SCOPING REPORT

FOR THE REHABILITATION OF PITS AND SUPPLEMENTARY PROJECTS FOR RHOVAN

Scoping Report in support of the applications for the Integrated Environmental Authorisations and Waste Management License; the amendment of the Environmental Management Programmes, Atmospheric Emission License and Water Use License for the proposed Rehabilitation of Pits and Supplementary Projects for Rhovan in terms of the National Environmental Management Act, No 107 of 1998, the National Water Act, No 36 of 1998, the National Environmental Management Air Quality Act, No 39 of 2004, the National Environmental Management: Waste Act, No 59 of 2008 and Mineral Petroleum and Resource Development Act (Act 28 of 2002 as amended).

NAME OF APPLICANT: **Rhovan, an Operation of the Rhovan PSV managed by Glencore (Pty) Ltd.**

TEL NO: +27 12 318 0711

FAX NO: +27 86 532 1760

POSTAL ADDRESS: P.O. Box 3620, Brits, 0250

PHYSICAL ADDRESS: Plot Road, Bamogopa Mine, Bethanie, Brits

FILE REFERENCE NUMBER SAMRAD: NW 30/5/1/2/3/2/1/87 EM

Report No: CHEMC-Rhovan-DSR-2019rev1

Prepared by: **CHEMC Environmental**
Contact: **Stephan Barkhuizen**
Tel: **012 802 1002**
Email: **stephan@chemc.com**

IMPORTANT NOTICE

In terms of the Mineral Petroleum and Resource Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining “will not result in unacceptable pollution, ecological degradation or damage to the environment”.

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme Report in terms of the National Environmental Management Act (Act 107 of 1998) ("**NEMA**"), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority. In terms of section 17 (1) (c) the Competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the Competent Authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an EA for listed activities triggered by an application for a right or permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulations and will lead to the EA being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner ("**EAP**") must process and interpret his/her research and analysis and use the findings thereof to complete that information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE SCOPING PROCESS

1) The objective of the scoping process is to, through a consultative process –

(a) Identify the relevant policies and legislation relevant to the activity;

(b) Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

(c) Identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;

(d) Identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process, inclusive of cumulative impacts, and a ranking process of all the identified alternatives, focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;

(e) Identify the key issues to be addressed in the assessment phase;

(f) Agree on the level of assessment to be undertaken, including the methodology to be applied; the expertise required; the extent of further consultation to be undertaken to determine the impacts; and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and

(g) Identify suitable measures to avoid, manage, or mitigate identified impacts and determine the extent of the residual risks that need to be managed and monitored.

EXECUTIVE SUMARY

Rhovan Mine ("Rhovan"), a Vanadium Opencast Mine and Processing Plant has submitted an application for an integrated environmental authorisation ("EA") and waste management license ("WML") under the National Environmental Management Act 107 of 1998 ("NEMA") and the National Environmental Management: Waste Act 59 of 2008 ("NEMWA") respectively to the Department of Mineral Resources ("DMR"), including for approval of the amendment of the existing Environmental Management Programme for the RM ("Existing Rhovan EMPR") for the following activities:

- Construction of the test kiln and technical plant baghouse ("Test Kiln and Baghouse").
- Construction of an evaporation plant ("Evaporation Plant").
- The Construction of Baghouse at the Dust Control ("Dust Control Baghouse")
- Deposition of dewatered beneficiation slimes into open pits for rehabilitation purposes, including the expansion and construction of associated infrastructure.

RM is an established (est. 1990's) open cast Vanadium Mine and processing plant. RM is located near the towns of Berseba and Bethanie between Brits (Madibeng) and Rustenburg (Bojanala) in the Central Bankeveld of the North-West Province of South Africa. The RM site falls within the jurisdiction of the Rustenburg Local Municipality. The RM site is situated directly to the east of the R555 which runs between the N4 in the south and to Sun City further to the north.

All the findings from the scoping process are included in this Scoping Report which forms part of an application for the EA and WML for the project. The project initiation Public Participation Process (PPP) included the following:

- I&AP's and stakeholders were informed of RM's intention via Emails, registered mail and hand delivered notices;
- Newspaper advertisements were placed in the Britspos and Rustenburg Herald on the 15th of August 2019;
- A public meeting was held on the 3rd of September 2019;

- A meeting was held with the Bakwena Ba-Mogopa Tribal Authority on the 28th of August 2019; and
- Site notices were erected at the following locations:
    - Site Entrance of the RM;
    - Bethanie Police Station;
    - Berseba Tribal Authority Office;
    - Bethanie Tribal Authority Office;
    - Modikwe Tribal Authority Office
    - Berseba General Dealer; and
    - Modikwe General Dealer.

CHEMC Environmental prepared a Draft Scoping Report ("DSR") to provide the relevant authorities and interested and affected parties ("I&APs") with sufficient information to ensure that they all have a clear understanding of the Proposed Project. This scoping process has been carried out in accordance with the NEMA and the 2014 Environmental Impact Assessment ("EIA") Regulations thereunder. The screening and scoping process was based on a review of the existing specialist studies conducted since mining commenced, including the Existing RM EMPR. The DSR will be available for review and comments for thirty (30) days at the following locations:

- RM Security Office;
- Bethanie Tribal authority office;
- Modikwe Tribal authority office;
- Berseba Tribal authority office; and
- Makolokwe Tribal authority office.

The Final Scoping Report (“FSR”) will be submitted to the DMR Regional Offices of NWP. Specialist studies are in the process of being finalised. The specialist studies and the Draft and Final EIA Report ("EIAR") and Environmental Management Programme ("EMP") will once again be made available for public comment. This will be preceded by notifications to all registered I&APs and commenting authorities of the availability of the documents. All comments received during the comment periods will be captured in the Comments and Response Report, which will be submitted with the draft and final EIAR and EMP.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIXES

LIST OF ABBREVIATIONS

Term/Abbreviation	Definition
#	Rare Bird record
2013 WML Regulations	The Regulations published under NEMWA in Government Notice 921 of Government Gazette 37083 on 29 November 2013
2014 EIA Regulations	Environmental Impact Assessment Regulations promulgated in terms of NEMA in GN 982 of Government Gazette 38282 on 4 December 2014 (as amended in 2017).
A	Abundant
BID	Background Information Document
BM	Breeding Migrant
BPDM	Bojanala Platinum District Municipality
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act (Act No. 43. of 1983)
DEA	Department of Environmental Affairs

DMR	Department of Mineral Resources
DSR	Draft Scoping Report
DWA	Then former Department of Water Affairs
DWS	Department of Water and Sanitation
E	Endemic
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Programme
EMPr	Environmental Management Programme Report
FAG	Fully Autogenous Mill
FeV	Ferrovanadium
FSR	Final Scoping Report
GDP	Gross Domestic Product
GN	Government Notice
GN 983	Environmental Impact Assessment Regulations promulgated in terms of NEMA in GN 983 of Government Gazette 38282 on 4 December 2014 (as amended in 2017).
GN 984	Environmental Impact Assessment Regulations promulgated in terms of NEMA in GN 984 of Government Gazette 38282 on 4 December 2014 (as amended in 2017).
GOSA	Glencore Operations South Africa (Pty) Ltd
ha	Hectares (measure of area, 10 000 square metres)
HIA	Heritage Impact Assessment
HSEC	Health Safety Environment Community
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IWULA	Water use licence application
Km	Kilometres
LOM	Life of Mine
m^2	Square Metres
MAP	mean annual precipitation
MAR	mean annual runoff
mm	Millimetres
MPRDA	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002), as amended
NBM	Non-Breeding Migrant
NEMA	National Environmental Management Act (Act No. 107 of 1998), as amended
NEMAQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004), as amended
NEMWA	National Environmental Management: Waste Act (Act No. 59 of 2008), as amended
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998), as amended
NWP	North-West Province
NWREAD	North West Department of Rural, Environment and Agricultural Development
PAIA	Promotion of Access to Information Act (Act No. 2 of 2000)
POS	Plan of Study
PPP	Public Participation Process
Pr.Sci. Nat	Professional Natural Scientists

R	Resident
RLM	Rustenburg Local Municipality
RM	Rhovan Mine
ROM	Run-of-mine
SACNASP	South African Council of Natural Scientific Professions
SAHRA	South African National Heritage Resources Agency
SANBI	South African National Biodiversity Index
SANS	South African National Standards
SDF	Spatial Development Framework
SHE	Safety Health Environment
SLP	Social and Labour Plan
TSF	Tailings Storage Facility
U	Uncommon
V	Vagrant
V_2O_5	Vanadium Pentoxide
VC	Very Common
WML	Waste Management Licence
YRS	Years

DRAFT SCOPING REPORT

1. INTRODUCTION:

Rhovan Mine (RM) an Operation of the Rhovan PSV managed by Glencore (Pty) Ltd established in the 1990's is an open cast Vanadium Mine and processing plant. RM is located near Brits, situated in the Rustenburg Local Municipality ("**RLM**") that forms part of the Bojanala Platinum District Municipality ("**BPDM**"), in the North-West Province ("**NWP"**) of South Africa.

RM operates with a mining right namely DMR Reference. No: NW 30/5/1/2/3/2/1/87MR granted in terms of the MPRDA by the DMR. The area within RM where surface infrastructure is located is approximately 1624 hectares in extent. The existing mining, processing and auxiliary infrastructure comprise of the following:

- Workshops and Stores;
- Overburden Rock and Topsoil Dumps;
- Opencast Mining Pits;
- Vanadium Processing Plant;
- On-site Laboratory;
- Mine clinic and training centre;
- Water Management Infrastructure (i.e. dams, channels and pipelines);
- Waste Water Treatment Plant;
- Slimes Storage Facilities ("**TSF**");
- Offices and auxiliaries;
- Game Camp; and
- Haul and internal Roads.

RM has identified a number of Proposed Project to take the operations forward. Certain gaps have also been identified in the Existing RM EMPR. RM will consequently submit the Integrated DMR Environmental Applications under the NEMA and NEMWA respectively to the DMR and will be submitting the WUL Amendment Application to the DWS and an AEL Amendment to the RLM for the following activities:

- Construction of the test kiln and technical plant baghouse (“Test Kiln and Baghouse”).
- Construction of an evaporation plant (“Evaporation Plant”).
- The Construction of Baghouse at the Dust Control (“Dust Control Baghouse”)
- Deposition of dewatered beneficiation slimes into open pits for rehabilitation purposes, including the expansion and construction of associated infrastructure.

  the "Proposed Project".

2. CONTACT PERSON AND CORRESPONDENCE ADDRESS:

2.1 Details of:

2.1.1 The applicant:

RM, an operation of the Rhovan PSV managed by Glencore Operations South Africa (Pty) Ltd. is the applicant for the Scoping and EIA application. Details of the applicant and the contact details of the responsible person are captured in ***Table 1*** below.

Table 1: Details of the applicant and contact person

Landowner:	Land ownership is held in a trust for the Bakwena Ba-Mogopa tribe and is leased by Rhovan. Mineral Lease K18/1992 L (as amended).
Project applicant:	Rhovan Mine, an operation of the Rhovan PSV managed by Glencore (Pty) Ltd.
Registration no:	1997/017998/07
Trading name:	Rhovan PSV
Contact person:	Adriaan Klaas Brugman (General Works Manager)
Physical address:	Plot Road, Bamogopa Mine, Bethanie, Brits
Postal address:	P.O. Box 3620, Brits, 0250
Telephone no:	012 318 0711
Fax no:	086 532 1760
Email:	Adriaan.brugman@glencore.co.za
For the purpose of the application process the following people may be contacted at Rhovan:	

Mr JJ Van Der Merwe **Manager (HSEC)** **Tel No:** +27 12 318 0823 **Fax No:** +27 12 318 0702 **Email:** jj.vandermerwe@glencore.co.za	**Mrs Melanie Silvis** **HSEC Superintendent** **Tel No:** +27 12 318 0715 **Fax No:** +27 12 318 0702 **Email:** melanie.silvis@glencore.co.za

2.1.2 The EAP who prepared the report:

Mr. G.S. Barkhuizen of CHEMC Environmental has been appointed as the independent EAP by RM to undertake the Integrated DMR Environmental Applications in terms of the NEMA and NEMWA and according to the 2014 EIA Regulations (as amended) and the WUL Amendment Application in terms of the NWA. The study will be undertaken by CHEMC Environmental.

CHEMC Environmental commenced its practises in 1994 and has since been involved in a large variety of environmental studies. It is a South African organisation of professionals providing a comprehensive range of consulting services to natural resource industries and organisations. CHEMC Environmental is based in Pretoria and staffed with professional consultants operating in a range of disciplines, mainly related to the environment, water and mining sectors.

Company: CHEMC Environmental
Name of the Practitioner: Gerhardus Stephanus (Stephan) Barkhuizen
Tel No.: +2712 802 1002
Cell No.: +2782 639 9944
Fax No.: +2712 802 1004
e-mail address: stephan@chemc.com

2.1.3 Expertise of the EAP.

2.1.3.1 Qualifications of the EAP

The qualifications of the EAP (With evidence attached as **Appendix 1**).

Mr Barkhuizen holds a BSc (Honours) in Environmental Monitoring and Modelling and a BTech in Landscape Technology. He is a certified Natural Scientist in the

Environmental Sciences Field (Registration number: 115982) with the South African Council of Natural Scientific Professions ("SACNASP"). Copies of the EAP's qualifications as listed above for this project can be found under Appendix 1.

2.1.3.2 Summary of the EAP's past experience.

(Attach the EAP's curriculum vitae as **Appendix 2**)

Mr Barkhuizen will be the project lead EAP for the said application, and has 11 years' experience in the environmental field. His experience is in the management of EIA and EMPR processes, coordination and execution of public participation processes ("PPP") and management of multi-disciplinary project teams, mainly for mining related projects. He is also involved in conducting environmental audits and site assessments.

Mr. Jannie Cronje will be the project partner and reviewer of the Environmental Scoping and EIA Report. He is a senior member of CHEMC Environmental, with 25 years' experience in the environmental and geohydrology consultancy industry. Jannie Cronje is appropriately qualified and registered with the relevant professional bodies. He is registered as a Professional Natural Scientists (Pr.Sci.Nat. 400063/93) with the SACNASP.

Mrs. Marilize Potgieter, will be the environmental junior consultant providing assistance and a supplementary role in the application. She has over 5 years' experience in the eco-conservation and game management field.

The team has extensive knowledge of environmental management extending from EMPRs, EIAs and basic assessments to environmental compliance auditing, environmental protection and pollution control and water and waste management. Curriculum Vitae ("CVs") of the project team members and past experience listed above for this project can be found in Appendix 2.

2.1.4 Description of the property:

The RM is located 25 km west north-west of Brits and 35 km north-east of Rustenburg. The main Sun City Road (R566) runs past the mine and is the main

access road from the south. The Brits-Beestekraal Road (D518/01) runs east-west to the north of the mine site, and is the main access from the town of Brits. Smaller dirt roads access local townships and villages between 2 and 10 km away from the mine ***(Refer to Figure 1: Regional Locality map and Figure 2: Locality map).***

A detailed property description of the RM operations is listed in ***Table 2***, below:

Table 2: Property description of the RM and the proposed dangerous goods storage infrastructure.

Farm name:	The Rhovan Site is situated on the following properties: • Portion 1 of the farm Berseba 397 JQ, • Remainder of portion 1 of the farm Losperfontein 405 JQ, • Portion 3 (a portion of portion 2) of the remainder of the farm Losperfontein 405 JQ, • Portion 3 of the farm Waaikraal 396 JQ, • Remainder of the farm Berseba 397 JQ, and • Certain portion of the farm Leeuwpen 403 JQ. The activities will be taking place on the following portions: • B0JQ00000000040500002 - Portion 3 (a portion of portion 2) of the remainder of the farm Losperfontein 405 JQ. • B0JQ00000000040500001 - Remainder of portion 1 of the Farm Losperfontein 405 JQ • B0JQ00000000039700001 - Portion 1 of the farm Berseba 397 JQ. • B0JQ00000000039700000 - Remainder of the farm Berseba 397 JQ. • B0JQ00000000040300000 - Certain portion of the farm Leeuwpen 403 JQ
Application area (Ha):	The entire Rhovan site comprises of an area of approximately 3759.23 Ha. The proposed activity will take place on an area of +/- 153 Ha.
Province:	North-West Province
District Authority	Bojanala Platinum District Municipality
Local Authority	Rustenburg Local Municipality
Magisterial	Rustenburg Magisterial District

district:	
Municipal Wards	Ward 29 and 30
Catchment	Limpopo-Crocodile primary drainage region and the Quaternary Sub-catchment A21K.
Servitudes	Eskom Power Lines are located within the mine boundary.
Distance and direction from nearest town:	RM is located near the towns of Berseba and Bethanie between Brits (Madibeng) in the Central Bankeveld of the North-West Province of South Africa. RM is located directly to the east of the R555 which runs between the N4 in the south and to Sun City further to the north ***(Refer to Figure 1: Regional Locality map and Figure 2: Locality map).***

2.2 Locality Map

(Show the nearest town, scale not smaller than 1: 250000 attached as Appendix 3)

RM is located near the towns of Berseba and Bethanie between Brits (Madibeng) and Rustenburg (Bojanala) in the Central Bankeveld of the NWP of South Africa. The RM site falls within the jurisdiction of the RLM.

The proposed project is situated within the RM site, directly to the east of the R556 which runs between the N4 in the south and to Sun City further to the north. The proposed project will take place on the following properties:

- Portion 3 (a portion of portion 2) of the remainder of the farm Losperfontein 405 JQ.
- Remainder of portion 1 of the Farm Losperfontein 405 JQ
- Portion 1 of the farm Berseba 397 JQ.
- Remainder of the farm Berseba 397 JQ.
- Certain portion of the farm Leeuwpen 403.

