resulting from accidents, should be kept in the storage area as well as by the appropriate site manager. Such areas should be securely locked;
- Workers should at all times be made aware of the health risks associated with the use of all chemicals (e.g. smoking near storage areas), and should be provided with appropriate protective clothing or equipment in case of spillages or accidents;
- Cement and other potential environmental pollutants should be stored and mixed on an impermeable substratum. There should be no opportunity for environmental contamination;
- All stockpiled material should be easily accessible without any environmental damage;
- All temporarily stockpiled material should be stockpiled in such a way that the spread of materials are minimised;
- The stockpiles may only be placed within demarcated areas of which the location is to be determined together with the ESO and ECO;
- The contractor should avoid vegetated areas that will not be cleared;
- Stormwater runoff from the stockpile sites and other related areas should be directed into the stormwater system with the necessary pollution prevention measures such as silt traps and may not run freely into the immediate and surrounding environments;
- Stockpiles are to be stabilised if signs of erosion are visible;
- Soils from different horizons should be stockpiled such that topsoil stockpiles do not get contaminated by sub-soil material;
- Topsoil stockpiles should be monitored for invasive exotic and encroaching vegetation growth. Contractors should remediate as and when required in consultation with the ESO;
- No plant, workforce or any construction related activities may be allowed onto the topsoil stockpiles;
- Topsoil stockpiles should be clearly demarcated as no-go areas;
- Stock piles should not be higher than 1.5 m to avoid compaction thereby maintaining the soil integrity and chemical composition;
- Materials such as fuel, oil, paint, herbicide and insecticides should be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas;
- Sufficient care should be taken when handling these materials to prevent pollution. Training on the handling of dangerous and toxic materials should be conducted for all staff prior to the commencement of construction;
- In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs (DWA) should be informed immediately;
- Storage areas should display the required safety signs depicting “no smoking”, “No Naked lights” and “Danger” containers should be clearly marked to indicate contents as well as safety requirements;

- The contractor should supply a method statement for the storage of hazardous materials at tender stage;
- Material Safety Data Sheets (MSDS) should be prepared for all hazardous substances on site and supplied by the supplier where relevant. MSDSs'' should be updated as required;
- The contractors should provide and maintain a method statement for "Diesel tanks and refuelling procedures";
- Bulk fuel storage tanks on the site should be on an impermeable surface that is bunded and able to contain at least 110% of the volume of the tanks. The filler tap should be inside the bunded area where possible and the bund wall should not have a tap or valve;
- A Flammable Liquid License should be obtained for diesel volumes greater than 200 m^3
- Environmental Authorisation is required for volumes greater than 80 m^3;
- Bulk fuel storage tanks should be located in a portion of the construction camp where they do not pose a high risk in terms of water pollution (i.e. they should be located away from water courses). No bulk fuel storage will be allowed within the 200 m buffer zone from the edge of the watercourse;
- Bulk fuel storage tanks should be placed so that they are out of the way of traffic, so that the risk of the tanks being ruptured or damaged by vehicles is minimised; and
- Bulk fuel storage areas should be covered during the rainy season.

Security

- Unsociable activities such as consumption or illegal selling of alcohol, drug use or selling on site are prohibited;
- Any persons found to be engaged in such activities shall have disciplinary and / or criminal action taken against them;
- No person shall enter the site unless authorised to do so by the contractor, Site Manager and ESO; and
- If any fencing interferes with the construction process, such fencing shall be deviated until construction is completed. The deviation of fences shall be negotiated and agreed upon with the landowner in writing by the ESO;
- Trespassing on private / commercial properties adjoining the site is forbidden; and
- The site should be secured in order to reduce the opportunity for criminal activity in the locality of the construction site.

Social environment:

- All contact with affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times;
- A complaints register shall be kept on site. Details of complaints, including the manner in which it was addressed and resolved, should be incorporated into the audits as part of the monitoring process. The register is to be tabled during monthly site meetings;

- No interruptions other than those negotiated shall be allowed to any essential services;
- Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. A record of all damage and remedial actions shall be kept on site;
- Road rehabilitation should take place during and once construction is completed;
- Construction traffic should only make use of approved routes;
- The approved Social and Labour Plan should be implemented;
- Where possible unskilled or skilled labour opportunities should be afforded to local community members;
- Equal opportunities for employment should be created to ensure that the local female population also have access to these opportunities. Females should be encouraged to apply for positions; and
- Payment should comply with applicable Labour Law legislation in terms of minimum wages.

Cultural and Heritage artefacts

1. **Remaining Extent of the Farm Mamatwan:**
    - The homestead on the Remaining Extent is older than 60 years, and is subsequently protected under the National Heritage and Resources Act, 1999 (Act No. 25 of 1999). Care should be taken that this structure is not affected by the construction and operations of the proposed mine;
    - A conservation buffer of 20 m should be placed around the graveyard located in close proximity to the homestead, as all graves are protected under the Human Tissue Act, 1983 (Act No. 65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), while graves older than 60 years are protected under the National Heritage and Resources Act, 1999 (Act No 25 of 1999);
    - Due to the presence of Late Stone Age (LSA) artefacts in a 200 m radius of the dry riverbed on the western section of the Remaining Extent, no development should take place within the buffered area. Should the need for development within this buffer arise, it is recommended that a Phase 2 Archaeological Impact Assessment be conducted prior to any construction or development activities; and
    - Should culturally significant material or skeletal remains be exposed during development and construction phases, all activities must be suspended pending further investigation by a qualified archaeologist (Refer to the National Heritage and Resources Act, 25 of 1999 section 36 (6)).

2. **Portions 3, 8 and the demarcated section of Portion 19 of the farm Mamatwan 331:**
    - Should culturally significant material or skeletal remains be exposed during development and construction phases, all activities must be suspended pending further investigation by a qualified archaeologist (Refer to the National Heritage and Resources Act, 25 of 1999 section 36 (6)).

Closure of Construction Phase

1. **Removal of equipment**

- All structures comprising the construction camp are to be removed from the site;
- The area that previously housed the construction camp is to be checked for spills of hazardous substances such as oil, paint etc. and these shall be cleared up and contaminants disposed of appropriately; and
- All hardened surfaces within the construction camp area should be top soiled and regressed using the guidelines as set out in the section on Flora and Fauna that forms part of this document.

2. **Temporary services**

- The Contractor should arrange the cancellation of all temporary services including chemical toilets. The toilets should be removed from the site and any spills or leaks of sewage should be cleaned up and contaminated soil should be disposed of at a licenced facility;
- Temporary roads should be closed and access across these blocked; and
- All areas where the temporary services were installed are to be rehabilitated to the satisfaction of the ESO and ECO.

3. **Associated infrastructure**

- Surfaces are to be checked for waste products from activities such as concrete batching and cleared in a manner approved by the ESO and ECO;
- All surfaces hardened due to construction activities are to be ripped and imported material thereon removed;
- All rubble is to be removed from the site to an approved landfill site as approved by the ESO and ECO. Burying of rubble on site is prohibited;
- The site is to be cleared of all litter;
- The Contractor is to check that all watercourses are free from building rubble, spoil and waste materials;
- Fences, barriers and demarcations associated with the construction phase are to be removed from the site;
- All residual stockpiles should be removed or spread on site as directed by the ESO and ECO;
- All leftover building materials should be removed from the site; and
- The Contractor should repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to damage caused by poor stormwater management.

4. **Rehabilitation**

- Disturbed areas of natural vegetation as well as cut and fills should be rehabilitated immediately after the installation of the new infrastructure to prevent further soil erosion;

- Once the mining phase is completed, all redundant infrastructure, soil, waste and construction materials should be removed from site by the proponent and disposed of in an appropriate manner, i.e. at a registered site;
- Disturbed areas, which are to remain free of development, should be rehabilitated to a state comparable to the surrounding vegetation;
- Areas compacted by vehicles during the mining phase may have to be ripped to allow penetration of plant roots and the re-growth of vegetation;
- Stockpiled topsoil (not higher than 1.5 m) should be used as the final cover for all disturbed areas where re-vegetation is required;
- Due to the sensitivity of the drainage lines, re-vegetation of these areas should take place as soon as possible after the work is completed and erosion control measures should be employed both during and after operation;
- To reduce the loss of material by erosion, the contractor should ensure that disturbance on site is kept to a minimum;
- All disturbed areas should be mulched to encourage vegetation re-growth. Mulch used should be free from alien seed;
- These areas should be cordoned off so that vehicles or construction personnel cannot gain access to these areas.

8.3 EMPr: Operational Phase

Water Quality:

1. Sanitation

- The Site Manager is responsible for the provision of adequate ablution facilities for all workers on site;
- The facilities should be regularly serviced to reduce the risk of topsoil, surface or groundwater pollution;
- Sanitary arrangements should be to the satisfaction of the ECO, ESO and the local authority. The toilets and other ablution facilities should be kept in a clean, neat and hygienic condition. Toilet paper should be supplied at all toilets at all times;
- Toilets provided should be easily accessible and a maximum of 50m from the works area where possible to ensure they are utilised;
- Sewage treatment and disposal should be implemented according to best practice methods and standards and care should be taken that no leaking of sewage take place; and
- Treated sewage should be disposed of at a suitable licenced facility.

2. Water resources

- When chemicals e.g. paint, fuels and oils are handled during construction and maintenance, impermeable material (drip tray) must be placed underneath to prevent spilling on the ground;
- It must be ensured that a credible company removes used oil after vehicle servicing;
- A sufficient supply of absorbent fibre should be kept at the site to contain accidental spills;
- Used absorbent fibre must be land-farmed, using approved methodologies;
- Domestic waste water, especially sewage, must either be treated at site according to accepted principles, or removed by credible contractors;
- Solid waste must similarly either be stored at site on an approved waste dump, or removed by credible contractors;
- To assess the impacts of the stockpile area on the groundwater regime a groundwater analysis need to be undertaken;
- Groundwater monitoring must be conducted according to the specifications in the Geohydrological Report:
    - Although no or little groundwater contamination is expected during the mining phases due to the cone of depression, it is nevertheless recommended that groundwater quality be monitored on a quarterly basis. This is essential to provide a necessary database for future disputes.
    - Water samples must be taken from all the monitoring boreholes by using approved sampling techniques and adhering to recognised sampling procedures. Samples should be analysed for both organic as well as inorganic pollutants, as mining activity often lead to hydrocarbon spills in the form of diesel and oil. At least the following water quality parameters should be analysed for:
        1. Major ions (Ca, K, Mg, Na, SO4, NO3, Cl, F)
        2. pH
        3. Electrical conductivity (EC),
        4. Total Petroleum Hydrocarbons (TPH)
        5. Total Alkalinity
    - These results should be recorded on a data sheet. It is proposed that the data should be entered into an appropriate computer database and reported to the Department of Water Affairs;
- Management of the stockpile in accordance with Section 73 of the MPRDA Regulations (No. R527, 2004).
- Vehicles are to be maintained in good working order so as to reduce the probability of leakage of fuels and lubricants;

- A walled concrete platform, dedicated store with adequate flooring or berm area should be used to accommodate chemicals such as fuel, oil, paint, herbicide and insecticides, as appropriate, in well-ventilated areas;
- Storage of potentially hazardous materials should be above any 100-year flood line, or as agreed with the Environmental Control Officer. These materials include fuel, oil, cement, bitumen etc.;
- Surface water draining off contaminated areas containing oil and fuel would need to be channelled towards a sump which will separate these chemicals and oils;
- All materials prone to spillage are to be stored in appropriate structures with impermeable flooring;
- Chemical toilets are to be provided and maintained for construction crews. Maintenance must include their removal without sewage spillage;
- Under no circumstances may ablutions occur outside of the provided facilities;
- No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority;
- In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs must be informed immediately;
- Store all litter carefully so it cannot be washed or blown into any of the water courses within the study area;
- Provide bins for staff at appropriate locations, particularly where food is consumed; the construction site should be cleaned daily and litter removed;
- Conduct ongoing staff awareness programs so as to reinforce the need to avoid littering; and
- Care should be taken to contain contaminated water and prevent it from seepage to the aquifer. Therefore it is especially important that, product stockpiles, tailings dams and dirty water dams should be properly lined.

Surface Water

- Operational staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction related activities;
- Site design and operation should ensure that surface- / stormwater be diverted away from excavation trenches;
- “NO ENTRY” signs should be strategically placed along the watercourse buffer zone or other natural or man-made drainage lines which are in close proximity to access routes;
- Stockpiles should not be positioned such that they obstruct natural water pathways and drainage channels;

- Sampling methodology applies predetermined points within the landscape with probability of influence by operational water flow and discard is sampled on a monthly basis (refer to Section 9.12 of this EMPr).
- The contractor should ensure that excessive quantities of sand, silt and silt-laden water do not enter the stormwater system. Design of the stormwater drainage system should ensure that the local and surrounding natural systems are not negatively impacted. Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses should be taken. These measures should be reviewed and audited by the ESO and ECO; and
- No wastewater may run freely into any of the surrounding naturally vegetated areas. Runoff containing high sediment loads should not be released into natural or municipal drainage systems or nearby watercourses. If this becomes a problem it is recommended that an attenuation pond be constructed to allow solids to settle prior to runoff leaving the site.