The location of the RM and the area of the proposed project are illustrated in ***Figure 1, 2 and 8.***

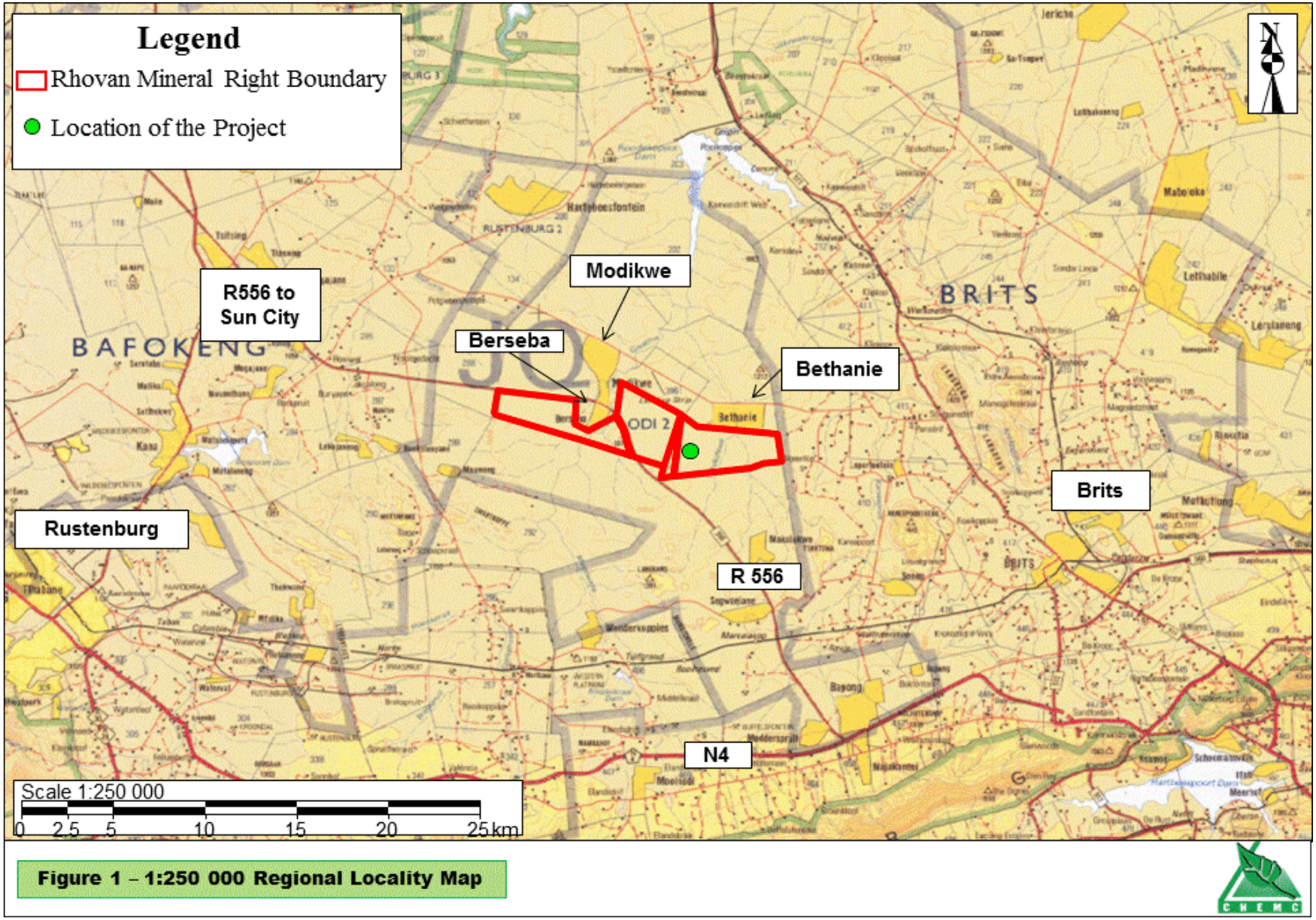

Figure 1: 1:250000 Regional locality map of the RM site boundary

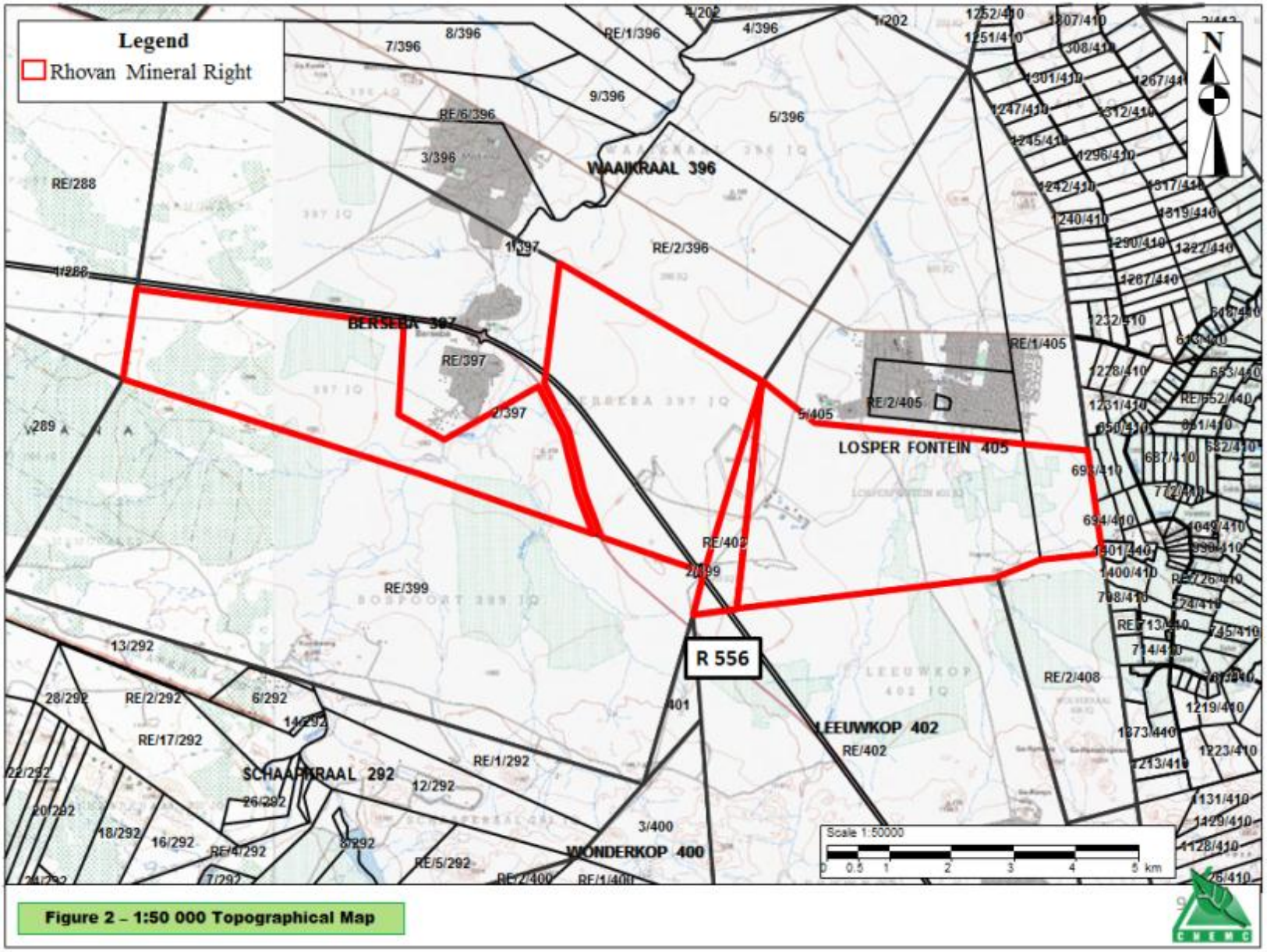

Figure 2 – 1:50 000 Topographical Map

Figure 2: 1: 50000 Topographical locality map.

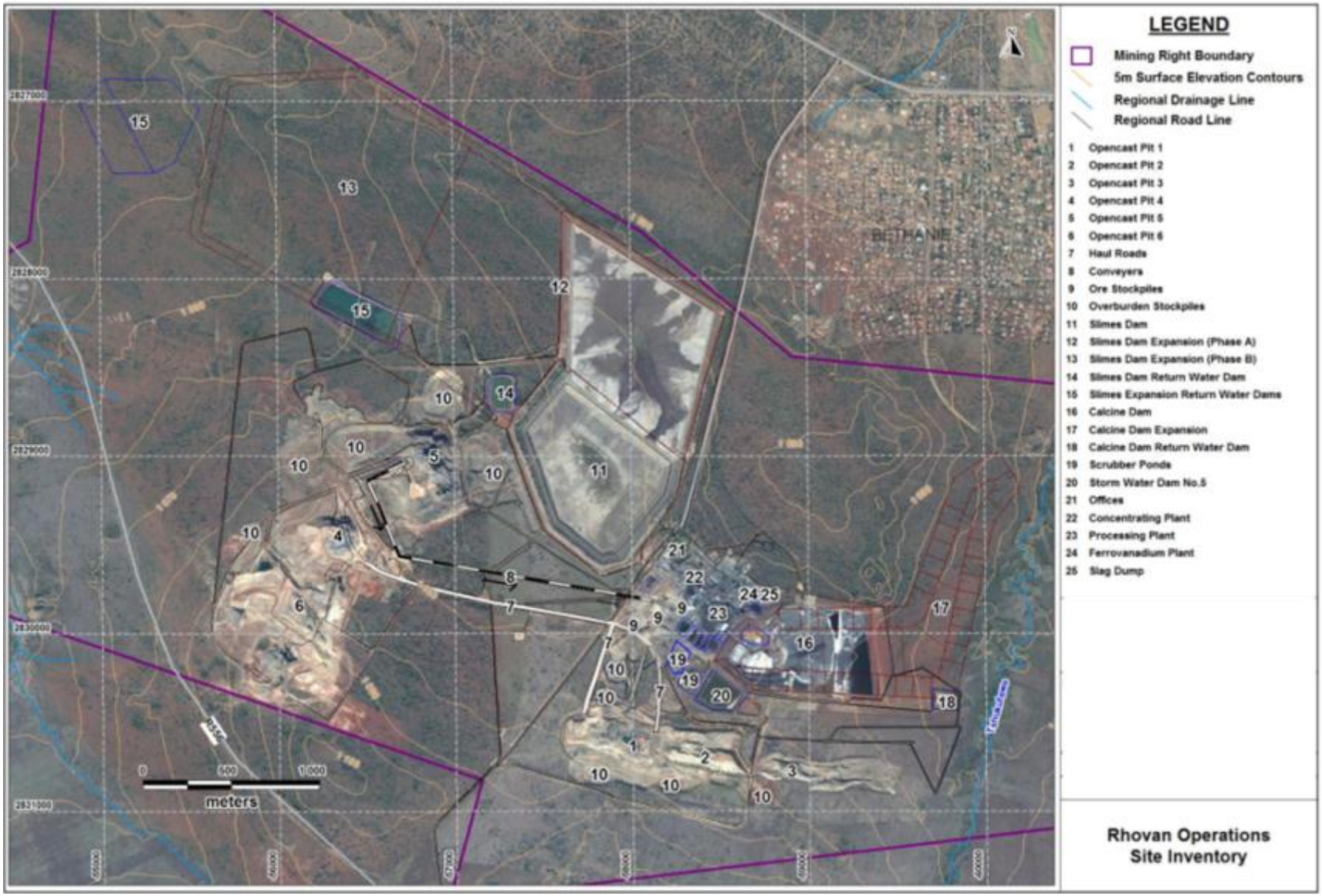

Figure 3: Rhovan Operations Site Inventory.

2.3 Legal framework

RM is an operational mine and is governed by the requirements of the MPRDA and the Regulations thereunder. NEMA and the 2014 EIA Regulations also apply to the site.

Mining commenced in the 1990's and is performed by an open-cast mining method. The Concentrate Plant at Rhovan was constructed at the same time and commissioned to supply magnetite concentrate. In 1993/1994, the Processing Plant to process the concentrate to V2O5 was constructed. The concentrating process was commissioned during May 1994 (www.wikimapia.com). With the promulgation and amendment of various environmental and other related laws, Rhovan progressively applied for legal authorisations for its Mine and Processing Plant, as listed below (This list does not cover occupational health and safety legislation requirements):

2.3.1 Existing Environmental Authorisation and Licenses

2.3.1.1 Water Use License (WUL) (License No: 26044735)

RM has a WUL that was issued on 31/03/2011 by the, now called Department of Water and Sanitation, in terms of Section 21 of the National Water Act, 36 of 1998. Hence, Rhovan is licensed to engage in the following water uses:

- Section 21 (a): Taking of water from a water resource;
- Section 21 (b): Storage of water;
- Section 21(e): Engaging in a controlled activity: irrigation of any land with waste or water containing waste generated through any industrial activity or by a watercourse;
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource;
- Section 21(j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people;

2.3.1.2 Section 24G Rectification of Unlawful Commencement of a listed activity (Reference No: REC 530)

The North West Department of Agriculture, Conservation and Environment (NWDACE) issued a Section 24G approval for the rectification of unlawful commencement of listed activities in terms of the National Environmental Management Act,107 of 1998 (NEMA) on 02/10/2006. The authorisation was issued in respect of the following activities:

- The disposal of waste as defined in Section 20 of the Environmental Conservation Act, 73 of 1989 (ECA), excluding domestic waste, but including the establishment, expansion, upgrading or closure of facilities for all waste, ashes and building rubble;
- Scheduled process listed in the Second Schedule to the Atmospheric Pollution Prevention Act, 45 of 1965 (APPA).
- Listed activities number 8 and 9 respectively as per schedule 1 of GNR 1182 of 1997, as amended, in terms of Section 21 of the ECA.
- The Section 24G authorisation entailed the existence and operation of the following:
    - No. 1 and 3 Scrubber Ponds;
    - No. 2 Purge Dam;
    - Erickson Storage Facility;
    - Evaporation Pond;
    - Ferrovanadium Plant; and
    - Ferrovanadium Slug Dump.

2.3.1.3 Section 28A Exemption in terms of ECA, (Act No.73 of 1989) – (Reference No: EIA 399/2005NW)

NWDACE issued an authorisation for the exemption from the Environmental Impact Assessment (EIA) Regulations for the Construction of an additional V2O3 reactor on 04/06/2006. The Exemption was granted in respect of the Scheduled Process listed as item 60 in the Second Schedule to the APPA, 1965 (Act No. 45 of 1965), namely listed activity 9 in Schedule 1 of GNR 1182 of 1997.

2.3.1.4 EA for the New Kiln (Reference No. 218/2005NW)

NWDACE issued an EA for the proposed construction of a new Kiln on 24/07/2007. The authorisation was issued in terms of the Scheduled process listed as item 60 in the Second Schedule to the APPA, Vanadium Process (listed activity 9 in Schedule 1 of GNR1182 of 1997). The authorisation was issued for the following:

- Construction of a new Kiln;
- Expansion of the existing Calcine Dump;
- Expansion of the existing Slimes dam facility;
- Additional electrical power (i.e. new substation built (Upgrade to 50 MVA);
- A plant installed to produce high purity grade Vanadium compounds; and
- New purge dams will be constructed.
- Decommissioning of current two Operation Purge dams and construction of one dam (i.e. No. 3 Purge Dam).

2.3.1.5 Amendment of the EA for the New Kiln (Reference No. 218/2005NW)

Rhovan applied for an amendment of their authorisation issued on 24/07/2007. NWDACE issued an amendment of the EA on 11/03/2008. The amendment made provision for the following activities and development:

- Mining and Beneficiation:
- Expansion of the Autogenous Mill be adding a second AG mill and a second stockpile with conveyor and feeders;
- Installation of the second ball mill circuit and the thickener.
- Recovery of Vanadium Products will include:
- Milled ore storage facility;
- Sodium Sulphate Storage shed;
- Rotary Kiln 120m long and 5,5m diameter;
- Associated new leaching process (3 Leach levels);
- Associated SO2 Scrubbing system;
- Leach wash system before calcine is disposed on the calcine tailings dump;
- Pregnant solution storage tanks; and

- Leaching solution storage tanks.
- Desilication:
    - Installation of desilication tanks, clear pregnant solution storage tanks and desilication filter press.
- Precipitation:
    - Installation of pregnant solution coolers;
    - Installation of precipitation reactors;
    - Replacements of present belt filter with a larger belt filter to allow for additional capacity; and
    - Installation of additional or bigger thickeners.
- Ammonium Meta Vanadate (AMV) processing:
    - The installation of an additional drier or flash drier to cope with additional volume AMV to be produced for the V2O3 production;
    - Installation of new vacuum transfer system to be installed to transfer the dry AMV, and
    - Installation of additional Fusion Furnace.
- V2O3
    - The installation of five V2O3 reactors to convert AMV into V2O3 suitable for FeV production; and
    - Addition of a vacuum transfer system and effluent drying system.
- Ferro Vanadium Furnace Production:
    - Ferrovanadium Alumino Thermic Production;
    - Installation of one additional DC Furnace similar to the present furnace with auxiliary equipment; and
    - Upgrading with ten new tapping pots and the overhead crane.
- Evaporation of Precipitation Barren Solution:
    - Addition of evaporation plant, electric power and a new substation (upgrade to 50 MVA);
    - Upgrading of the storm water controls dams (New No. 5 storm water Dam);
    - Relocation of laboratory from operational plant area to suitable area outside the plant;
    - Construction of a new purge dams; and

- Decommissioning of the current two operation Purge Dams and replaced by one Dam (i.e. No. 3 Purge Dam).

2.3.1.6 Approval of the Environmental Management Plan (Reference No. NW30/5/1/2/3/2/1/87EM)

The Department of Mineral and Energy ("DME") approved the Environmental Management Programme ("EMPR") of Rhovan on 01/10/2009.

2.3.1.7 Amendment of the Environmental Management Plan (Reference No. NW30/5/1/2/3/2/1/87EM)

The Department of Mineral Resources ("DMR") in terms of Section 102 of the Mineral and Petroleum Resources Development Act ("MPRDA"), 2002 (Act No. 28 of 2002) approved the removal, processing and selling of the Calcine and Slag Dumps on site on 9/02/2015.

2.3.1.8 Atmospheric Emissions License ("AEL") (AEL No. BPDM-VA1-March2014)

The Bojanala Platinum District Municipality (BJDM) issued an AEL to Rhovan Operation in terms of the National Environmental Management: Air Quality Act, 36 of 2004 (NEMAQA) on 22/11/2013. The AEL was issued in respect of Listed Activities: Sub-category 4.18.