Ground Water

- Although no significant impact is predicted and no extraordinary mitigation measures are recommended, it is essential to monitor surrounding boreholes to build a reliable database. The groundwater monitoring system must adhere to the criteria as specified within the Geohydrological Report;
- It is important to monitor static groundwater levels on a quarterly basis in all boreholes within a zone of 2 km surrounding the mine to ensure that any deviation of the groundwater flow from the idealized predictions is detected in time and can be reacted upon appropriately. Preferred flow structures (dykes, sills, faults etc.) have not been included in the model due to the unknown hydraulic characteristics, and these structures could alter the actual effects considerably;
- The affected users of groundwater in the area should be compensated. This may be done through the installation of additional boreholes for water supply purposes, or an alternative water supply.
- Water availability and quantity needs to be monitored regularly to ensure that basic needs and human health are not compromised (refer to Section 9.3 of this EMPr for the methodology and frequency of monitoring);
- These include the containment and treatment of pollution sources with measures such as treatment of contaminated water, monitoring of borehole yields in the expected cone of depression to assess the impact of dewatering and correctly manage the process;
- Runoff water from the waste dumps, stockpiles and contaminated storm-water should be channelled into pollution control dams to avoid effects on groundwater and surface water;
- Prevent mixing of clean and dirty water by constructing suitable storm-water management infrastructure.
- Bulk water supply provided by Sedibeng Water from the Vaal Gamagarra pipeline (or another source approved by the ESO and ECO) should be used for all mining activities to prevent dewatering of the groundwater aquifer;

- 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 vehicles and other chemicals from construction activities e.g. paints, may lead to the infiltration of toxicants into the groundwater; and
- Mining material stockpiles should be lined to prevent seepage from the stockpiles that may contaminate groundwater resources.

2. Fuel storage

- Topsoil and subsoil to be protected from contamination;
- Any storage tanks containing hazardous materials should be placed in bunded containment areas with sealed surfaces. The bund walls should be high enough to contain 110% of the total volume of the stored hazardous material;
- Vehicles and equipment requiring fuel should preferably be refuelled offsite or if onsite in a demarcated area on an impermeable surface or placing drip-trays underneath to prevent ground surface and water pollution; and
- Contaminated soil should be contained and disposed of offsite at an approved landfill site.

Air quality:

1. Dust control

- Damping down the un-surfaced and un-vegetated areas during windy periods is required;
- Retention of vegetation where possible will reduce dust travel;
- The ESO shall be responsible for dust control on site to ensure no nuisance is caused to the Landowners or neighbouring communities;
- A speed limit of 30km/h on dirt roads (if any) should not be exceeded;
- Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the ESO or Site Manager and recorded in the complaints register as well as any actions taken to respond to the complaint and remedy dust pollution;
- Air quality monitoring must be carried out as described in Section 9.11 of this EMPr;

2. Emissions control

- Regular servicing of vehicles in order to limit gaseous emissions (to be done offsite);
- Regular servicing of onsite toilets to avoid potential odours;
- Odour control to be implemented and sewage treatment facility; and
- Allocated cooking areas should be provided.

3. **Fire prevention**

- All cooking shall be done in demarcated areas that are safe in terms of runaway or uncontrolled fires; and
- The ESO shall have operational fire-fighting equipment available on site at all times. The level of fire-fighting equipment should be assessed and evaluated through a typical risk assessment process. It may be required to increase the level of protection, especially during the dry winter months.

Waste Management:

- The proponent should provide and maintain a method statement for "solid waste management". The method statement should provide information on proposed licensed facility to be utilised and details of proposed record keeping for auditing purposes;
- Waste should be separated into recyclable and non-recyclable waste, and should be separated as follows:
    - Hazardous waste: including (but not limited to) old oil, paint, etc.;
    - General waste: including (but not limited to) domestic waste;
    - Reusable operational material; and
    - Recyclable waste should preferably be deposited in separate bins. The contractor is advised that "Collect-a-Can" collect tins, including paint tins, chemical tins, etc. and "Consol" collect glass for recycling.;
- Any illegal dumping of waste should not be tolerated, this action will result in a fine and if required further legal action will be taken. This aspect should be closely monitored and reported on; proof of legal dumping should be produced on request;
- Bins should be clearly marked for ease of management;
- All refuse bins should have a lid secured so that animals cannot gain access;
- Sufficient closed containers should be strategically located within the mining site to handle the amount of litter, wastes, rubbish, domestic waste;
- All solid and chemical wastes that are generated should be removed and disposed of at a licensed waste disposal site. The proponent is to provide proof of such to the ECO;
- Chemical containers and packaging brought onto the site should be removed for disposal at a suitable site; and
- A skip, with a cover, should be used to contain refuse from campsite bins, rubble and other construction material.
- Sewage treatment and disposal should be implemented according to best practice methods and standards and care should be taken that no leaking of sewage take place;
- Treated sewage should be disposed of at a suitable licenced facility;

Maintenance:

- Regular inspection of the mining operations should take place to monitor its operational status;
- The surrounding community should be encouraged to report any unexpected fault / failure to Mamatwan Manganese (Pty) Ltd as soon as possible.

Vegetation:

- An appropriate waste management programme should be implemented throughout the mining phase;
- Fires from cooking should be located within the enclosed, demarcated area. Fire-fighting equipment should be kept onsite in order to contain an accidental fire.
- Ensure that operational activities are limited to the proposed mining infrastructure area according to the layout;
- Vehicles may only move within demarcated areas and approved access roads used;
- Vehicle access to Mamatwan Manganese should as far as possible be limited to existing roads;
- All weeds and invasive vegetation should be eradicated over a five year period;
- Encroacher vegetation species should also be controlled throughout the operational phase; and
- No faunal species should be harmed or disturbed by maintenance staff during the routine checks of the mining operations infrastructure or by operational staff.

Noise:

- Heavy vehicle traffic should be routed away from noise sensitive areas, where possible;
- Noise levels should be kept within acceptable limits. All noise and sounds generated should adhere to SABS specifications for maximum allowable noise levels for mining operations;

- No pure tone sirens or hooters may be utilised except where required in terms of SABS standards or in emergencies;
- Blasting operations (if any) are to be strictly controlled with regard to the size of explosive charge in order to minimise noise and air blast, and timings of explosions. The number of blasts per day should be limited, blasting should be undertaken at the same times each day and no blasting may be allowed at night;
- The Contractor should take measures to discourage labourers from loitering in the area and causing noise disturbance;
- Noise generating activities should be restricted to between 06h00 and 18h00 Monday to Friday, and 06h00-13h00 on Saturdays and no work to be conducted on Sundays or Public Holidays, unless otherwise approved by the appropriate competent person in consultation with adjacent landowners or potentially affected persons; and

- Noise impacts should be minimised by restricting the hours during which the offending activities are carried out and, where possible, by insulating machinery and/or enclosing areas of activity.