2.3.1.9 EA issued for the Construction of Dangerous Goods Storage Infrastructure exceeding 500 cubic meters (Reference No. NW30/5/1/2/3/2/1/87EM)

The DMR issued an EA for the construction of Dangerous Goods Storage Infrastructure exceeding 500 cubic meters in terms of the 2014 EIA Regulations on 1/06/2016.

2.3.1.10 EA issued for the Expansion of Dangerous Goods Storage Infrastructure (Reference No. NW30/5/1/2/3/2/1/87EM)

The DMR issued an EA for the expansion of Dangerous Goods Storage Infrastructure in terms of the 2014 EIA Regulations on 1/06/2016.

2.3.1.11 EA issued for the decommissioning of the Existing Leach Dams and the construction of four new leach Vats (Reference No. NW30/5/1/2/3/2/1/87EM)

The DMR issued an EA for the decommissioning of the Existing Leach Dams and the construction of four new leach Vats in terms of the 2014 EIA Regulations (as amended) on 13/02/2018.

Note there are other approvals that have been issued to Rhovan not listed above.

2.4 Description of the scope of the proposed overall activity:

2.4.1 Listed and specified activities

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site and attach as **Appendix 4.**

2.4.1.1 Rhovan's Current Mining Operations

Rhovan Operations (Rhovan) is an Opencast Vanadium Mine and Processing Plant. Magnetite ore containing around 28% pure magnetite is mined by open pit using a drill and blast procedure ***(Refer to Figure 4: Rhovan Operation Process Flow Diagram).***

2.4.1.2 The mining and primary processes

All Vanadium in the ore occurs in solid solution in the Titaniferous magnetite. The first stage of processing is therefore to concentrate this magnetite by physical means, i.e. crushing, grinding and low intensity wet magnetic separation. The magnetite concentrate is then subjected to a conventional roast leach precipitation process for the recovery of vanadium pentoxide (V_2O_5).

a) Crushing

Coarse ore is tipped from mine trucks into the primary crusher. Ore is crushed by a 43 x 53 Jaw Crusher to –250mm, and conveyors then feed the ore to the Fully Autogenous Mill (FAG Mill) via an intermediate stockpile.

b) Grinding and wet magnetic separation

The previous crushing and screening process (before December 1999), was a dry process that caused immense dust problems. The screens also easily got blocked whenever it rained or even when trying to use dust suppression sprays.

A FAG Mill was commissioned in December 1999. The FAG Mill discharge is fed through a hydrocyclone to wet magnetic separators. The non-magnetics are pumped to the slimes dam while the magnetics gravitates to the Ball Mill. Ball Mill discharge is fed via a hydrocyclone and a hydrocone to cleaner magnetic separators. The magnetic product from the cleaner magnets is filtered on a Delkor 45m^2 belt filter to form magnetite concentrate stockpile.

c) Roasting

The purpose of the roasting stage is to convert the Vanadium, occurring in solid solution in the matrix of the Titaniferous magnetite to water-soluble sodium vanadate. This is achieved principally by the following reaction:

$$Na_2O + V_2O_5 = 2Na\ VO_3$$

Sodium oxide is provided in the form of either sodium carbonate or sodium sulphate (recycled from the hydrometallurgical process), which dissociates to form sodium oxide and CO_2 or SO_2 gasses respectively in the kiln.

Magnetic concentrate is reclaimed from the stockpile using a table feeder and conveyors. Weigh feeders automatically add sodium carbonate and sodium sulphate from silos in the proportion of 5.5% sodium carbonate equivalent.

Kiln temperatures are monitored at the inlet and discharge ends. Temperatures in excess of 1200ºC are avoided as this results in fusion of the charge with a subsequent loss in conversion and inability to leach the resulting mass.

Primary control of the kiln process is by 4 hourly chemical analysis of the calcine. Calcine discharges from the kiln at a temperature of approximately 1100ºC onto a

water-cooled grizzly. Oversized material is stockpiled, re-crushed and returned while undersized material passes to a cooling conveyor (an inclined, refractory lined trough with travelling, suspended raking blades above). This conveyor is designed to reduce the calcine temperature below 800ºC.

Calcine discharges from the end of the cooling conveyor into a quenching box equipped with a scrubber, which successfully suppresses any steam explosions.

d) Leaching

Calcine is fed to three leach dams where the porous calcine is leached with water. Filtration is achieved through the calcine itself. During filling and emptying, the calcine is spread by three electric scrapers mounted on blocks attached to the feed end of each dam.

Emptying of the dam is achieved by scraping the leached calcine over the sloping discharge end onto a conveyor system for stacking. The calcine from the leach process is sold to customers. The solution produced, containing the V_2O_5 is called the pregnant solution.

e) Desilication and Precipitation

To achieve the desired product quality, SiO_2 has to be removed from the solution. This is achieved by using 5g/L Al_2SO_4 and filtering out insoluble silica at pH8.3. Silica filtration is carried out on pressure filters with a diatomite pre-coat.

Precipitation of Vanadium from solution is achieved by the addition of ammonium sulphate:

$$2Na\ VO_3 + (NH_4)\ 2SO_4 = 2NH_4VO_3 + Na_2SO_4$$

Rhovan has in the past used two similar systems to precipitate vanadium. The first required the addition of ammonium sulphate, steam and sulphuric acid at pH 1.75 and 85 - 90ºC to precipitate ammonium polyvanadate. The second, which used only ammonium sulphate at pH 7.8, precipitate the metavanadate. Rhovan chose to adopt the metavanadate system for the following reasons:

- Metavanadate precipitation can be carried out from solution strength as high as 100g / L without forming a gelatinous precipitate (as polyvanadate does);

- Metavanadate precipitate filters more easily, producing a cake moisture of 15% compared to 36% for polyvanadate;
- Metavanadate precipitation is carried out under non corrosive conditions and requires no external heat source; and
- The barren solution from metavanadate precipitation does not require neutralisation with sodium carbonate.

f) Barren Solution Handling

The Vanadium recovery process uses an evaporation method to recover sodium sulphate salt from the barren solution after precipitation. This salt is recycled back to the kiln, displacing the need for a portion of the sodium carbonate flux.

At an increased pregnant solution strength of 100g /L, approximately 12m^3 of barren solution needs to be evaporated for every ton of V_2O_5 produced. At the planned higher level of production, this means that approximately 360m^3 / day of barren solution needs to be evaporated *(at 90% availability)*.

The nameplate capacity of the currently installed evaporator is 480m^3 / day and therefore adequate for the application.

In order to prevent a build-up of chlorine *(coming mainly from impure sodium carbonate)* in the MVR circuit, Rhombus Vanadium operates a purge stream of approximately 1.5m^3 / hour. Rhombus Vanadium has commissioned a vacuum evaporator that evaporates the high chlorides purge from the MVR producing a mixed (Sodium Sulphate and Ammonium Sulphate) and a waste salt (Sodium chloride). The vacuum evaporator has a zero discharge solution. The mixed salt is fed back to the MVR.

g) Ammonium Vanadate Processing to V_2O_5

Filtration

The slurry containing the ammonium vanadate precipitate is pumped to a continuous filter, where the cake is washed with water. All filtrate solution goes to the evaporation circuit.

Drying

The filter cake is fed to either a Flash Dryer and then fed to the V_2O_3 reactors or the deammoniators.

Deammoniation

$2NH_4VO_3 = V_2O_5 + 2NH_3 + H_2O$

The deammoniator currently in use is of rotary design with a length of 15m and diameter of 1.3m. It is externally heated electrically to a maximum temperature of 600ºC in three independently controlled zones.

Fusion and Flaking

V_2O_5 is a dusty product and as such is not suitable for onward shipping to the customer. Consequently the V_2O_5 powder is melted in an oil-fired furnace. The molten V_2O_5 from the fusion furnace is formed into flakes on a water-cooled wheel. The final product is dispatched in drums or bulk bags.

h) Ferrovanadium production

Rhovan has two routes of Ferrovanadium production:

One process is the production of FeV by the use of the Alumin thermic reduction process. In this process, accurate weight of V_2O_5, Aluminium, Lime and Iron scrap are mixed together and placed in a refractory lined ladle. The pot is ignited electrically via a V_2O_5 and Aluminium powder fuse. The reaction is fully autogenous and at the end of the reaction FeV has collected at the bottom of the ladle and a high Al_2O_3 slag forms above the FeV.

After cooling, the slag and metal are separated. The FeV is crushed, sized and packed to customer requirements. The slag is crushed, some of the slag recycled back into the process and the balance sold. All fume generated in the process is collected in a gas cleaning plant and recycled.

The second process is where the AMV from the Flash Dryer is fed into an electrically heated rotary dryer. The gas from the dryer is scrubbed free of particulates. The dry AMV is fed into three V_2O_3 reactors which are heated electrically, with material held under reducing conditions. In the process Ammonia (NH_3) breaks down into Nitrogen and Hydrogen, the Hydrogen reducing the V_2O_5 to V_2O_3. The V_2O_3 is transferred to the FeV furnace facility where it reacts with Iron and Aluminium to produce FeV. The slag generated in the furnace is sold to customers.

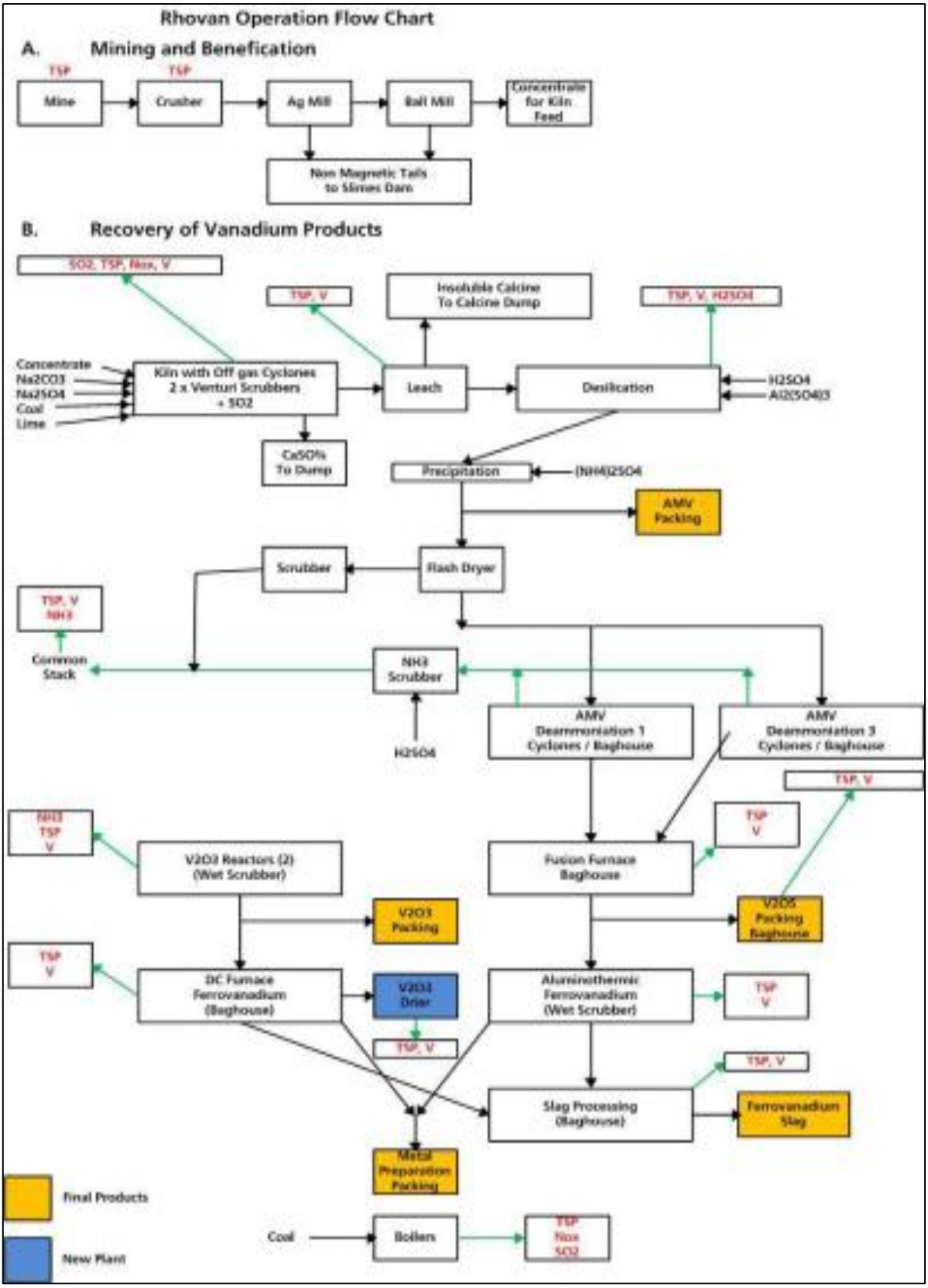

Figure 4: Rhovan Operation Process Flow Diagram

2.4.2 Proposed Activity Description

The purpose of the application is to obtain an Integrated Environmental Authorisation (EA) and Waste Management License (WML) application for the proposed projects. The Project will also include the amendment of the Environmental Management Programme (EMPR), Existing Atmospheric Emissions License (AEL) and the Existing Water Use License (WUL). The existing Calcine Dump which is authorised in terms of the MPRDA, 2002 and the NWA, 1998 as a Section 21(g) water use will need to be included as a Waste Management License in terms of the NEMWA, 2008.

Table 3: List of proposed activities

NAME OF ACTIVITY (All activities including activities not listed) (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.)	AERIAL EXTENT OF THE ACTIVITY HA OR M²	LISTED ACTIVITY Mark with an X where applicable or affected.	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546) /NOT LISTED
1. Establishment of temporary construction camp	+/- 400 m^2	N/A	Not listed
2. Construction and operation of the technical plant baghouse and test equipment.	**+/- 100 m^2**	**X**	**GNR 984 of 8 December 2014**
3. Construction of an evaporation plant.	+/- 400 m^2	N/A	Not listed
4. The Construction and operation of the Baghouse at the Vanadium Slag Dust Control	**+/- 400 m^2**	**N/A**	**GNR 984 of 8 December 2014**
5. Expansion of pipelines for the conveying of slimes to the filter press.	**+/- 4 000 m^2**	**X**	**GNR 983 of 8 December 2014**
6. Implementation of four filter presses and associated infrastructure	+/- 2400 m^2	N/A	Not listed

7. Backfilling of the Pits with dewatered arising slimes. Starting with Pit 5 and 6.	**153 Ha**	**X**	**GNR 984** **GNR 921 WML activity** **Section 21g Water Use**
8. Construction of the pipeline to gravitate return water to the return water dam from the pits. Including associated infrastructure	**+/- 2 700 m^2**	**X**	**GNR 983 of 8 December 2014**
9. Building waste management (Waste skips)	+/- 80 m^2	N/A	Not listed
10. Decommissioning of the temporary construction camp	+/- 400 m^2	N/A	Not listed
11. Rehabilitation and closure of pit 5 and 6, and the subsequent pits thereafter	**+/- 151 Ha**	**X**	**GNR 984**
12. Rehabilitate and replace the topsoil	Unknown	N/A	Not listed
13. Continuous ground and surface water monitoring	Unknown	N/A	Not listed
14. Dust suppression and monitoring	Unknown	N/A	Not listed
15. Maintaining and training of emergency preparedness and response plan	unknown	N/A	Not listed

2.5 Description of the activities to be undertaken

(Describe Methodology or technology to be employed, and for a linear activity, a description of the route of the activity).

The purpose of the application is to obtain the required authorisation from the department to successfully:

2.5.1.1 Project 1 - Construction of the technical plant baghouse and test equipment.

Project 1 will entail the construction and operation of the following infrastructure at the technical plant within the RM Processing Plant Area, namely. A rotary kiln that

will be used for experimental work. The kiln is used to raise the temperature of the material placed inside until calcination occurs. The following infrastructure will be constructed:

- A Gravmec mixer that is used to dry material with hot air.
- Vanadium battery electrolyte;
- An infrared dryer that is used to heat material with electromagnetic energy.
- A Baghouse to capture any fugitive dust during the operation of the test kiln, Gravmec, Infrared dryer at the Technical department at RM.

The infrastructure will be located within the existing footprint of the RM Processing plant and will comprise of a total area of approximately 100 square meters.

2.5.1.2 Project 2 – Construction of an evaporation plant.

Project 2 will entail the construction of an Evaporation plant at the V_2O_5 production plant. The purpose of the evaporation plant will be to improve the current process by upgrading liquor and decreasing the use of water within the RM Processing Plant. The Evaporation plant will consist of the following major components:

- Evaporator/Crystalliser,
- Heat Exchanger,
- Separator and
- Condenser.

The purpose of the evaporation plant will be to improve the current process by upgrading liquor and decreasing the use of water within the RM Processing Plant. The infrastructure will be located within the existing footprint of the RM Processing plant and will comprise of a total area of approximately 400 square meters.

2.5.1.3 Project 3 - The Construction of Baghouse at the Vanadium Slag Dust Control

Project 3 will entail the construction of a baghouse at the existing Kiln to capture Vanadium and Reagent Dust. The Baghouse main purpose is to reduce the fugitive dust generated.

2.5.1.4 Project 4 - Deposition of dewatered beneficiation slimes into open pits for rehabilitation purposes, including the expansion and construction of associated infrastructure.

Project 4 will entail the deposition of the current dewatered slimes arising into open mine pits (open cast) in the mine area. A filter press will be installed, and the process will be remove moisture from the slimes before depositing it in the open pits for rehabilitation purposes. Moisture that can't be recovered from the filter press system will be gravitated/pumped back to the existing return water dams. When the respective pits are full it will be rehabilitated according to the Rhovan closure plan. The project includes the expansion and construction of the associated infrastructure to dewater the slimes, conveying the material to the pits, pumps and piping for the routing of water back to the return water dam.

The Environmental Authorisation application is therefore submitted for the proposed four (4) projects. The majority of the infrastructure will be located on already impacted and disturbed areas, with the exception of pipelines.

(Refer to Figure 5-8: Google Earth Image illustrating the location of the proposed Projects).

Figure 5: Aerial Photograph of the RM Site layout with the existing infrastructure.

Figure 6: Map indicating the location of the existing footprint of the opencast pits.

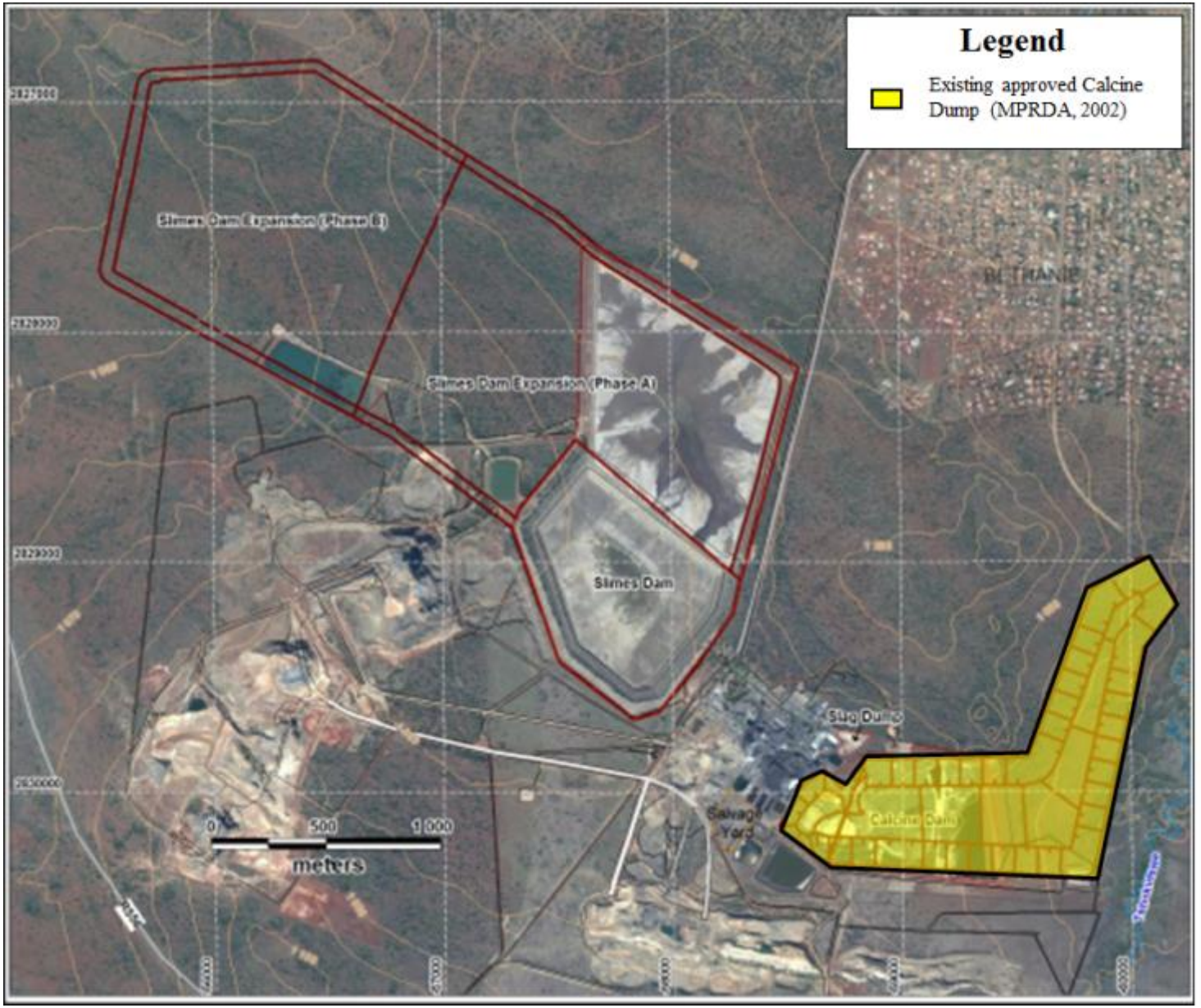

Figure 7: Existing approved Calcine Dump in terms of the MPRDA, 2002 that will need to be approved in terms of the NEMWA, 2008.

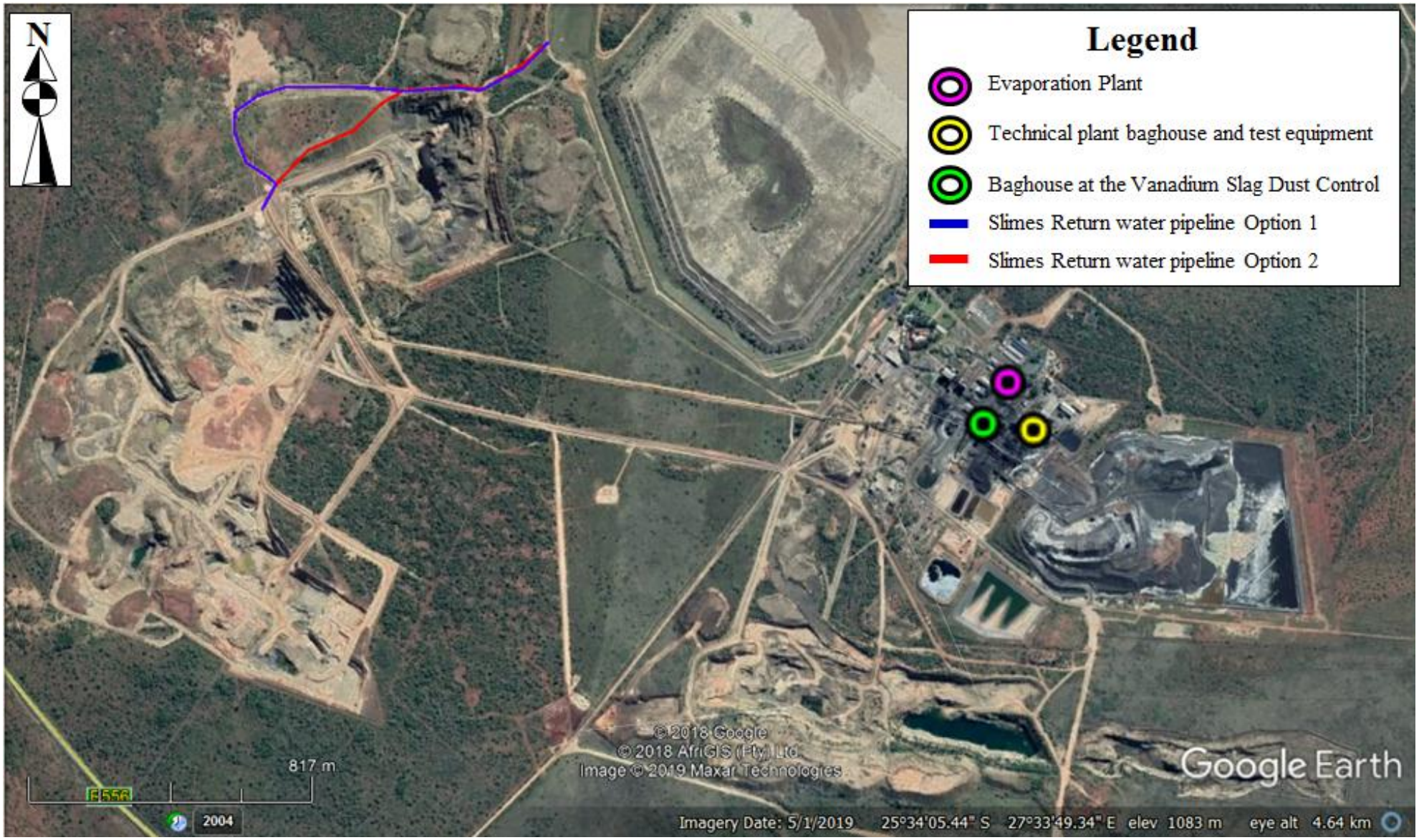

Figure 8: Aerial Map of the proposed projects.

2.6 Policy and Legislative Context

Table 4: Policy and legislative context of the proposed project.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
1. <u>Constitution of the Republic of South Africa (Act No. 108 of 1996)</u> Environmental legislation is shaped by the Bill of Rights of the Constitution of the Republic of South Africa ("**Constitution**"). Section 24 of the Constitution, known as the '**Environmental Right**', guarantees every person the right to an environment that is not harmful to their health or well-being; provides for the protection of the environment against pollution; and degradation and centres sustainable development as the cornerstone of South Africa's environmental law regime. This right is binding on the State and people, both natural and juristic. In fulfilment of its constitutional mandate to take reasonable legislative measures that gives effect to section 24 of the Constitution, the government has promulgated several environmental laws. These laws provide a legal framework that embodies internationally recognised legal principles. The principal act governing activities that affect the environment is NEMA. ***Applicability to the project:*** The implication of the Environmental Right for the Proposed Project includes the obligation to ensure that it will not result in pollution and/or ecological degradation and the activity is ecologically sustainable while promoting justifiable economic and social development.	***Refer to point 1 in table 4.***
2. <u>National Environmental Management Act (NEMA) (Act No. 107 of 1998)</u> In terms of sections 24(2) and 24D of NEMA the Minister of Environmental Affairs promulgated certain activities that may not commence without an EA. Activities promulgated in terms of GN983 and GN9835 require a basic assessment process, while activities promulgated in terms of GN984 require that a full Scoping and EIA process be conducted (GN 983, 984 and 985 promulgated under NEMA in Government Gazette 38282 of 4 December 2014 (as amended in 2017). The requirements for an EIA and EMP are specified in Appendix 3 and Appendix 4 of GN 982 promulgated under NEMA in Government Gazette 38282 of 4 December 2014 (as amended in 2017) ("**2014 EIA Regulations**"). Section 24C(2A) of NEMA indicates that where listed activities are directly related to the extraction and primary processing of a mineral or petroleum resource the Minister of Mineral Resources is the Competent Authority (**"CA**") or officials at the DMR to whom he has delegated his authority, being the Regional Managers.	***Refer to point 2 in table 4.***

Applicability to the project: Based on the aforesaid, the Proposed Project constitute activities listed in terms of GN R983 and GN R984 which require an EA from the CA, in terms of 2014 EIA Regulations (as amended in 2017). This EA must be obtained prior to the commencement of the activities. The application for the EA will thus be made to the Regional Manager of the DMR North West Regional Office. A closure and rehabilitation plan will be developed as part of the EIA process and submitted with the EIAR and EMP. Further, section 28 of the NEMA places a duty of care on all persons to prevent, limit or remediate any pollution or degradation of the environment. This duty of care should be adhered to at all times during construction, operation and decommissioning of the Proposed Project. Section 28 applies to all activities taking place, and not solely focused on the listed activities being applied for.	
3. <u>EIA Regulations (2014 EIA Regulations)</u> Chapter 6 of the 2014 EIA Regulations provides for the requirements for PPP, which must be carried out as part of the DMR Application process. In terms of Regulations 21 and 23, the outcome of the PPP must be reported in the Scoping Report and EIAR submitted to the CA. The PPP "*must give all potential or registered interested and affected parties, including the competent authority a period of at least 30 days to submit comments on each of the EMPr, scoping report and environmental impact assessment report, and where applicable the closure plan, as well as the report contemplated in regulation 32, if such reports or plans are submitted at different times*" (Regulation 40 (1)). The PPP must also: ➢ provide access to all information that reasonably has or may have the potential to influence any decision regarding an application; ➢ involve consultation with the CA, every state department that administers a law relating to the environment relevant to the application, all relevant organs of state and all potential, or where relevant, and registered I&APs; and ➢ provide opportunity for I&APs to comment on reports and plans prior to submission of an application but must be provided with an opportunity to comment on such reports once an application has been submitted to the CA. The process must include: ➢ notification of the application to all I&APs, as stipulated in Regulation 41; ➢ registration of all I&APs, as required in Regulations 42 and 43; and ➢ a record of comments and responses and records of meetings of and with I&APs, as outlined in Regulation 44. Regulation 39 of the 2014 EIA Regulations as amended in 2017) requires that: "*(1) If the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land.*	***Refer to point 3 in table 4.***

(2) Sub regulation (1) does not apply in respect of—

(a) linear activities;

(b) activities constituting, or activities directly related to prospecting or exploration of a mineral and petroleum resource or extraction and primary processing of a mineral or petroleum resource; and

(c) strategic integrated projects as contemplated in the Infrastructure Development Act, 2014."

Applicability to the project:

For the Proposed Project, an integrated PPP will be undertaken to make provision for the consultation process during the DMR Applications and application for amendment of the Rhovan WUL.

All the properties where the proposed activities requiring an EA or WML will be undertaken are owned by the Bakwena Ba-Mogopa and Rhovan has a lease agreement for the applicable properties. Whilst not required under the 204 EIA Regulations, the Bakwena Ba-Mogopa was notified as part of the EIA process.

4. NEMA Listed Activities (GN983 and 984)

Refer to point 3 in table 4.

The listed activities in GN983 and 984 applicable to the Proposed Project are given in Table below.

Number and date of relevant notice	Activity No.	Description of each listed activity as per the GN.	Description of the proposed activities in relation to the listed activities being applied for.
GN R. 983	10	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes (i) with an internal diameter of 0,36 metres or more	It is proposed to pump the slimes from the processing plant to the opencast pits for deposition. The pipelines will have a diameter of 0,36 meters and have a length exceeding 1000 meters.
GN R. 983	22	The decommissioning of any activity requiring – (i) a closure certificate in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002); or (ii) a prospecting right, mining right, mining permit, production right or exploration right, where the throughput of the activity has reduced by 90% or more over a period of 5 years excluding where the competent authority has in writing agreed that such reduction	RM is proposing to deposit the current slimes first into open pits 5 and 6, and at a later stage to the remaining pits.

		in throughput does not constitute closure.		
GN R. 983	46	The expansion and related operation of infrastructure for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes where the existing infrastructure has: (i) an internal diameter of 0,36m^2 or more; or (ii) a peak throughput of 120 litres per second or more; and where the: (a) facility or infrastructure is expanded by more than 1 000m in length; or (b) throughput capacity of the facility or infrastructure will be increased by 10% or more.	There is a possibility that existing pipelines will have to be expanded for the transportation of slimes.	
GN R. 984	6	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.	The following activities is proposed: - Test Kiln and Baghouse; - Construction of an Evaporation Plant; - Construction of a Dust Control Baghouse at the Kiln; and - Deposition of the current arising beneficiation slimes/slurry into open pits. The existing Atmospheric Emissions License and Water Use License for the RM will need to be amended	
GN R. 984	19	The removal and disposal of minerals contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including— (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing.	Rhovan will be disposing the current slimes arising into the opencast pits for rehabilitation purposes.	

5. <u>National Environmental Management: Air Quality Act (Act No. 39 of 2004</u>)

Refer to point 5 in table 4.

NEMAQA was promulgated to ensure the protection and regulation of air quality and provide measures that will prevent pollution and sustainability. Under NEMAQA, the Minister of Environmental Affairs must identify substances in ambient air which present a threat to health, well-being or the environment and establish national standards for ambient air quality, including the permissible quantity or concentration of each substance in ambient air.

The following regulations promulgated under NEMAQA were considered for the Proposed Project:

➢ Listed Activities and Associated Minimum Emission Standards, published under GN 893 in GG 37054 of 22 November 2013, which lists activities that could result in atmospheric emissions requiring an Atmospheric Emissions Licence before being undertaken. Examples of such activities include: ▪ the use of combustion installations; ▪ storage of petroleum products; ▪ slag processes; ▪ carbonisation and coal gasification; ▪ mineral processing and ▪ disposal of hazardous and general waste by way of incineration. ➢ Waterberg-Bojanala National Priority Area, GN1207/2015 in GG 39489 on 9 December 2015: The Waterberg-Bojanala National Priority Area was established due to the exceedance of the ambient air quality standards or alternatively that a situation exists within the area which is causing or may cause a significant negative impact on air quality in the area and the area requires specific air quality management action to rectify the situation. ➢ National Dust Control Regulations, published under GN827 in GG 36974 of 1 November 2013, which provide that an acceptable dust fallout rate for a non-residential area is considered more than 600 mg/m^2/day but less than 1200 mg/m^2/day (30-day average), with maximum allowable two exceedances per year, provided these exceedances do not take place in consecutive months. Where the dust fallout rate is exceeded, a dust fall monitoring programme, as prescribed in terms of the Regulations, must include: ▪ the establishment of a network of dust monitoring points using method ASTM D1739:1970 (or an equivalent standard), sufficient in number to: establish the contribution to dust fallout in residential and non-residential areas near the premises, monitor identified or likely sensitive receptor locations, and establish the baseline dust fall for the district; and ▪ a schedule for submitting to the air quality officer dust fallout monitoring reports annually or at more frequent intervals if so requested by the air quality officer. ➢ Greenhouse gases have been declared priority pollutants under the Declaration of Greenhouse Gases as Priority Air Pollutants published GN 710 in GG 40996 of 21 July 2017, in terms of NEMAQA, with potential reporting requirements for Rhovan. ***Applicability to the project:*** ➢ Rhovan falls within the Waterberg-Bojanala National Priority Area, as contemplated in section 18(1) of NEMAQA. An AEL was issued for the RM by the BPDM on 31/03/2014 (Ref No: BPDM – VA1 – March 2014). The existing Atmospheric Emissions License for the RM will need to be amended to include the following activities is proposed: - Construction of the Test Kiln and Baghouse; - Construction of an Evaporation Plant; and - Construction of a Dust Control Baghouse at the Kiln. ➢ A dust fall-out monitoring network and programme is in place for Rhovan. Rhovan will subsequent to the commencement of the Proposed Project monitor the dust impacts from the proposed project.	
6. <u>National Environmental Management: Biodiversity Act (Act No. 10 of 2004)</u>	***Refer to point 6 in***

In line with the Convention on Biological Diversity, the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA) aims to legally provide for biodiversity conservation, sustainable use and equitable access and benefit sharing. NEM:BA creates a basic legal framework for the formation of a national biodiversity strategy and action plan and identification of biodiversity hotspots and bio-regions, which may then be given legal recognition. It imposes obligations on landowners (state or private) regarding alien invasive species. It requires that provision is made by a site developer to remove any aliens which have been introduced to the site or are present on the site. The NEM: BA also provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered, endangered, vulnerable or protected. Threatened ecosystems are listed to reduce the rate of ecosystem and species extinction, by preventing further degradation and loss of structure, function and composition of threatened ecosystems. The purpose of listing protected ecosystems is primarily to conserve sites of exceptionally high conservation value. ***Applicability to the project:*** The Proposed Project will be located within an already impacted area within the RM boundary and Plant Area. No critical endangered ecosystems will be affected by the proposed activity.	***table 4.***
7. <u>National Environmental Management: Waste Act (Act No. 59 of 2008) ("Waste Act")</u> The purpose of the Waste Act is to: assist in regulating waste management; ensure the protection of human health; and prevent pollution and environmental degradation through sound waste management principles and guidelines. It furthermore provides for: ➢ national norms and standards for regulating the management of waste by all spheres of government; ➢ licensing and control of waste management activities; ➢ remediation of contaminated land; ➢ a national waste information system; and ➢ provision for compliance and enforcement. The Waste Act defines waste broadly as "*any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be reused, recycled or recovered*". It also regulates processing of mining residue deposits or stockpiles. The Waste Act imposes a general duty upon waste holders to take reasonable measures to avoid waste generation and, where this is impossible, to: minimise the toxicity and quantities of waste generated; reuse, reduce, recycle and recover waste; and ensure that it is treated and disposed of in an environmentally-sound way. Failure to do so is a criminal offence, with a maximum fine of R10 million or imprisonment of up to 10 years, or both. It is necessary to hold a WML for defined waste management activities. The DEA promulgated the 2013 WML Regulations, which provides that a WML is required for undertaking certain waste management activities ("**Waste Listed Activities**"). The Waste Listed Activities are separated into three categories, namely Category A, Category B and Category C.	***Refer to point 7 in table 4.***

Category A and B Waste Listed Activities require a WML, for which either a Basic Assessment or an EIA process needs to be undertaken that complies with the 2014 EIA Regulations. The procedures for licensing Waste Listed Activities are stipulated in Chapter 5 of Waste Act and will have to be considered in the overall EIA process.