Heritage and Cultural Artefacts:

- Should culturally significant material or skeletal remains be exposed during development and construction phases, all activities must be suspended pending further investigation by a qualified archaeologist (Refer to the National Heritage and Resources Act, 25 of 1999 section 36 (6)).

Health and Safety:

- A health and safety plan in terms of the Occupational Health and Safety Act (Act 85 of 1983) should be drawn up and implemented to ensure worker safety;
- A health and safety control officer should monitor the implementation of the health and safety plan for the operational phase;
- Regular health and safety audits should be conducted and documented; and
- Most health and safety management actions and measures during the construction phase also applies to the operational phase and applicable actions and measures described in Section 8.2 of this EMPr should be included in the plan and implemented.

Security

- Unsociable activities such as consumption or illegal selling of alcohol, drug use or selling within the mining operations area are prohibited;
- Any persons found to be engaged in such activities shall have disciplinary and / or criminal action taken against them;
- No person shall enter the site unless authorised to do so by security personnel;
- Trespassing on private / commercial properties adjoining the site is forbidden; and
- The site should be secured in order to reduce the opportunity for criminal activity in the locality.

Social environment:

- All contact with affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times;
- A complaints register shall be kept on the mining operation site. Details of complaints, including the manner in which it was addressed and resolved, should be incorporated into the audits as part of the monitoring process. The register is to be tabled during routine meetings;
- Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the proponent. A record of all damage and remedial actions shall be kept on site;
- Road maintenance within the site should take place during the operational phase;
- Heavy vehicles should only make use of approved routes;

- The approved Social and Labour Plan should be implemented;
- Where possible unskilled or skilled labour opportunities should be afforded to local community members;
- Equal opportunities for employment should be created to ensure that the local female population also have access to these opportunities. Females should be encouraged to apply for positions; and
- Payment should comply with applicable Labour Law legislation in terms of minimum wages.

8.4 EMPR: Closure / Decommissioning Phase

Closure goals and targets

The main closure goal of the mine should be that all residual environmental impacts associated with the construction, operation and rehabilitation methods employed, including possible infrastructure, stockpile, dumps or waste water containment structures, be neutralized or minimised such that the post-operational environment is able to function in a manner which conforms to the concept of sustainable development.

Specifically, the rehabilitation and closure objective of the Mamatwan Manganese (Pty) Ltd mining operations should be that the final (end) land use will as a minimum be comparable to the pre-operational land use of grazing, which could further be optimized for either a game farming, conservation and / or eco-tourism activities in future. This will also ensure that employment opportunities lost after mining operations can be mitigated although not totally, but at least to a certain extent.

The predominant pre-operational land capability is that of grazing and the focus of the rehabilitation program will be that the post-operational environmental be suitable for grazing again. The development of low yield graze land is a possible end land use. The following objectives were identified: Note that these objectives have been spelled out to be specific, measurable, relevant and achievable:

Implement operational control measures as indicated and required by the EMPr:

- Initiate first stage rehabilitation with the aim of establishing low yield graze land, simultaneous acknowledgement of structural and service related factors for the end land use objectives;
- Establish a close working relationship with adjacent landowners and organisations and facilitate a common long term closure objective;
- Address post operational objectives as stipulated in the section below; and
- Establish and conform to a frequent monitoring and reporting programme, such that liability assessments as well as legal compliance is tested and screened for improvements.

8.4.1 Socio-economic impacts

The mining operation is only a temporary use of land, so it is vital that rehabilitation of land takes place once these operations have stopped. In best practice a detailed rehabilitation or reclamation plan is designed and approved for each of the activities.

Reclamation activities are undertaken gradually;

- with the shaping and contouring of natural environment,
- removal of infrastructure,
- replacement of topsoil,
- seeding with grasses and planting of trees taking place, and
- Care is taken to relocate streams, wildlife, and other valuable resources.

The above is largely achieved through bulldozers and scrapers which are used to reshape the disturbed area. Drainage within and off the site should be designed to make the new land surface as stable and resistant to soil erosion as the local environment allows.

The above is however much dependent on the actual environmental conditions, historical activities such as:

- The objective for closure of the mining operations is to create a free draining post operational landscape that has been returned to a productive post operational land use. The land use is likely to be primarily wilderness with the potential for arable agriculture and livestock grazing;
- No new fixed infrastructure will be established on closure and all existing infrastructure will be removed; and
- The closure objective regarding groundwater is zero discharge of contaminated water to the environment.

8.4.2 Infrastructure area

The removal, decommissioning and disposal of all infrastructure, will comply with all conditions contained in the EMPr. To this end, decommissioning and rehabilitation of all infrastructure areas will follow the following principles:

- Dismantle project related infrastructure. Load and remove from site for re-sale or disposal at an approved waste site;
- Any item that has no salvage value to Mamatwan Manganese (Pty) Ltd but could be of value to individuals will be treated as waste;
- Demolish and remove concrete foundations and slabs to an approved waste disposal facility;
- Inert ceramics such as bricks, concrete, gravel will be used as backfill or disposed of in a permitted waste disposal site;
- Inert waste, which is more than 500 mm underground, such as pipes will be left in place;
- Dismantle and remove redundant fence for salvage;

- Cover the fence line with topsoil;
- The company contracted to supply fuel will be requested to remove all fuel storage and reticulation facilities;
- All structures will be demolished and terracing and foundations removed to the lesser of 500 mm below the original ground level;
- Rip and grade the above areas for placement of topsoil;
- Rip and grade access roads for placement of topsoil;
- Maintenance of roads required for maintenance and monitoring;
- Load from stockpile, haul, place and spread a layer of topsoil on all areas on which vegetation will be established;
- Establish vegetation on top-soiled surfaces, including analysis of topsoil, application of fertilisers, application of seed and hand planting as necessary;
- Active maintenance of planted areas for a period of at least a year, including re-seeding and replanting, weed and alien vegetation control as required;
- Passive maintenance of planted areas, including re-seeding and re-planting, weed and alien vegetation control as required;
- Undertake complete groundwater quality and water level monitoring in order to establish long-term groundwater levels and quality trends;
- Access roads will have consolidated basement materials lifted and disposed in to pit. Footprint of access roads will be ripped to a depth of 1.0 meters. Topsoil will be spread over the ripped access road footprint to a depth of 300 mm and reseeded; and
- Piping and water treatment infrastructure will be maintained on site until water quality monitoring data proves that the water quality is acceptable for direct release to the receiving environment. The detailed closure plan that will be developed at end of operational life will address long term water monitoring and maintenance requirements.