Category C activities do not require a WML but must comply with *inter alia* the Norms and Standards for Storage of Waste, 2013 (published in GN 926 of *Government Gazette* 37088 on 29 November 2013). Such facilities need to be registered with the DEA 90 days before construction commences.

Classification of certain waste streams is required in terms of the Waste Classification and Management Regulations, published in GN634 of GG 36784 on 23 August 2013, to ensure that the correct waste management standards and disposal methods are implemented.

The National Norms and Standards for the Assessment of Waste for Landfill Disposal and the National Norms and Standards for the Disposal of Waste to Landfill (published under GN R635 and GN R636 respectively in GG 36784 of 23 August 2013) provide the norms and standards for disposal of waste to landfill. This includes liner requirements and design specifications.

In 2014 the National Environmental Management: Waste Amendment Act, No 25 of 2014 was promulgated to include residue deposits and residue stockpiles from:

- Mineral excavation;
- Physical and chemical processing of metalliferous minerals;
- Physical and chemical processing of non-metalliferous minerals; and
- Drilling operations.

Residue deposits are defined in the MPRDA as "*any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right*". Residue stockpiles, in turn, are defined in the MPRDA as "*any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, beneficiation plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated for potential re-use, or which is disposed of, by the holder of a mining right, mining permit, production right or an old order right*".

The Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits ("**Residue Regulations**"), published under GN R632 in GG 39020 of 24 July 2015, provide for the planning, management and reporting of residue stockpiles and residue deposits, which obligations include:

- The assessment of impacts and analyses of risks relating to the management of residue stockpiles;
- Residue deposits; characterisation of residue stockpiles and residue deposits;
- Classification of residue stockpiles and residue deposits;
- Investigation and the selection of site for residue stockpiling;
- Design of the residue stockpiles and residue deposits;
- Impact management;
- Duties of the holder of right or permit;

- Monitoring and reporting systems;
- Dust management and control; and
- Decommissioning, closure and post closure management requirements.

The Residue Regulations provide the tools for and correspond to the statutory provision relating to managing residue stockpiles and residue deposits in the manner prescribed in section 43A of the Waste Act.

Applicability to the project:

The following activities will be triggered by the proposed project:

Number and date of relevant notice	Activity No.	Description of each listed activity as per the GN.	Description of the proposed activities in relation to the listed activities being applied for.
GN R. 921	Category B - 4(7)	The disposal of any quantity of hazardous waste to land	RM has an existing Calcine Dump which has been approved in terms of the MPRDA, 2002 and the NWA, 1998 as a Section 21(g) water use under WUL No: 26044735. The facility however does not have a Waste Management License (WML) in terms of NEMWA, 2008. It is therefore the applicants decision to authorise the facility in terms of NEMWA, 2008.
GN R. 921	Category B - 4(9)	The disposal of inert waste to land in excess of 25 000tons, excluding disposal of such waste for the purpose of levelling and building which has been authorised by or under other legislation.	RM is proposing to deposit the current arising beneficiation slimes into open mining pits. The slimes are considered to be non-hazardous.
GN R. 633	Category B - 4(11)	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	RM is proposing to deposit the current arising beneficiation slimes into open mining pits. The slimes are considered to be non-hazardous.

A scoping and EIA process is required for Category B activities. An integrated EA and WML have been submitted by Rhovan for the Proposed Project. A Waste Assessment and Classification of the slimes will form part of the EIAR.

8. <u>National Heritage Resources Act (Act No. 25 of 1999)</u>

Refer to point 8 in table 4.

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (Act No. 25 of 1999) ("**NHRA**"). The national enforcing authority for the NHRA is the South African Heritage Resources Agency ("**SAHRA**"). In terms of the NHRA, historically important features such as graves, archaeology and fossil beds are protected. Similarly, culturally significant symbols, spaces and landscapes are also afforded protection. In terms of section 38 of the NHRA, SAHRA can call for a heritage impact assessment ("**HIA**") for certain categories of development. The activities identified in the NHRA requiring notification to SAHRA include:

Section 38 states: *"(1) (a): The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;* *(c): Any development or other activity which will change the character of a site* *i. exceeding 5 000 m² in extent; or* *ii. involving three or more existing erven or subdivisions thereof; or* *iii. involving three or more erven or divisions thereof which have been consolidated within the past 5 years; or* *iv. the costs of which will exceed a sum in terms of regulations by SAHRA or a provincial heritage resource authority."* The NHRA however makes provision for the assessment of heritage impacts as part of an EIA process and, if such an assessment is deemed adequate by SAHRA, a separate application for consent under the NHRA is not required. ***Applicability to the project:*** The proposed project footprint area has already been fundamentally transformed by the mining and processing activities over the area. A HIA has been conducted as for the Rhovan mining area in the past.	
9. <u>National Water Act (Act No. 36 of 1998)</u> ("**NWA**") The NWA is the primary regulatory legislation controlling and managing the use of water resources and pollution thereof. It provides for fundamental reformation of legislation relating to water resource use. The preamble to the NWA recognises that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that water resources quality protection is necessary to ensure sustainability of the nation's water resources in the interests of all water users. The NWA's purpose is stated in section 2 and enforced by the DWS. Section 2 of the NWA relates to the following: • *Promoting the efficient, sustainable and beneficial use of water in the public interest;* • *Facilitating social and economic development;* • *Protecting aquatic and associated ecosystems and their biological diversity;* • *Reducing and preventing pollution and degradation of water resources;* • *Meeting international obligations.* The NWA presents strategies to facilitate sound management of water resources; provides for the protection of water resources; and regulates use of water by means of Catchment Management Agencies, Water User Associations, Advisory Committees and International Water Management. As the NWA is founded on the principle of trusteeship, the government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and industry (including mines) can only	***Refer to point 9 in table 4.***

be entitled to use water if the use is permissible under the NWA.

In terms of section 21 of the NWA, certain consumptive and non-consumptive water uses are identified and can only commence once authorised. Where a water use constitutes a Scheduled 1 Use (permissible use without an authorization requirement); permissible water use in terms of section 22 of the NWA; or is authorised in terms of a General Authorisation, a WUL is not required.

The NWA further requires that:

- a motivation in terms of section 27 be submitted as part of a water use licence application ("**IWULA**"). This will be included in the main application report;
- the necessary water use application forms be compiled and submitted in support of the IWULA;
- the requirements of GN704 and detail surrounding these activities will be considered in the IWULA; and
- an integrated waste and water management plan be submitted in support of the IWULA.

Applicability to the project:

Rhovan has a WUL that was issued on 31/03/2011 by the, now called Department of Water and Sanitation, in terms of Section 21 of the National Water Act, 36 of 1998. Hence, Rhovan is licensed to engage in the following water uses:

- Section 21 (a): Taking of water from a water resource;
- Section 21 (b): Storage of water;
- Section 21(e): Engaging in a controlled activity: irrigation of any land with waste or water containing waste generated through any industrial activity or by a watercourse;
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource;
- Section 21(j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people;

The Rhovan WUL will need to be consequently amended in terms of section 50 of the NWA, 1998. New WUL activities that will be included in the amendment process are set out below. The WUL also requires certain corrections and amendments to the conditions, which will be included in the WUL Amendment Application.

Water Use	Activities
Section 21 (a): Taking of water from a water resource	Abstraction of additional water from the Harties Irrigation Channel.
Section 21 (g): Disposing of waste in manner which may detrimentally impact on a water resource	Disposal of the dewatered slimes in the pits.

10. <u>GN 704</u>

GN 704 was promulgated in terms of section 26(1) of the NWA and specifically aimed at the protection of water resources associated with mining

Refer to point 10 in table 4

related activities. It provides minimum requirements which need to be adhered to for the protection of the water resources on a mine. GN 704 regulates the use of water, management of dirty and clean water infrastructure and related activities at mines. This includes minimum requirements for infrastructure that hold dirty water. A mine can apply for exemptions from these requirements and could be granted approval should sufficient management measures be put in place to ensure the protection of the environment. Regulation 4 of GN 704 places some restrictions in terms of the locality of certain infrastructure which could have an impact on water resources. ***Applicability to the project:*** RM currently holds a valid WUL (Rhovan WUL), however the backfilling of the pits with dewatered slimes material must be exempted from GN 704.	
11. <u>Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)</u> The MPRDA aims at the equitable access and the sustainable development of the country's mineral resources. It provides mechanisms that will ensure the protection of the environment throughout the LoM. Social and environmental sustainability is enhanced through the requirement to submit a Social and Labour Plan ("**SLP**"), which records a company's obligations to improve social development. This includes a commitment to training and social investment, with the goal of transferring skills that can be used after mine closure. Section 5A of the MPRDA indicates that: "*No person may prospect for or remove, mine, conduct technical co-operation operations, reconnaissance operations, explore for and produce any mineral or petroleum or commence with any work incidental thereto on any area without – (a) an environmental authorisation"*. Section 37 of the MPRDA requires all mining and prospecting operations and related activities to be carried out in terms of the environmental management principles set out in section 2 of NEMA. Section 102(1) of the MPRDA states that: "*(1) A reconnaissance permission, prospecting right, mining right, mining permit, retention permit, technical corporation permit, reconnaissance permit, exploration right, production right, prospecting work programme, exploration work programme, production work programme, mining work programme environmental management programme or an environmental authorisation issued in terms of the National Environmental Management Act, 1998, as the case may be, may not be amended or varied (including by extension of the area covered by it or by the additional of minerals or a shares or seams, mineralised bodies or strata, which are not at the time the subject thereof) without the written consent of the Minister."* ***Applicability to the project:*** Rhovan currently holds a Mining Rights and holds an approved Existing EMPR in terms of the MPRDA for the mining operations at Rhovan. Approvals for amendments of EMPs were previously required under section 102 of the MPRDA. The DMR now requires EMPs to be amended in	***Refer to point 11 in table 4***

terms of Chapter 5 of the 2014 EIA Regulations. The amendments of the Existing Rhovan EMPR will require approval in terms of Chapter 4 of the 2014 EIA Regulations.	
12. <u>Conservation of Agricultural Resources Act, No 43 of 1998</u> ("**CARA**") In terms of CARA, landowners are legally responsible for the control of weeds and alien vegetation. The Act makes provision for three categories of Alien and Invasive Plant Species: ➢ Category 1a: must immediately be removed and destroyed; ➢ Category 1b: need to be immediately be removed and contained; ➢ Category 2: require a permit to retain the species on site and it must be ensured that they do not spread. All category 2 plants in riparian zones need to be removed; and ➢ Category 3: require a permit to retain these species. All category 3 plants in the riparian zone need to be removed. CARA is also clear in terms of the conservation of soil and states that degradation of the agricultural potential is illegal. It furthermore requires the protection of land against soil erosion and the prevention of water logging and associated salinization. ***<u>Applicability to the project:</u>*** The surface of the proposed project is mainly utilized for mining and mineral processing activities. Areas are also utilised by the local communities for informal grazing of their livestock. The proposed project will take place on a disturbed area, but Rhovan will pay cognisance to the requirements of CARA where applicable.	***Refer to point 12 in table 4***
13. <u>NEMA Financial Provisioning Regulations, 2015</u> The NEMA Financial Provisioning Regulations published under GN R1147 under GG 39425 of 20 November 2015 ("**FP Regulations**"), set out the requirements for the development of a closure and rehabilitation plan; and the financial provision for rehabilitation and closure. ***<u>Applicability to the project:</u>*** These regulations Will only be applicable to Rhovan from 2020.	***Refer to point 13 in table 4***
14. <u>Other Legislation, Policy & Guidelines</u> Other legislation and associated regulations (where applicable) considered as part of the application process include: ➢ The National Development Plan 2030. ➢ National Veld and Forest Fire Act, 101 of 1998. ➢ Transvaal Nature Conservation Ordinance, 12 of 1983. ➢ Hazardous Substance Act, No 15 of 1973.	***Refer to point 14 in table 4***

➢ Mine Health and Safety Act, No 29 of 1996. ➢ National Forestry Act, No 84 of 1998. ➢ DMR Consultation Guidelines. ➢ Spatial Planning and Land Use Management Act, No 16 of 2013. ➢ Traditional Leadership and Governance Framework Amendment Act, No 41 of 2003 and National House of Traditional Leaders Act, No 22 of 2009. ➢ Restitution of Land Rights Act 22 of 1994 ➢ Municipal Systems Act, No 32 of 2000.	
15. <u>Provincial and Municipal Bylaws</u> The BPDM and RLM and NWP have developed local bylaws and various policies relating to waste disposal, water, economic development, air quality etc. The following provincial and Municipal Bylaws are applicable to Rhovan: ➢ Bojanala Platinum Integrated Development Plan; ➢ Bojanala Spatial Development Framework (SDF); ➢ Rustenburg SDF; ➢ Rustenburg Environmental Management Framework; ➢ Spatial Development Framework, 2016: North West Province; Rhovan will ensure that such policies and bylaws, are adhered to during the commencement and operation of the Proposed Project.	***Refer to point 15 in table 4***
16. <u>Guidelines</u> In addition to the abovementioned Acts and their associated Regulations, the following guidelines and reports have been be taken cognisance of during the application process: • National Department of Environmental Affairs and Tourism (DEAT). 2002. Integrated Environmental Management, Information series 2: Scoping. (DEAT. 2002); • DEAT. 2002. Integrated Environmental Management, Information series 3: Stakeholder Engagement. (DEAT. 2002); • DEAT. 2002. Integrated Environmental Management, Information series 4: Specialist Studies. (DEAT. 2002); • DEAT. 2002. Integrated Environmental Management, Information series 12: Environmental Management Programmes (EMPr). (DEAT. 2002); • DEA. 2012. Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 5, DEA; • DEA. 2012. Public Participation Process, Integrated Environmental Management Guideline Series 7, DEA; • DEA. 2012. Draft guideline on need and desirability in terms of the EIA Regulations, 2010.	***Refer to point 16 in table 4***
17. <u>RM Health, Safety, Environmental and Community Policy (HSEC) and Emergency preparedness and response procedure</u> A copy of the RM HSEC Policy and Emergency Preparedness and Response Procedure (EPRP) can be found in ***Appendix 5***.	***Refer to point 17 in table 4***

2.7 Needs and desirability of the proposed activities.

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

a) Raw water

The slimes will be dewatered to a moisture content of approximately 30% prior to placement in the pit. The only water accumulating on the top surface of the slimes will be rain water falling directly on the pit footprint.

The utilisation of the filter press to dewater the slimes will likely reduce raw water consumption, and increase the amount of water that can be re-used in the process plant. Making use of the pits to deposit the slimes will reduce the need to deposit the slimes on the existing approved Slimes Dams. The water volumes used to deposit the slimes on the slimes dam is far greater than using the filter press system and depositing the dewatered slimes in the pits.

b) Job Creation

The proposed project would have a beneficial impact on the local economy through the creation of new procurement and possible employment opportunities during the construction and operation phase of the development. In a developing country such as South Africa, following a “no-project” option would have potential adverse impacts on a local and regional employment scale.

c) Safer working environment

Based on recent international disasters/ events associated with the failure of tailings facilities[1], significant attention has been place on the risk associated with the aboveground storage of mine tailings and tailings storage facilities. Rhovan currently has an environmental authorisation and WUL to expand the existing slimes facility to cater for future slimes arising. However should the backfilling of the pits be approved the possibility of expanding the slimes dams will be minimised. Therefore, reducing the risks of possible structural failures and environmental impacts as a result thereof.

The installation of the baghouse(s) will reduce the fugitive emissions and create safer working conditions for employees.

[1] The Brumadinho dam disaster occurred on 25 January 2019 when Dam I, a tailings dam at the Córrego do Feijão iron ore mine.

d) ***Reduce Environment Liability***

The slimes will be used as backfill material in the pits. The opencast pits are a significant environmental liability that has a potential cumulative financial knock-on effect on the closure liability for Rhovan. Utilising the slimes for backfill material will likely increase the sequencing of implementing concurrent rehabilitation that has significant environmental and financial benefits.

e) ***Promotion of sustainable development by proficiently utilising natural resources***

Rhovan is proposing to use the current slimes arising for backfill material. Although the material will be disposed it serves an increased purpose by backfilling pits for rehabilitation purposes. In essence the backfilling of the pits with slimes promotes the waste management hierarchy, as detailed in the National Waste Management Strategy, 2012.

The waste management hierarchy is a tiered approach where waste management options are organised in an order of significance, which starts with the avoidance of waste; the subsequent reduction, reuse, recycling, recovery; treatment and disposal (DEA, 2012b).

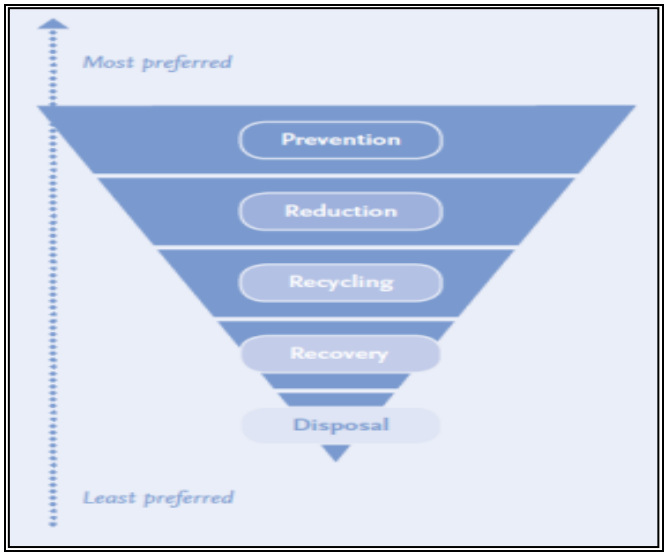

Figure 9: Waste management hierarchy, (DEA, 2012)

2.8 Period for which the environmental authorisation is required

The proposed projects form an important part of the mining and vanadium production process. Rhovan will commence with the backfilling of pit 5 which will take between 5 and 6 year to complete. The other pits will be backfilled as mining progresses.

The other proposed projects will be required as part of the Vanadium Processing Process and will be required until the plant is decommissioned. Therefore the environmental authorisation will be required for the Life of Mine (LOM) of the Rhovan operations.

2.9 Description of the process followed to reach the proposed preferred site.

NB!! – This section is not about the impact assessment itself; It is about the determination of the specific site layout having taken into consideration (1) the comparison of the originally proposed site plan, the comparison of that plan with the plan of environmental features and current land uses, the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout as a result.

As mentioned previously, the proposed projects will be located within the RM and processing plant area. The site selection was done by taking cognisance of the following factors:

- Required capacity and footprint extent of the infrastructure;
- Existing and future infrastructure and servitudes e.g. future plant upgrades etc.;
- Position in relation to other mine infrastructure;
- Distance from the processing Plant and water infrastructure;
- Area available for development;
- Environmental and Social Constraints;
- General topography;
- Geology of the site;
- Surface geotechnical conditions in the footprint zone;
- Geohydrology;
- Watercourse locations;
- Land use;
- Burial and archaeological sites;
- Proximity to settlements.

Alternative locations were only provided for the return water pipeline, and technology alternatives were considered with the slimes deposition methodology. No other location alternatives for the projects were considered as the Pits, Plant and infrastructure are existing and fixed. The preferred location and technology alternatives were determined based on the site and location constraints, resource intensity and the anticipated impacts on the receiving environment i.e. biodiversity, heritage, water sources and surrounding communities.

2.10 Details of all alternatives considered.

With reference to the site plan provided as Appendix 4 and the location of the individual activities on site, provide details of the alternatives considered with respect to:
(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

2.10.1 Alternative 1 (Preferred alternative)

The proposed activities essentially have been selected to ensure the Processing Plant can be optimised and environmental liability be reduced

The preferred alternative was based on the following:

- The proposed activities are located within the established Rhovan Surface Area, where the necessary services (i.e. electricity supply, roads and water supply) have already been developed.
- Majority of the proposed activities footprints, except for the pipelines have previously been disturbed by mining and anthropological activities.
- The utilisation of dewatered slimes will potentially reduce the raw water usage and save water.
- Using the slimes as backfill retrospectively promotes the waste management hierarchy and has a knock-on beneficial effect on the environmental and closure liability.

The preferred alternative includes the following projects:

- Construction of the Test Kiln and Baghouse;

- Construction of an evaporation plant;
- The Construction of Dust Control Baghouse; and
- Deposition of dewatered beneficiation slimes into open pits for rehabilitation purposes, including the expansion and construction of associated infrastructure.

2.10.2 Alternative 2 (Alternative Slimes deposition Methodology and return water pipeline route)

A technology alternative will be considered for the method of conveying and depositing the slimes in the pits. The alternative would be to convey wet slimes directly from the processing plant into the pits through a pipeline. The slimes will be deposit via a spigot system and accumulated water will be pumped out via a barge. An alternative location was also considered for the return water pipeline. Refer to ***Figure 8*** for the location of the two pipeline alternatives.

No other location alternatives for the projects were considered as the Pits, Plant and infrastructure are existing and fixed.

2.10.3 No Go Alternative

The no-go option entails that none of the proposed projects be undertaken, including the construction of the Test Kiln and Baghouse, evaporation plant and Dust Control Baghouse. The approved methodology of slimes management will continue.

3. DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

The Stakeholder Engagement Process undertaken during the project announcement phase was incorporated into the DSR and will be included in the FSR and was undertaken in terms of Regulations 41 of the GN 982 of 8 December 2014. The

following tasks will be performed during the PPP to inform stakeholders and interested parties (Refer to ***Appendix 6 – I&AP Consultation*** Report, for evidence of Public Participation Process (PPP) followed up-to-date):

The project initiation Public Participation Process (PPP) included the following:

- I&AP's and stakeholders were informed of RM's intention via Emails, registered mail and hand delivered notices;
    - Stakeholders and I&APs included the following:
        - North West Department of Rural, Environment and Agricultural Development (NWREAD);
        - Department of Water and Sanitation;
        - Department of Environmental Affairs;
        - Department of Mineral Resources;
        - Rustenburg Local Municipality;
        - Bojanala District Platinum Municipality;
        - South African Heritage Resource Agency;
        - ESKOM;
        - Ward No. 29 councillor;
        - Ward No. 30 councillor;
        - Bakwena Ba-Mogopa tribe;
        - Berseba Tribal Council;
        - Modikwe Tribal Council;
        - Bethanie Tribal Council;
        - Makolokwe Tribal Council;
        - Landowner and neighbouring farms surrounding the RM;
        - Surrounding Mines; and
        - Community Members.
- Newspaper advertisements were placed in the Britspos and Rustenburg Herald on the 15th of August 2019;
- A public meeting was held on the 3rd of September 2019;
- A meeting was held with the Bakwena Ba-Mogopa Tribal Authority on the 28th of August 2019; and
- Site notices were erected at the following locations:

- Site Entrance of the RM;
- Bethanie Police Station;
- Berseba Tribal Authority Office;
- Bethanie Tribal Authority Office;
- Modikwe Tribal Authority Office
- Berseba General Dealer; and
- Modikwe General Dealer.

CHEMC Environmental prepared a Draft Scoping Report ("DSR") to provide the relevant authorities and interested and affected parties ("I&APs") with sufficient information to ensure that they all have a clear understanding of the Proposed Project. This scoping process has been carried out in accordance with the NEMA and the 2014 Environmental Impact Assessment ("EIA") Regulations thereunder. The screening and scoping process was based on a review of the existing specialist studies conducted since mining commenced, including the Existing RM EMPR.

The DSR will be available for review and comments for thirty (30) days at the following locations:

- RM Security Office;
- Bethanie Tribal authority office;
- Modikwe Tribal authority office;
- Berseba Tribal authority office; and
- Makolokwe Tribal authority office.

The I&APs Register will be compiled making use of the existing Stakeholder Database from the RM for this area. The I&APs Register will be updated as necessary (i.e. with new contact details, new I&APs etc.). All comments received from the I&APs during the project announcement phase will be incorporated into the DSR and FSR. The I&APs will be informed of the availability of reports for comment, where/how these reports can be accessed and the commenting timeframes and the manner in which comments can be submitted to CHEMC Environmental. Proof of the PPP undertaken during the Impact Assessment Phase will be appended to all reports produced. Tasks to be performed to inform the registered I&APs of the availability of the documents for comment:

- All registered and I&APs will be informed of the availability of the reports for comment by means of notices sent via an advertisement, posted letters, e-mails, facsimile;
- The Draft Reports will be made available to the public for a 30-day commenting period;
- The Final Reports will be made available to the public for a 7-day commenting period;
- These reports will be made available for comment at following locations:
    - Bethanie Tribal authority office;
    - Berseba Tribal authority office;
    - Makolokwe Tribal authority office; and
    - Modikwe Tribal authority office.

3.1 Summary of issues raised by I&AP's

(Complete the table summarising comments and issues raised, and reaction to those responses)

Table 5: Table summarising comments and issues raised, and reaction to those responses

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		**Date Comments Received**	**Issues raised**	**EAP's Response to the issues raised**	**Section and paragraph** reference in this report where the issues and or response were incorporated.
Affected Parties					
1. Landowners					
• ***Land ownership is held in trust for the Bakwena Ba-Mogopa tribe and is leased by Rhovan. Mineral Lease K18/1992 L (as amended).***	***X***	***28 August 2019***	***Meeting held with the Tribal Council on the 28th of August 2019.*** *Concerns raised included:* *1. The impacts that will be generated as a result of the proposed project;* *2. Employment and procurement opportunities* ***3.*** *A Draft report also needs to be left at the Makolokwe Tribal Offices.*	***Notified via Email and hand delivered notice.*** ***Response to the concerns raised:*** *1. The preliminary positive and negative impacts identified include the following:* • *Positive:* ➢ *Reduce environmental liability* ➢ *Reduced safety risk associated with constructing a new slimes facility* ➢ *Raw Water saving* ➢ *Timeously and concurrent rehabilitation of pits* ➢ *Improvement of occupational health and safety of workers* • *Negative* ➢ *Potential impact on groundwater quality and quantity* ➢ *Air quality impacts* ➢ *Land disturbance*	***Refer to the Appendix 6 for the meeting notes.*** ***Section 3***

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		**Date Comments Received**	**Issues raised**	**EAP's Response to the issues raised**	**Section and paragraph** reference in this report where the issues and or response were incorporated.
				The potential impacts will be assessed as part of the EIA Process. Specialists have been appointed to determine and assess the impacts. *2. It is highly likely that potential temporary and permanent employment and procurement opportunities will be created during the construction and operational phase. Rhovan can't make a commitment on the number of opportunities at this point in time, however will advertise and follow procurement processes once the authorisation process has been concluded.* *3. The draft reports have in the past only been distributed at the Berseba, Bethanie and Modikwe Tribal Offices. However an extra copy will be left at the Makolokwe Tribal Office.*	
2. <u>Lawful occupier/s of the land</u>					
• ***RM is the legal occupiers of the land***	***X***				
3. <u>Landowners or lawful occupiers on adjacent properties</u>					
• ***Rand Mines LTD***	***X***		***No comments***	***Notified via email.***	***Refer to the Appendix 6***
• ***Kelgran Africa Pty Ltd***	***X***			***Notified via email.***	

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		**Date Comments Received**	**Issues raised**	**EAP's Response to the issues raised**	**Section and paragraph** reference in this report where the issues and or response were incorporated.
• ***Bakwena Ba-Mogopa tribe***	***X***			***Refer to point 1 above.***	***Section 3***
• ***M A Rothmann Trust***	***X***			***Notified via email.***	
4. Municipal councillor					
• ***Clr D Motlhamme – Ward No. 29***	***X***		***No comments***	***Notified via email and registered mail.***	***Refer to the Appendix 6*** ***Section 3***
• ***Clr E. Matabane - Ward No. 30***	***X***				
5. Municipality					
• ***Bojanala District Platinum Municipality;***	***X***		***No comments***	***Notified via email and registered mail.***	***Refer to the Appendix 6*** ***Section 3***
• ***Rustenburg Local Municipality;***	***X***				
6. Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA e					
• ***NWREAD***	***X***		***No comments***	***Notified via email***	***Refer to the Appendix 6*** ***Section 3***
• ***DWS***	***X***				
• ***DMR***	***X***				
• ***SAHRA***	***X***			***Notice uploaded on SAHRIS***	
• ***ESKOM***	***X***			***Notified via email***	
7. Communities					
• ***Berseba Community***	***X***		***No comments***	***Notices were placed at a number of locations***	***Refer to the Appendix 6*** ***Section 3***
• ***Bethanie Community***	***X***				
• ***Modikwe Community***	***X***				
8. Traditional Leaders					
• ***Berseba Tribal Council;***	***X***		***No comments***	***Notices were placed at a number of locations***	***Refer to the Appendix 6*** ***Section 3***
• ***Modikwe Tribal Council;***	***X***				
• ***Bethanie Tribal Council;***	***X***				
9. Dept. Environmental Affairs					

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAP's Response to the issues raised	Section and paragraph reference in this report where the issues and or response were incorporated.
• ***Director: Environmental Authorisations***	***X***		***No comments***	***Notified via email***	***Refer to the Appendix 6*** ***Section 3***
10. Other Competent Authorities					
• ***Department of public Works Road and Transport***	***X***		***No comments***	***Notified via email***	***Refer to the Appendix 6*** ***Section 3***
• ***Department of Rural Development***	***X***				
• ***Department of Local Government and Traditional Affairs***	***X***				
11. Other Affected Parties					
12. Interested Parties					
• ***Afplats Platinum mine Pty. Ltd***	***X***		***No comments***	***Notified via email***	***Refer to the Appendix 6*** ***Section 3***
• ***Phule Loate***	***X***				

4. THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES

This section describes the existing status of the environment that may be affected by the proposed project.

In this section of the report, a summary of the baseline environment of the areas on which the proposed project is to be located is described. This has been compiled on the basis of the following:

- Available information from the existing MPRDA EMPR for the RM;
- Specialist reports conducted in and around the proposed development footprint on previous applications lodged;
- South African Weather Service;
- South African National Biodiversity Institute (SANBI);
- Statistics South Africa;
- Rustenburg Local Municipality IDP;
- Existing information on the environmental parameters of the area;
- National Web based Environmental Screening Tool (refer to Appendix 8)
- Stakeholder and I&AP comments received from the Background Information Document (BID) and Draft Scoping Report.

4.1 Baseline Environment

4.1.1 Type of environment affected by the proposed activity.

(Its current geographical, physical, biological, socio- economic, and cultural character).

4.1.1.1 Regional Setting

The proposed projects will be taking place within the RM and Vanadium Processing plant area. The RM is located in proximity of neighbouring communities which include Berseba, Modikwe and Bethanie Villages, and approximately 40 km south east of the Pilansberg National Park and Sun City. The RM is situated between Brits (Madibeng) in the Central Bankeveld of the North-West Province of South Africa.

Rhovan is located directly to the east of the R556 which runs between the N4 in the south and to Sun City further to the north.

In terms of the administrative boundaries, the proposed project is located within the North West Province. The project is located within the Rustenburg Local Municipality (RLM), which forms part of the Bojanala Platinum District (BPD) Municipality. The RM boundary is located within Ward 29 and 30 of the RLM. The towns and residential areas close to the proposed project area are given in ***Table 6*** (line-of-sight distances).

Table 6: Line of sight distances to nearest towns from Rhovan.

Town	Distance Km	Direction
Berseba	2.4 Km	South West of the site
Bethanie	0.5 Km	East of the site
Modikwe	4.2 Km	West of the site
Makolokwe	5.0 Km	South of the site
Brits	18 Km	South East of the site

4.1.1.2 Climate

The RM is located in a semi-arid region in the North West Province of South Africa. The climate of the area is characterized by warm summers, cold to moderate winters, with the main rainy season being in summer from October through to April. Average daily maximum temperatures range from 30.3°C in January to 21.2°C in July, with daily minima ranging from 17°C in January to just above 1.3°C in July. The average annual rainfall is 651 mm/year, and which falls mainly as thundershowers during the summer months of October through April. The average annual evaporation is 2185 mm/year which means that the climatic water balance is therefore in deficit, resulting in an effective annual average evaporation of 1534 mm/year. Extreme conditions of rainfall can occur with the 24 hour events for various return periods which can vary between 79 mm (1:5 yrs.) to 125 mm (1:50 yrs.) to 138 mm (1:100 yrs.).

4.1.1.3 Wind Direction and Speed

Day time wind directions at Rhovan are dominated by north-westerly, through northerly to easterly winds. Day time calms are estimated at 23.4%. Night time wind directions at Rhovan are dominated by easterly to south-easterly winds. Night time calms are estimated at 39.4%. The impacts on the air quality of the area will be considered during the Impact Assessment Phase of the project.

4.1.1.4 Topography

The North West Province, the sixth largest province in South Africa, occupies a total area of 116 320 km^2 (9,5% of the total area of South Africa). It is geographically situated between 25° and 28° south of the equator and between 22° and 28°longiture east of Greenwich meridian.

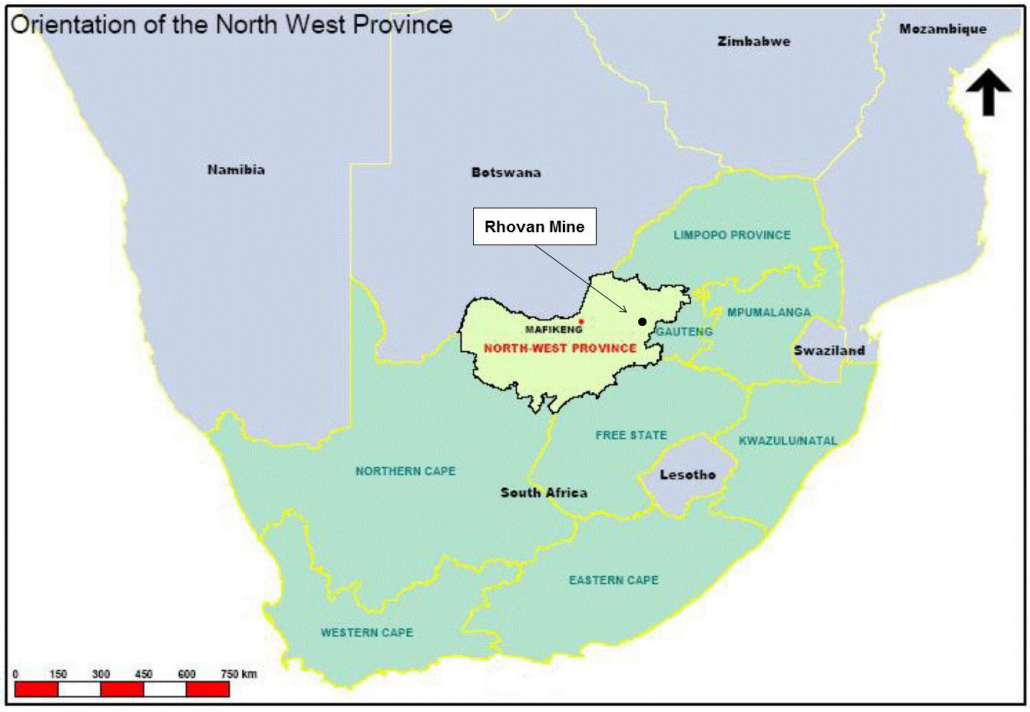

Figure 10: Orientation of the North West Province – South Africa.