8.4.3 Maintenance of Impacts Identified

- The necessary agreements and arrangement will be made by Mamatwan Manganese (Pty) Ltd to ensure that all natural, physical, chemical and biological processes for which a closure condition were specified are monitored until they reach a steady state or for three (3) years after closure or as long as deemed necessary at the time;
- Such processes include erosion of the rehabilitated surfaces, surface water drainage, ground water recharge, air quality, surface water quality, ground water quality, vegetative re-growth, weed encroachment; and
- The closure plan will be reviewed every one (1) years.

8.4.4 Topography: Surface Infrastructure

Management objectives

Return topography as close as possible to pre-operational topography.

Management principles and criteria

- Remove all concrete or steel structures that cannot be used by the community;
- Topsoil and rehabilitate open areas; and
- Rehabilitation includes planting and shaping to fit in with the natural topography.

8.4.5 Soil: Erosion

Management objectives

To prevent erosion.

Management principles and criteria

- It is not anticipated that surface subsidence will occur associated with the mining operations. Some minor settlement may occur, however it is unlikely to result in ponding of water;
- Vegetation establishment in disturbed areas will be undertaken during the rainy season;
- Mamatwan Manganese (Pty) Ltd will observe the requirements of the Department of Agriculture Forests and Fisheries (DAFF) in the design of effective erosion control measures on bare soils. These requirements are as follows:
    - Erosion control measures are required in all areas where slope gradients exceed 2%;
    - Engineered erosion control measures are required where slope gradients exceed 7º (15%);
    - The following activities will be included:
        - Ensure that all slopes are safe in the long term;
        - Submission of closure report and application for closure to the authorities;
        - Environmental monitoring and maintenance for three (3) years after closure; and
        - Rehabilitation of the land will be maintained until a closure certificate is granted or until the land use is regarded as sustainable.

8.4.6 Land Capability: Loss of Grazing Land

Management objectives

- Restore disturbed land to grazing potential; and
- After rehabilitation the site will be returned as close as possible to the pre-operational land capability.

Management principles and criteria

- All other sites, will be landscaped so that the slope gradient is as gentle as possible and minimal erosion control measures are required;

- Spread available topsoil on all areas on which vegetation will be established;
- Before seeding and planting, topsoil should be sampled and analysed to establish fertility status and fertilised accordingly; and
- Maintain planted areas for a period of at least 3 years, including fertilisation, re-seeding and replanting, weed and alien vegetation control as required.

8.4.7 Natural Vegetation: Loss of Biodiversity and Ecological Function

Management objectives

- Restore disturbed land to grazing potential at all sites.

Management principles and criteria

- Rehabilitated areas of grazing capability will comprise a grass community dominated by grasses of pasture origin. These areas will be managed by a combination of grazing or mowing or veldt burning to effect defoliation. Mamatwan Manganese (Pty) Ltd to monitor re-grassed areas as indicated in order to demonstrate the trend towards the areas becoming self-maintaining in these rehabilitated systems.

8.4.8 Visual Aspects: Negative Visual Impact

Management objectives

- To limit the visual impact of the project on both the surrounding landowners and the Ga-Segonyana Local Municipality.

Management principles and criteria

- All disturbed areas to be rehabilitated;
- Areas to be re-vegetated with endemic trees and grass species; and
- Remaining waste areas to be flattened, sloped, covered with topsoil and vegetated.

8.4.9 Regional Socio-Economic Impacts

Management objectives

- To mitigate the impacts of the termination of the project. Closure will result in cessation of employment, with a limited number of workers benefiting from closure and decommissioning activities.

Management measures

- Mamatwan Manganese (Pty) Ltd will give advance warning of the closure of the manganese mining operations as early as practically possible, so that employees have the maximum time to seek alternative employment;

- Mamatwan Manganese (Pty) Ltd will offer professional employee counselling to deal with the effects of job loss to reduce the traumatic effect of dismissal. Where dismissal based on operational requirements becomes necessary the company will offer training in small business development and relevant skills to encourage job creation and financial independence;
- Mamatwan Manganese (Pty) Ltd will provide severance payments and assist employees in obtaining social benefits. Mamatwan Manganese (Pty) Ltd will take reasonable steps to notify employees, recently dismissed in terms of the Social and Labour Plan procedure, of vacancies, which have occurred subsequent to their dismissal, so that they may apply for re-employment. Application for such vacancies should be forwarded within the stipulated period and will be considered with due regard to the skills required;
- Local product and service providers will be most affected by the reduced economic activity in the area as a result of the mines' closure. Mamatwan Manganese (Pty) Ltd will assist in the re-focussing and diversification of local service providers in accordance with sustainable development principles;
- Rehabilitated land and remaining infrastructure could be used for other purposes, which could include agriculture (grazing), tourism, training centres and other activities; and
- Rehabilitation should take account of sustainable development opportunities, formulated with the local community.

9. ENVIRONMENTAL MONITORING

According to the regulation 33 of GN R543, an environmental management programme should include:
(e) proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereof

The Environmental Management Programme (EMPr) becomes a tool by which compliance on the proposed site can be measured against. In order to utilise the tool, environmental monitoring needs to take place with regular audits against the EMPr to ensure that all aspects are attended to.

Environmental monitoring establishes benchmarks to judge the nature and magnitude of potential environmental and social impacts.

Some of the key parameters for monitoring and auditing of the proposed project include the following *inter alia*:

- Soil erosion and siltation;
- Oil and other contaminant spillages;
- Dust and gaseous emissions;
- Water quality;
- Noise and Vibration;

- Change in biodiversity;
- Socio-economic change; and
- Land use changes.

The overall objective of environmental and social monitoring is to ensure that mitigation measures are implemented and that it is effective. Environmental and social monitoring will also enable responses to new and developing issues and concerns. The activities and indicators that have been recommended for monitoring are presented in the EMPr.

Environmental monitoring will be carried out to ensure that all construction activities comply and adhere to environmental provisions and standard specifications. The contractor shall employ an ESO responsible for implementation of social and environmental requirements. This person will maintain regular contact with the local / district Environmental Officer and the ECO. The Contractor and proponent will have a responsibility to ensure that the proposed mitigation measures are properly implemented during the construction phase. The proponent will be responsible for implementation of the EMPr through all phases of mining including the planning, pre-construction, construction, operational and decommissioning and rehabilitation phases.