With altitudes ranging from 920 m - 1782 m above sea level, the North West Province is professed to have the most uniform terrain of all provinces. The central and western regions are characterized by flat or gently undulating plains. Dunes

associated with the arid environment of the Kalahari occur in the far western region. The topography of the eastern region is more variable, giving rise to the Magaliesberg mountain range of the Transvaal Sequence Magaliesberg formation. Another prominent feature in the east is the Pilansberg which consists of a formation of concentric hills or ring-dykes, remnants of an ancient volcano.

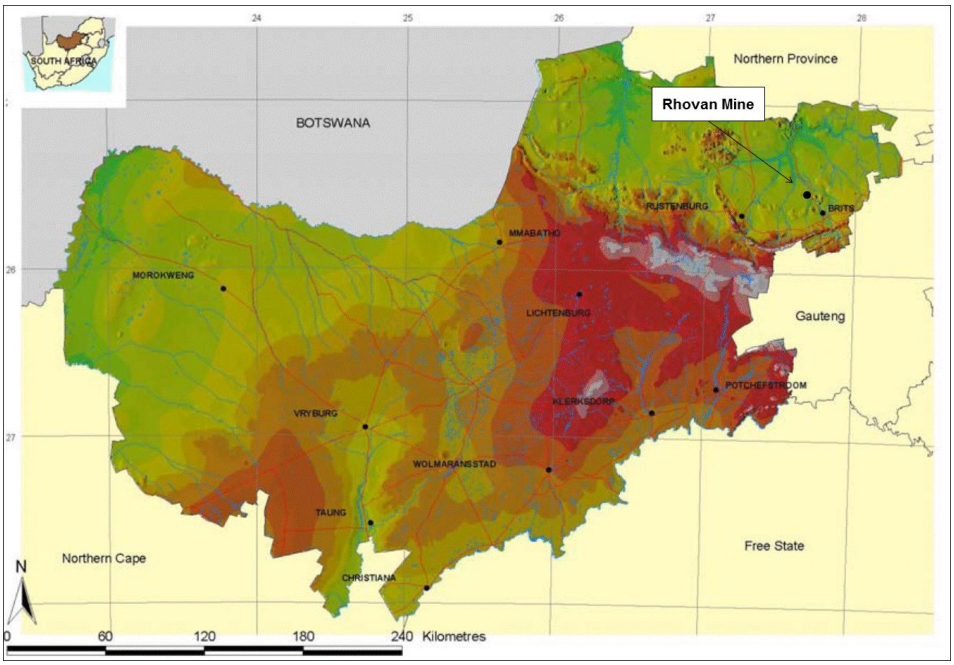

Figure 11: Regional Topography of the North West Province

The topography for the mine lease area is generally flat with gentle surface slopes towards the two main surface drainage arterials, the Gwatlhe Spruit in the west and the Tshukutswe Spruit (small tributary of the Crocodile River) in the east. The mine lease area straddles two quaternary sub-catchments (A21J and A21K), both of which drains into a northerly direction into the Roodekopjes Dam, a surface water reservoir (receptor) with a capacity in excess of 10 million cubic meters.

4.1.1.5 Regional Geology

The mine is located on ferrogabbro of the Bierkraal Magnetite Gabbro of the Upper Zone of the Rustenburg Layered Suite as shown in ***Figure 12*** below. The ferrogabbro unit largely consists of ferrogabbro with magnetite bands, although

bands of troctolite, anorthositic ferrogabbro and magnetite anorthosite are also developed. Small occurrences of Bushveld granite do occur within the ferrogabbro. The hard rock geology of the area is intermittently exposed through a thick colluvial blanket.

Over most of the area the magnetite bands are mainly distributed in the ferrogabbro of the Upper Zone, with the underlying Main Zone (gabbro, norite and anorthosite) occurring south of the mine area. The current open pit operations are situated at the base of the Upper Zone. The magnetite seams vary in thickness from a few cm to approximately 2 m.

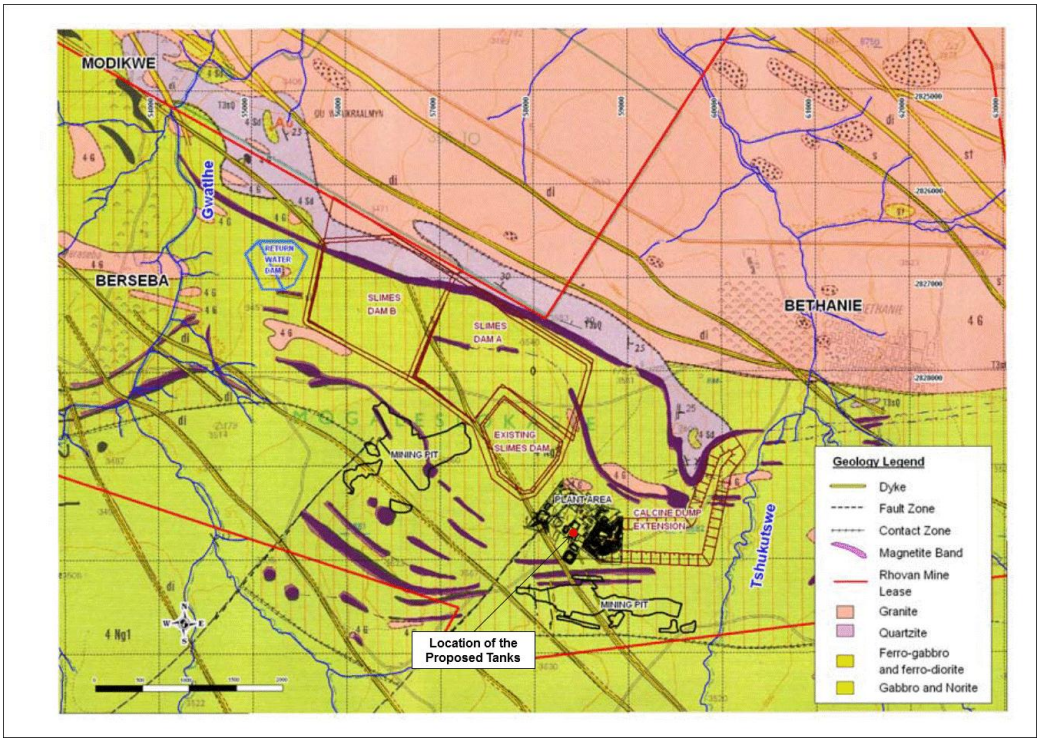

Figure 12: Regional Geology of the Glencore Alloys Rhovan area.

In the lower portion of the Upper Zone, the number and thickness of the bands, including the thickness of the intervening gabbroidal rocks, vary considerably. In the middle and upper portions of the Upper Zone the seams are thicker but with lower V_2O_5 content. Due to their high resistance to weathering, the bands are frequently partly eluvial on outcrop and the width of the outcropping zone does not reflect the real width. The regional dip averages 12 degrees but locally attains higher values of up to 55 degrees. Folding of magnetite bands in the ferrogabbro unit does occur in

the area. Rafts or inliers of Transvaal beds in the complex have also been involved. South of Bethanie the metamorphosed beds of the Smelterskop Stage and the upper magnetite bands in the ferrogabbro have been thrown into a syncline.

Apart from the Transvaal inlier, the northern extent of the area is underlain by Bushveld granite and granophyre, the acid portion of the complex. According to field relationships, the Bushveld granite and granophyre intruded after the basic (mafic) portion of the complex.

Several post-Waterberg linear intrusives, in the form of syenite and diabase dykes are present in the mining area. Pilanesberg ring dykes (syenite) and Karoo dolerite dykes also occur. The general strike direction is northwest-southeast as could be seen in ***Figure 12***. Widths range between 1.5 m and 30 m. The dykes are believed to be vertical or sub-vertical.

The area is also faulted and the layers are occasionally disrupted. The folding, combined with the shallow dip of the sequence, has caused significant changes in the orientation of the layers.

Faulting, after emplacement of the complex, is indicated by faults which intersect it. One prominent southwest-northeast striking fault and two lesser, almost north-south striking faults, are present within the study area.

The colluvium is a product of erosion which followed a period of 30 million years of deep planation which created the African erosion surface during the Mid Cretaceous. This surface has been lowered about 600 m to the present level at the RM site. This process is a very important factor in the creation of the Talus Ore deposits in this area.

4.1.1.6 Soils

Soils in the Rhovan mining area are characterised into seven broad groups. Namely:

- Red apedal soils (Hutton, Bainsvlei, Bloemdal forms);
- Red structured soils (Shortlands form);
- Pedocutanic soils (Swartland, Sepane, Valsrivier, Bonheim forms);

- Shallow soils (Mispah, Glenrosa, Milkwood, Dresden forms);
- Vertic soils (Arcadia, Rensburg forms);
- Prismacutanic soils (Sterkspruit form);
- Man-made soils (Witbank form).

The soils of the RM area have moderately low to high amounts of silt ranging from approximately 5 to 26 % in the topsoils and subsoils. These soils have moderate to high clay contents ranging from approximately 18 to 52 % (majority 41 to 52 %) (red apedal, red structured and pedocutanic soils) or 63 % (vertic soils) in the topsoils, and from approximately 27 to 65 % (majority 50 to 65 %) in the subsoils. The soils contain low to moderate, fine (including very fine) sand contents that generally range from approximately 10 to 29 % in both the topsoils and the subsoils.

4.1.1.7 Land Use

The land use where the proposed activities will take place comprises mining and mineral processing activities. The proposed projects will be located within the RM boundary and the Processing Plant.

4.1.1.8 Land Capability

The footprint of the planned projects is located on a section of the existing Processing plant and mining area. Suitable land capabilities for the post decommissioning phase will be considered during the Impact Assessment Phase.

4.1.1.9 Surface Water

RM is situated within the Roodekopjes Dam catchment, within quaternary sub-catchment A21K of the Limpopo-Crocodile primary drainage region, shown in ***Figure 13*** taken from Volume 1, Surface Water Resources of South Africa –1990 (Midgely et al, 1994).

The mining area is located on quaternary sub-catchment A21K, on the watershed between the Tshukutswe River in the east and the Ga Kgolodi and Gwatlhe Rivers in

the west. These rivers all drain into Roodekopjes Dam, where they join the Crocodile River. The Crocodile River flows into the Limpopo River, which discharges into the Indian Ocean on the east African coastline.

No watercourses flow directly through the footprint area of the proposed projects. Surface water sampling points have been identified in the rivers around the Rhovan site. Regular sampling has been undertaken, the sampling locations are shown on ***Figures 14-16.***

4.1.1.10 Geohydrology

The aquifer(s) underlying the larger Rhovan area exists of primarily two different zones that are classified as aquifers in their own respect. These zones are the weathered zone aquifer and the deep fractured aquifer.

Two types of aquifer boundaries exist around the Rhovan area:

- Physical aquifer boundaries such as (semi-)impermeable dolerite dykes and sills, or other geological discontinuities, for example ground water divides identified in the area or granite rock outcrops in the north-west.
- Hydraulic aquifer boundaries such as water sheds (no-flow boundaries) and streams, the latter which could act as either ground water discharge or recharge boundaries.

A map indicating the major lateral aquifer boundaries for the Rhovan area is shown in ***Figure 17*** below:

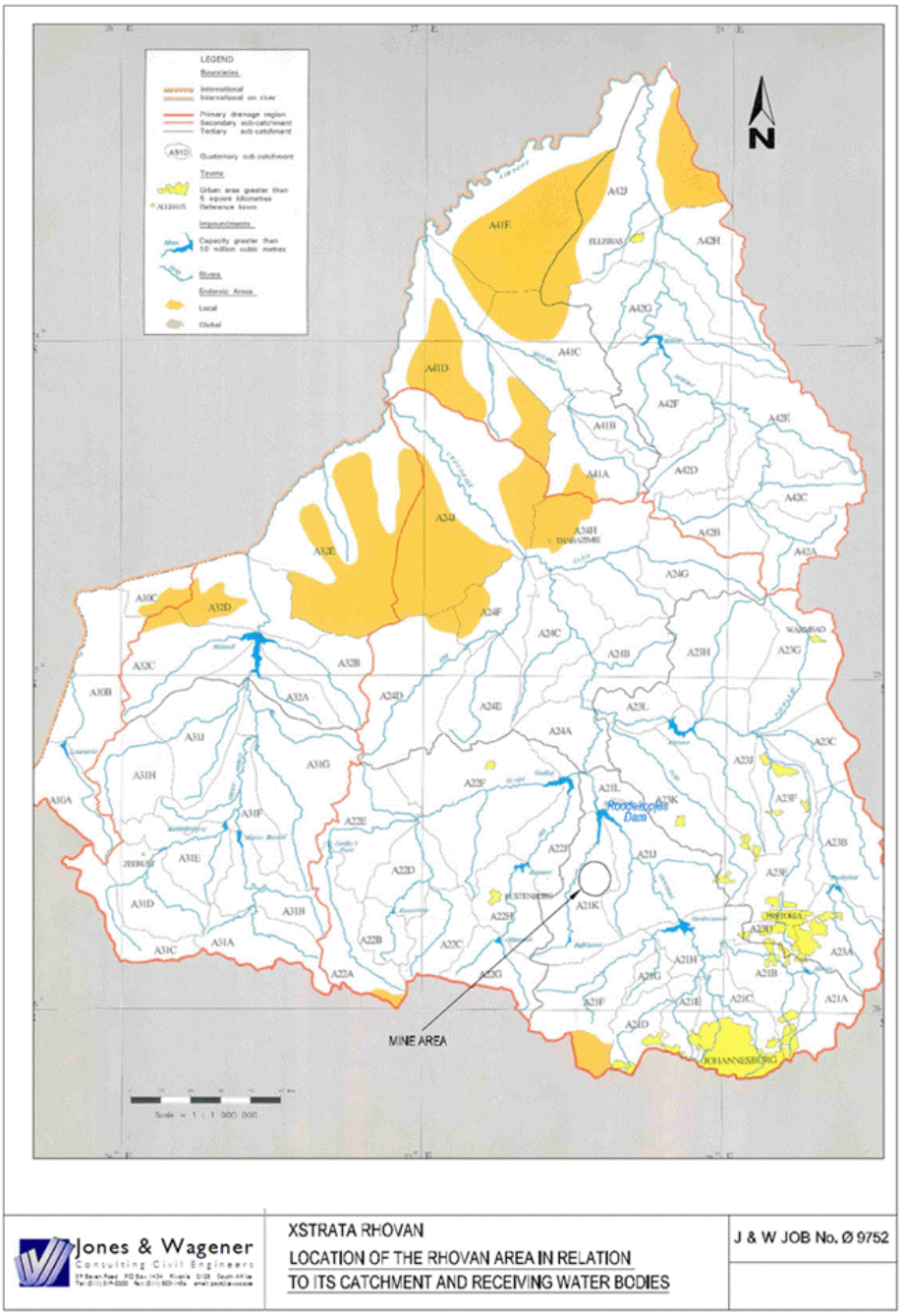

Figure 13: Location of the Rhovan area in relation to its catchment and receiving water bodies.