The environmental monitoring program will operate through the pre-construction, construction, operational and decommissioning and rehabilitation phases. It will consist of a number of activities, each with a specific purpose with key indicators and criteria for significance assessment. The following aspects will be subject to monitoring:

- Water quality of surface and ground water resources;
- Air quality;
- Noise, vibration and shock levels and disturbance;
- Soil conservation
- Encroachment into sensitive areas;
- Maintenance of project footprint;
- Vegetation maintenance around project work sites, workshops and camps; and
- Health and Safety.

Monitoring should be undertaken at a number of levels. Firstly it should be undertaken by the contractor at work sites during construction, under the direction and guidance of the ECO who is responsible for reporting the monitoring to the implementing agencies. It is not the Contractors' responsibility to monitor land acquisition and compensation issues. It is recommended that the Contractor employ local full time qualified environmental inspectors for the duration of the Contract.

Environmental monitoring is also an essential component of project implementation. It facilitates and ensures the follow-up of the implementation of the proposed mitigation measures as they are required. It helps to anticipate possible environmental hazards and / or detect unpredicted impacts over time.

Periodic ongoing monitoring will be required during the life of the project and the level can be determined once the project is operational.

9.1 Dust and Air Quality

Passive sampling (Gravimetrical Dust Bucket)

This method entails a dust stand and bucket at a minimum of eight locations on the peripheral area of the operation, these areas are selected by using the prevailing wind directions on the area.

Three (3) cycles of Dust fall out samples per quarter is taken (thus monthly), analysis includes gravimetrical ($mg/m^3/day$) and one metals scan per quarter.

Gravimetrical analysis of dust fall out is done according to SANS 1929 methodology at an independent registered laboratory.

Active sampling (High volume dust sampler EVM 07 Quest)

- Active sampling includes 8 suites of samples on the 8 sampling sites (main compass point directions).
- A suite includes SO_2, NO_2, HF, HCl, VOC, CO_2 en PM_{10} and PM 2.5.
- Analysis is done on site by the EVM 7 Environmental Monitor device.

Standards applied

Analysis of all samples (active and passive) are done according to the SANS 1929: 2004 methodology at a registered independent laboratory.

9.2 Surface water

- Sampling methodology applies predetermined points within the landscape with probability of influence by operational water flow and discard is sampled on a monthly basis.
- Analysis includes Chemical, Biological and Metal tests.
- DWA guidelines, general standards and SANS 241:2006

9.3 Groundwater

- Sampling methodology includes the testing of predetermined boreholes affected or used by operations are sampled on a quarterly basis or on a frequency requested by the owner or in compliance with the Environmental Management Programme of the organisation.
- All groundwater tests are done according to SANS 241: 2006 methodologies at an independent and registered laboratory.

9.4 Fauna and Flora

- Specialist monitoring on Faunal and Floral aspects include the monitoring of effects operational processes have on vegetation and accompanied animal life within the immediate or surrounding areas of the operations.
    - Alien vegetation control and management;
    - Habitat and vegetation management;
    - Rehabilitation services include the rehabilitation of operational disturbed areas and hydrocarbon spill areas;
    - Re-vegetation and sloping of disturbed area to surrounding landscape; and
    - Remediation of soil at spill sites.

Monitoring should take place during and after the rehabilitation phase as well.

9.5 Environmental inspection

Site inspection should include observations and reporting on site-specific environmental aspects and impacts.

10. GENERAL EMERGENCY PROCEDURES AND CONTINGENCY

10.1 Fire protection

Portable fire extinguishers suitable to each area, conditions and hazards shall be provided and in a ready to use condition. They should be conspicuously located and mounted so as to be readily accessible. Fire extinguisher training to be provided to designated fire marshals.

10.2 Fire Emergency

In the case of fire, set off the alarm and notify emergency services immediately. Secure the scene and isolate the area allowing sufficient space for access by the emergency services and escape routes in the event of an escalation of the incident. Follow evacuation procedures. Identify major risks to minimise the environmental impacts e.g., air pollution contaminated effluent runoff.

10.3 General Emergency

Where an incident occurs, personnel at the scene shall render assistance to limit further damage and minimise the environmental impacts. There should be minimum delay in calling emergency services. The first responder shall judge how much information to obtain before emergency services are called and further provide information on an ongoing basis, as it becomes available.

10.4 Spill Emergency including hydrocarbon spills

Assess the risk by means of MSDS for the spilled substance before taking any action. Where necessary, call the emergency services immediately. Secure the scene and isolate the area to ensure the safety of people and the environment. Efforts to protect the environment should be weighed against the possibility of becoming part of the problem. The first responder shall remain in command of the scene of the incident until the arrival of emergency services at which time he passes on all relevant information to the person in command. Compile a brief written report as soon as possible thereafter while the facts are still fresh.

10.5 Evacuation during an Emergency

An evacuation may be ordered when any hazard (e.g. fire, gas leak, hazardous substance spill, toxic fumes or bomb threat) exists which may endanger the building, its occupants or the environment. Evacuation should be done according to a locally devised plan (site specific) which should take environmental hazards into account. Evacuation is to be initiated by an alarm and done in accordance with Occupational Health and safety guidelines.

10.6 Hazard Communication

Employees have a 'right to know' and be informed regarding the chemical and other hazards that they and the environment are exposed to under normal conditions of use or in a foreseeable emergency. This document is applicable to all employees, including those working at remote facilities and operations, who engage in the use of hazardous chemicals. Information and inventories of hazardous chemicals, including MSDSs' should be available at all times where they are used. Employees using these products shall be trained in the specific handling precautions of substances used for their work. Induction programs for new employees should include relevant information described here. Ensure through the use of appropriate and visible signs that employees not normally assigned to the work area are aware of the hazards to which these areas are subjected. Report all working conditions, which may put the environment at risk.

10.7 Management of alien and invasive species and encroaching plants

Aliens and invasive plants are opportunistic plants that invade areas that are disturbed, thus competing and replacing endemic plants. They have a potential to degrade the area and make it more susceptible to fire as their fuel content is high and uses more water than the indigenous plant species. Land uses that often disturbed the environment such as infrastructure development, mining, agriculture and mismanagement of environment results in the area being susceptible to alien and invasive plant invasion. In terms of CARA 43 of 1983 alien and invasive plants are to be controlled and prevented.

The area in which the proposed activity will take place is already prone to bush encroachment and further disturbance may trigger alien invasion; thus, rehabilitation measures should be considered and be implemented

accordingly should the proposed activity be approved. Replacement of weedy plants with indigenous or economical important plant species should be a priority.

11. ENVIRONMENTAL AWARENESS

According to the regulation 33 of GN R543, an environmental management programme should include:

- An environmental awareness plan describing the manner in which: -
  - i. The applicant intends to inform his or her employees of any environmental risk which may result from their work; and
  - ii. Risks should be dealt with in order to avoid pollution or the degradation of the environment.

Reference are made to the Environmental Awareness Plan compiled for this project and attached as *Annexure A* to the document. This plan should be implanted.

Environmental training:

- The proponent and its employees and consultants should familiarise themselves with the content of this document and that the ESO ensures that the proponent and his staff understand the content of this document and its implications;
- Ensure that all site personnel have a basic level of environmental awareness training. Topics should include:
  - What is meant by the environment?
  - Why the environment needs to be protected and conserved?
  - How construction activities can impact on the environment?
  - Awareness of emergencies and spillages;
- It is the Contractors' responsibility to provide the Site foreman with environmental training and to ensure that the foreman has sufficient understanding to pass this information on to the construction staff;
- Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary;
- The need for a clean site policy also needs to be explained to the workers;
- Staff operating (such as excavators, loaders etc) shall be adequately trained and sensitised to any potential hazards associated with their tasks;
- The Contractor should monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear;
- Toolbox talks (Green talks) are recommended.

Contractors shall ensure that their employees and any third party who carries out all or part of the Contractors' obligations are adequately trained with regard to the implementation of the EMPr, as well as regarding environmental legal requirements and obligations. Training shall be conducted by the ECO where necessary.

Environment and Health awareness training should be targeted at three distinct levels of employment i.e. the executive, middle management and labour. Environmental awareness training programme shall contain the following information:

- The names, positions and responsibilities of personnel to be trained;
- The framework for appropriate training plans;
- The summarized content of each training course; and
- A schedule for presentation of the training courses.

The ECO shall ensure that all records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMPr. The training records shall verify each of the targeted personnel training experience.

The developer shall ensure that adequate environmental training takes place. All employees shall have been given induction presentation on environmental awareness and the content of the EMPr. The presentation needs to be conducted in the language of the employees to ensure it is understood. The environmental training shall as a minimum include the following:

- The importance of conformance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personnel performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the Agencys' environmental management systems, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- Environmental legal requirements and obligations;
- Details regarding flora / fauna species of special concern and protected species, and the procedures to be followed should these be encountered during the mining operations;
- The importance of not littering;
- The importance of using supplied toilet facilities;
- The need to use water sparingly;
- Details of and encouragement to minimize the production of waste and re-use, recover and recycle waste where possible;

- Details regarding archaeological and or historical sites that may be unearthed during construction and the procedures to be followed should these be encountered.

12. COMPLIANCE WITH THE EMPr

According to the regulation 33 of GN R543, an environmental management programme should include:

(e) Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;

(i) The process for managing any environmental damage, pollution , pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;

12.1 Non-Compliance

The contractors shall act immediately when notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the construction site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints.

Any non-compliance with the agreed procedure of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant authority for them to deal with the transgression, as it deems fit.

The Contractor is deemed not to have complied with the EMPr if, *inter alia:*

- There is evidence of contravention of the EMPr specifications within the boundaries of the mining operations, site extensions and roads;
- There is contravention of the EMPr specifications which relate to activities outside the boundaries of the construction site;
- Environmental damage ensures due to negligence;
- Construction activities take place outside the defined boundaries of the site; and /or
- The contractor fails to comply with corrective or other instructions issued by the Engineer with a specific time period.

It is recommended that the Engineers / Contractors institute penalties for the following less serious violations and any other determined during the course of work as detailed below:

- Littering on site;
- Lighting illegal fires on site;

- Persistent or un-repaired fuel and oil leaks;
- Any persons, vehicles or equipment related to the Contractors' operations found within the designated "no-go" areas;
- Excess dust or excess noise emanating from the site;
- Possession or use of intoxicating substances on site;
- Any vehicles being driven in excess of designated speed limits;
- Removal and / or damage to fauna, flora or cultural or heritage objects on site;
- Urination and defecation anywhere except at designated facilities.

12.2 Emergency preparedness

The Contractor shall compile and maintain environmental emergency procedures to ensure that there will be an appropriate response to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the construction period. Such activities may include *inter alia*:

- Accidental discharge to water and land;
- Accidental exposure of employees to hazardous substances;
- Accidental fires;
- Accidental spillages of hazardous substances;
- Accidental toxic emissions into the air;
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans shall include:

- Emergency organisation (manpower) and responsibilities, accountability and liability;
- A list of key personnel and contact details;
- Details of emergency services available (e.g. the fire department, spill cleanup services, etc);
- Internal and external communication plans, including prescribed reporting procedures where required by legislation;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures required to be implemented;
- Information on hazardous materials, including the potential impacts associated with each;
- Training plans testing exercises and schedules for effectiveness.

The Contractor shall comply with the emergency preparedness and incidents and accident reporting requirements, as required by the Occupational Health and Safety Act (Act 85 of 1993), the NEMA (Act 107 of 1998), The National Water Act (Act 36 of 1998) and the National Veld and Forests Fire Act (Act 101 of 1998) as amended and or any other relevant legislation.

12.3 Incident reporting and remedy

If a leakage or spillage of hazardous substances occurs on site, the local emergency services should be immediately notified of the incident. The following information should be provided:

- The location;
- The nature of the load;
- The extent of the impact; and
- The status at the site of the accident itself (i.e. whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records should be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

12.4 Penalties

Where environmental damage is caused or a pollution incident, and / or failure to comply with any of the environmental specifications contained in the EMPr, the developer and / or contractor shall be liable.

The following violations, and any others determined during the course if work, should be penalised:

- Hazardous chemicals / oil spillages and / or dumping in non-approved sites;
- Damage to sensitive environments;
- Damage to cultural and historical sites;
- Unauthorised removal / damage to indigenous trees and other vegetation, particularly in identified sensitive areas;
- Uncontrolled unmanaged erosion;
- Unauthorised blasting activities (if applicable);
- Pollution of water sources;

  Unnecessary removal or damage of trees.

13. CLOSURE PLANNING

According to the regulation 33 of GN R543, an environmental management programme should include:

(k) Where appropriate, closure plans, including closure objectives.

The main closure goal of the mine should be that all residual environmental impacts associated with the construction, operation and rehabilitation methods employed, including possible infrastructure, stockpile, dumps

or waste water containment structures, be neutralized or minimised such that the post-operational environment is able to function in a manner which conforms to the concept of sustainable development.

Final site cleaning – the contractor shall clear and clean the site and ensure that everything not forming part of the permanent works is removed from the site before issuing the completion certificate or as otherwise agreed.

Rehabilitation – the contractor shall be responsible for rehabilitating and re-vegetation at all areas disturbed / areas earmarked for conservation during construction to the satisfaction of the engineer and ECO.

13.1 Post construction environmental audit

A post mining environmental audit should be carried out and submitted to DMR at the expense of the developer so as to fulfil conditions of the Environmental Authorisation granted. Objectives should be to audit compliance and the key components of the EMPr, to identify main areas requiring attention and recommend priority actions. The audit should be undertaken annually and should cover a cross section of issues, including implementation of environmental controls, environmental management and environmental monitoring.

Results of the audits should inform changes required to the specifications of the EMPr or additional specifications to deal with any environmental issues which arise on site and have not been dealt with in the current document.

13.2 Management review and revision of the EMPr

The EMPr is to be reviewed annually for the first three years and then once every five years thereafter by an independent environmental consultant, unless otherwise specified by the authorities. The auditor is to highlight issues to be addressed in the EMPr or charges required during the annual audit. These points are to be included as an annexure to the EMPr and to be considered during the review process. Recommended changes to the EMPr should be forwarded to DMR for the approval and comment, before subsequently being incorporated into the EMPr.

13.3 General review of the EMPr

The EMPr will be reviewed by the ECO on an on-going basis. Based on observations during site inspections and issues raised at the site meetings, the ECO will determine whether any procedures require modification to improve the efficiency and applicability of the EMPr on site.

Any such changes or updates will be registered in the ECOs' record, as well as being included as an annexure to this document. Annexure of this nature should be distributed to all relevant parties.

14. REPORTING

14.1 Administration

Before the contractor begins each construction activity, the Contractor shall give to the ECO and engineer a written method statement setting out the following:

- The type of mining activity;
- Locality where the activity will take place;
- Identification of impacts that may result from the activity;
- Identification of activities or aspects that may cause an impact;
- Methodology and / or specification for impact prevention for each activity or aspect;
- Methodology and / or specification for impact containment for each activity or aspect;
- Emergency / disaster incident and reaction procedure;
- Treatment and continued maintenance of impacted environment.

The contractor may provide such information in advance of any or all construction activities provided that new submissions shall be given to the ECO and / or engineer whenever there is a change or variation to the original.

The ECO and/or engineer may provide comment on the methodology and or procedures proposed by the Contractor but he shall not be responsible for the contractors' chosen measures of impact mitigation and emergency / disaster management systems. However, the contractor shall demonstrate at inception and at least once during the contract that the approved measures and procedures function properly.

14.2 Good housekeeping

The Contractor shall undertake "good housekeeping" practises during construction. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole. Good housekeeping extends beyond the wise practice of construction methods that leaves production in the safe state from the ravages of weather to include the care for and preservation of the environment within which the site is situated.

14.3 Record keeping

The engineer and the ECO will continuously monitor the contractors' adherence to the approved impact prevention procedures and the engineer shall issues to the contractor a notice of non-compliance whenever transgressions are observed. The ECO should document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. The non-compliance shall be documented and reported to the engineer in a monthly report. These reports shall be made available to DEA when requested.

The Contractor shall ensure that an electronic filing system identifying all documentation related to the EMPr is established.

A list of reports and documents which will be generated during all phases of the Mamatwan Manganese mining operations is provided below, and all applicable documentation should be included in the environmental filing system catalogue or document retrieval index.

- Environmental Management Programme;
- Final design documents and diagrams issued to and by the Contractor;
- All communications detailing changes of design / scope that may have environmental implications;
- Daily, weekly and monthly site monitoring reports;
- Complaints register;
- Medical reports;
- Training manual;
- Training attendance register;
- Incident and accident reports;
- Emergency preparedness and response plans;
- Copies of all relevant environmental legislation;
- Permits and legal documents, including letters authorising specific personnel of their duties as part of emergency preparedness teams e.g. fire teams etc;
- Crisis communication manual;
- Disciplinary procedures;
- Monthly site meeting minutes during construction;
- All relevant permits;
- Environmental Authorisations from DMR; and
- All method statements from the Contractor for all phases of the project.

14.4 Document Control

The Contractor and Resident Engineer shall be responsible for establishing a procedure for electronic document control. The document control procedure should comply with the following requirements:

- Documents should be identifiable by organisation, division, function, activity and contact person;
- Every document should identify the personnel and their positions, who drafted and compiled the document, who reviewed and recommended approval, and who finally approved the document for distribution;
- All documents should be dated, provided with a revision number and reference number, filed systematically, and retained for a five year period.

The Contractor shall ensure that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations essential to the functioning of the EMPr are performed. All documents shall be made available to the independent external auditor.

15. CONCLUSIONS

Although all foreseeable actions and potential mitigations or management actions are contained in this document, the EMPr should be seen as a day to day management document. This EMPr thus sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the Mamatwan Manganese mining operations as detailed in the Environmental Management Programme and specialists' studies. The EMPr could thus change daily, and if managed correctly leadsuccessful construction and operational phases.

Further guidance should also be taken for any conditions contained in the Environmental Authorisation, if the project is granted approval, and that these DMR conditions should be incorporated into the final EMPr.

All attempts should be made to have this EMPr available, as part of any tender documentation, so that the engineers and contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these.

16. REFERENCES

CITY OF CAPE TOWN: ENVIRONMENTAL MANAGEMENT PROGRAMME (2002) Specification EM – 02/07: ENVIRONMENTAL MANAGEMENT, Version 5 (03/2002)

Conservation of Agricultural Resources Act (Act 43 of 1983) [CARA];

DEAT (1992) Integrated Environmental Management Guideline Series, Volumes 1-6, Department of Environmental Affairs, Pretoria.

DEAT (2004a) Environmental Management Plans, Integrated Environmental Management, Information Series 12, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

Hazardous Substances Act (Act 15 of 1973);

Health Act (Act 63 of 1977);

Mine Health and Safety Act (Act 29 of 1996);

Mineral and Petroleum Resources Development Act (Act 28 of 2002);

National Environmental Management Act (Act 107 of 1998) as amended [NEMA];

National Environmental Management: Air Quality Act (Act 39 of 2004) [NEMAQA];

National Environmental Management: Biodiversity Act (Act 10 of 2004) [NEMBA];

National Environmental Management: Protected Areas Act (Act 57 of 2003);

National Environmental Management: Waste Act (Act 58 of 2009) [NEMWA];

National Water Act (Act 36 of 1998);

National Forests Act (Act 84 of 1998);

National Heritage Resources Act (Act 25 of 1999);

National Veld and Forests Fire Act (Act 101 of 1989);

Occupational Health and Safety Act (Act 85 of 1993) [OSHA];

The Constitution of South Africa (Act 108 of 1996);