Figure 14: Storm Water Pollution Control Dam Monitoring Localities (4 Locations)

Figure 15: Process Water Dam Monitoring Localities (12 Locations)

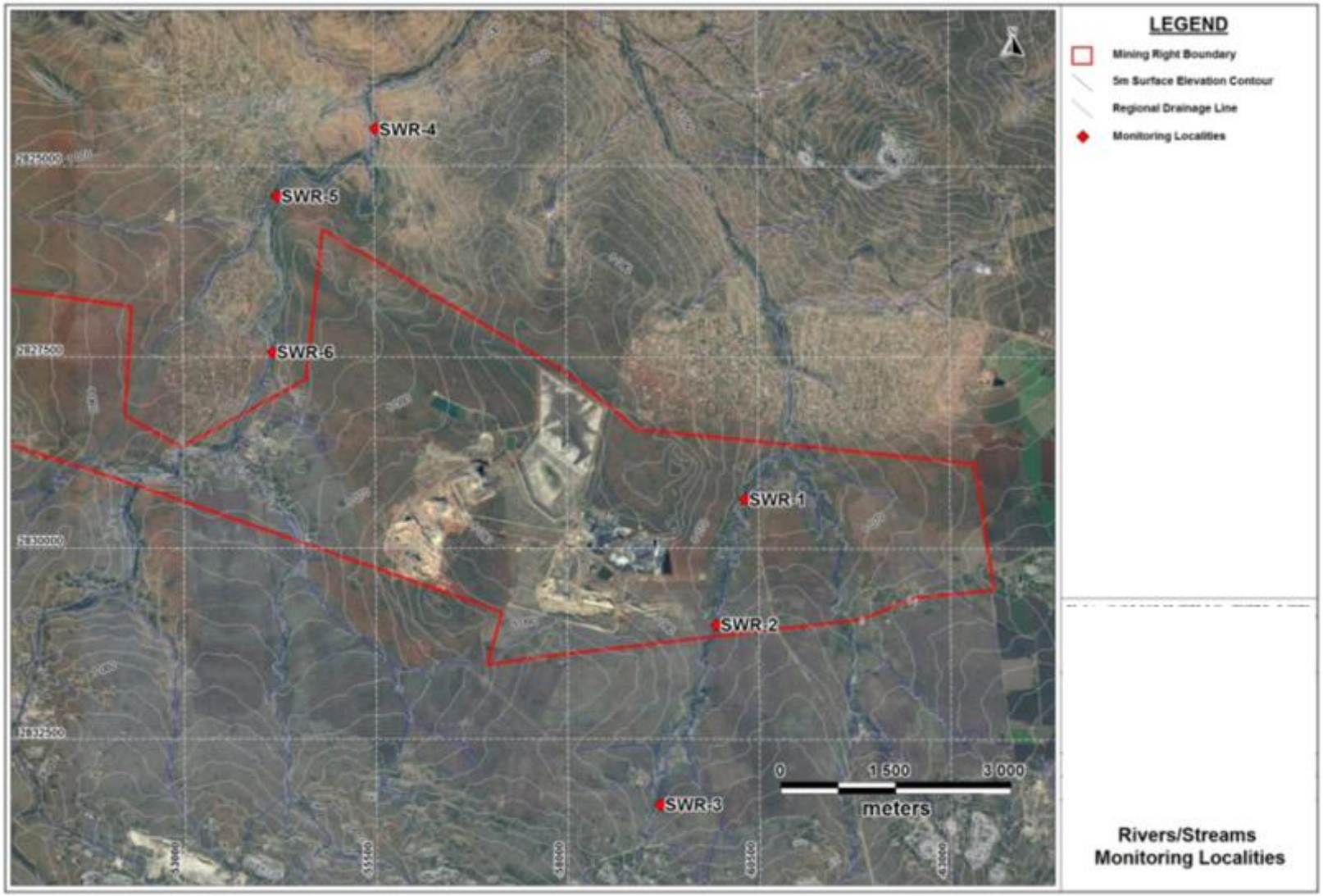

Figure 16: Rivers / Streams Monitoring Localities (6 Locations)

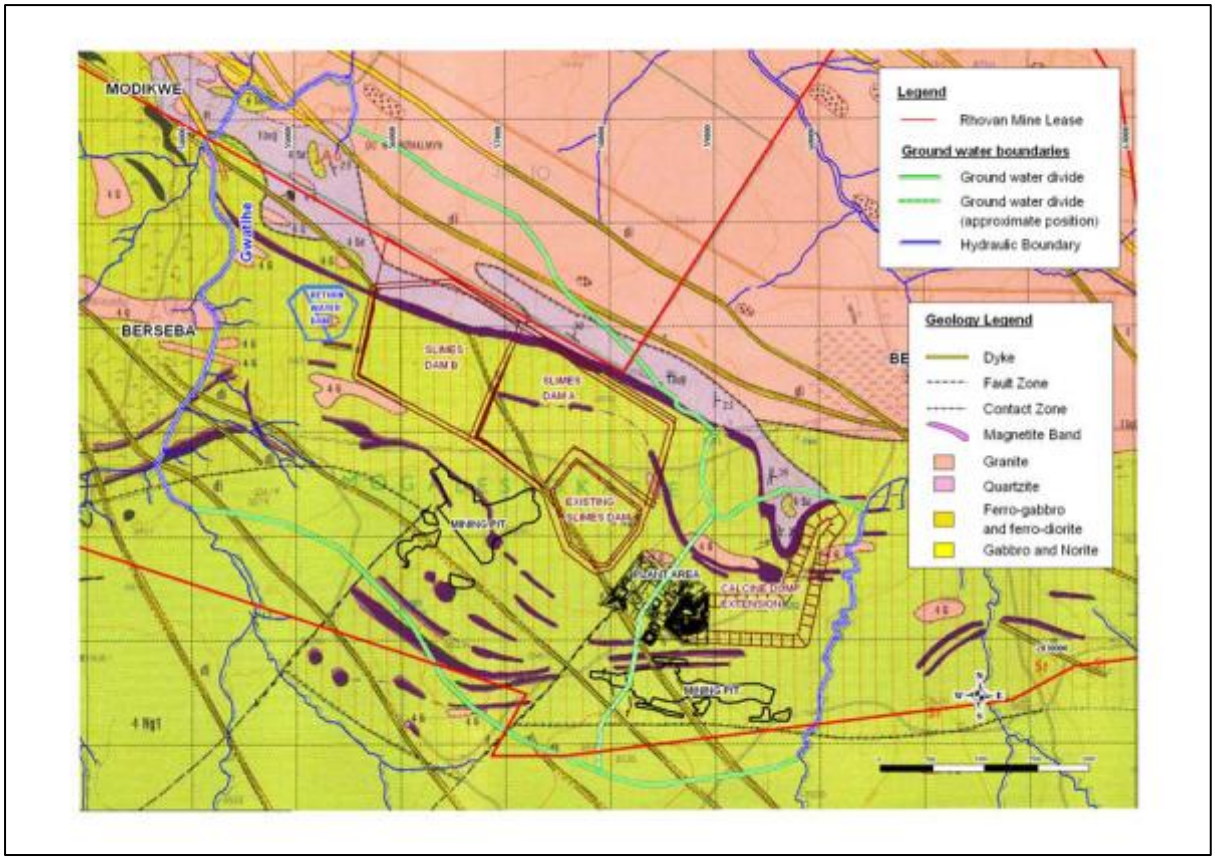

Figure 17: Geological aquifers and aquifer boundaries.

RM, has an extensive groundwater monitoring network. Any reduced groundwater quality is actively identified through the groundwater monitoring programme. Additional monitoring points will be required as a result of the pits backfilling. The location of the groundwater monitoring network is illustrated in ***Figure 18***. The potential impacts associated with the geo-hydrological aspects will be further considered during the Impact Assessment Phase.

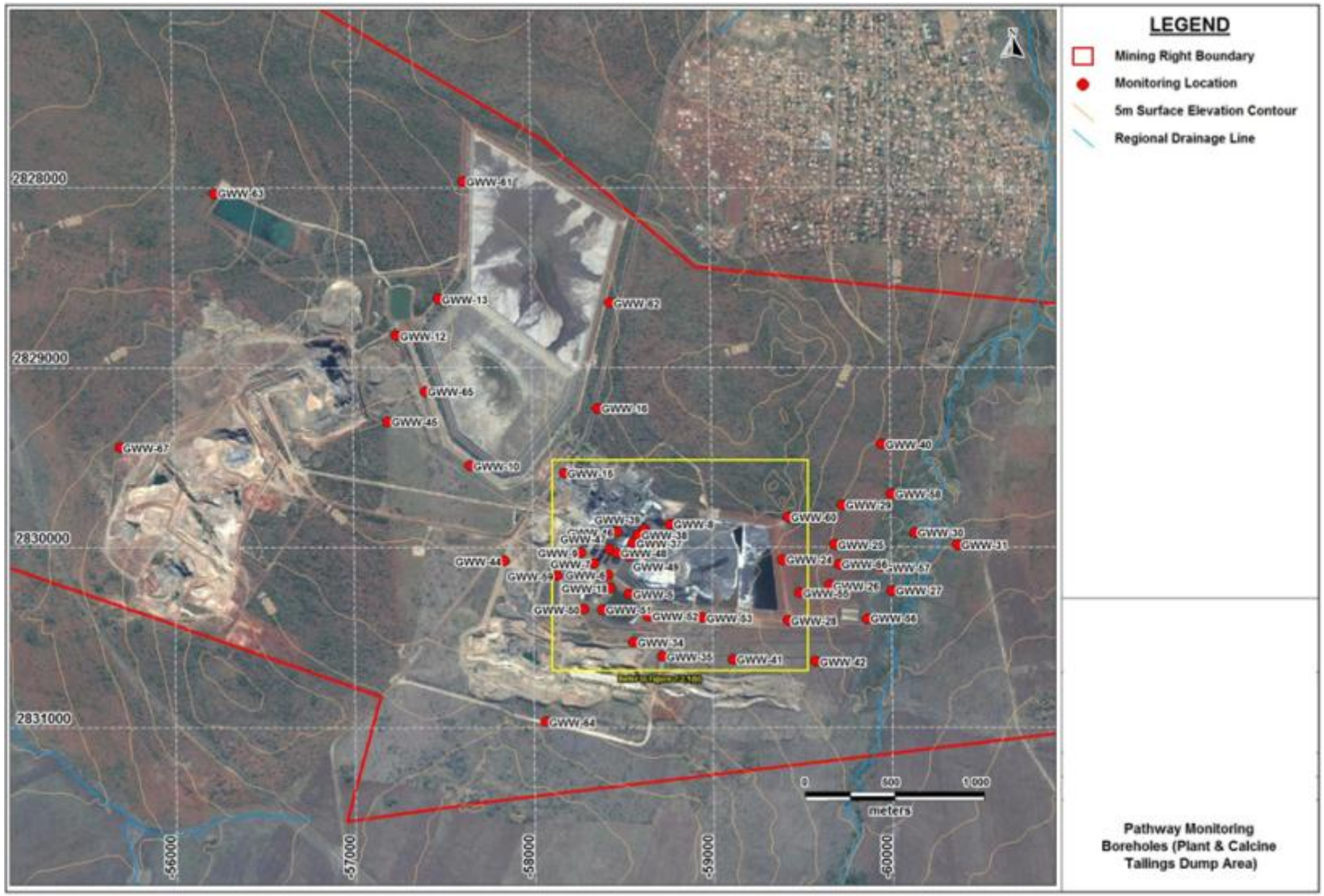

Figure 18: Routine Groundwater Monitoring Boreholes (50 Boreholes).

4.1.1.11 Ecology

According to the North West Province Biodiversity Conservation Assessment, about 40% of the province's ecosystems are under severe pressure. Eleven of the 61 vegetation types and 14 of the 18 river types in the province have been classified as threatened in terms of their ecosystem status. These are high production landscapes characterized by already high levels of transformation. Some landscapes experiencing high rates of current transformation are not yet highlighted as threatened. These are priority areas for environmental management and conservation action. These areas are the Eastern Bushveld and South Eastern Grasslands or Platinum Belt and Golden Highway respectively (***Refer to Figure 19***).

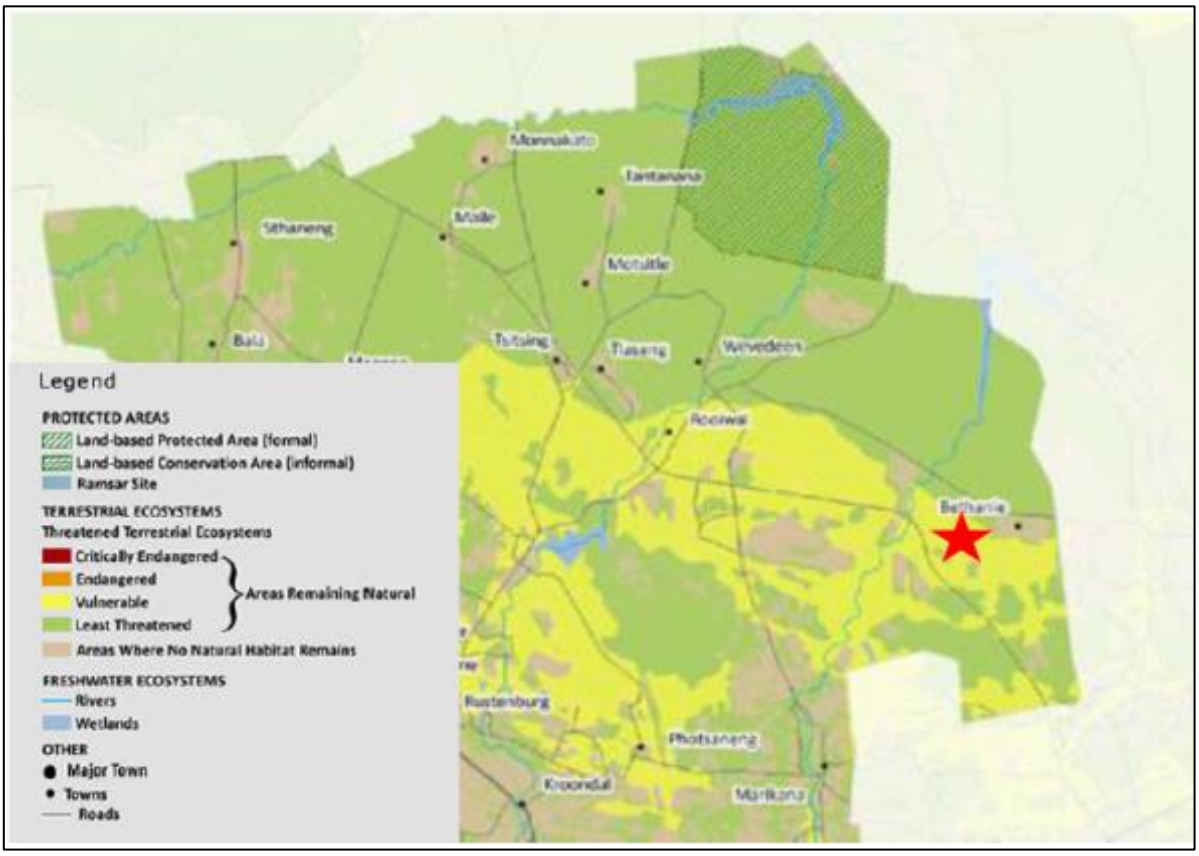

Figure 19: Areas of biodiversity importance at Municipal scale (BGIS: Rustenburg Municipality).

Approximately 30% of the province has been transformed to other non-natural land uses. Over the period 1994 to 2006, the period spanning the first and current land covers, approximately 1% of province was converted from natural to other land uses

per year. The major driver of this change has been agriculture (73%) with mining only contributing 3% to this change. The remainder (24%) was due to urban expansion.

4.1.1.12 Flora

The RM falls within the Savanna biome, although it is located at the southern edge, adjacent to the Grassland biome. The most recent and comprehensive regional vegetation classification (Mucina and Rutherford, 2006) places the site into two types, namely SVcb6 (Savanna biome, Central Bushveld) Marikana Thornveld in the south and SVcb12 (Vulnerable Savannah biome, Central Bushveld) Central Sandy Bushveld ***(Refer to Figure No 20)***. The vegetation present in the mining area and surrounds is typical of both vegetation units and displays elements of both, making this an ecotone or transitional zone between units.

The proposed projects will be located on an already impacted area inside the RM boundary and the Processing Plant.

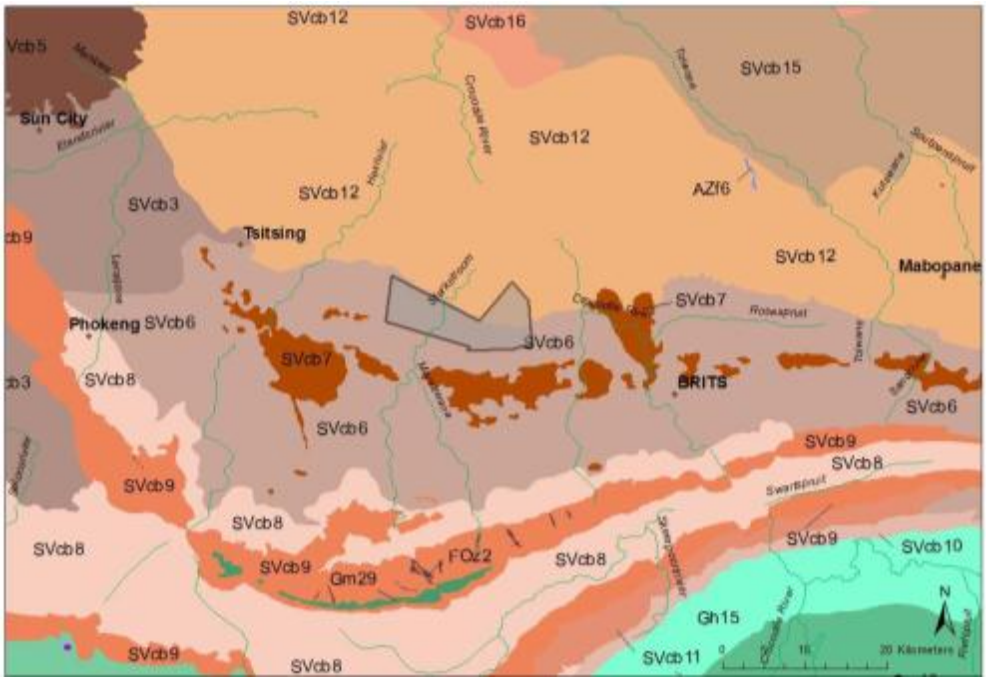

Figure 20: Location of Rhovan relative to vegetation types.

4.1.1.13 Fauna

The RM falls within the Savanna biome, although it is located at the southern edge, adjacent to the Grassland biome. A Reconnaissance survey on the area surrounding RM and Plant was done at the end of October 2005, during which the species observed were recorded.

Twenty-five (25) observation localities were selected in the area surrounding the RM and Plant. The following table outlines the species composition for the area surrounding the Plant and Open-cast Area.

Table 7: List of Mammals possibly occurring in the area surrounding the Rhovan Plant and Open-cast Area.

English Name	Scientific Name	Conservation Status
Aardvark	*Orycteropus afer*	Vulnerable
African Wild Cat	*Felis lybica*	Vulnerable
Angoni Vlei Rat	*Otomys angoniensis*	
Black-backed Jackal	*Canis mesomelas*	
Black-tailed Tree Mouse	*Thallomys nigricaudatus*	
Bushveld Gerbil	*Tatera leucogaster*	
Bushveld Horseshoe Bat	*Rhinolophus simulator*	
Cape Fox	*Vulpes chama*	
Cape Serotine Bat	*Eptesicus capensis*	
Caracal	*Caracal caracal*	
Common Duiker	*Sylvicapra grimmia*	
Common Molerat	*Cryptomys hottentotus*	
Damara Molerat	*Cryptomys damarensis*	
Egyptian Free-tailed Bat	*Tadarida aegyptiaca*	
Egyptian Slit-faced Bat	*Nycteris thebaica*	
Fat Mouse	*Steatomys pratensis*	
Geoffroy's Horseshoe Bat	*Rhinolophus clivosus*	
Grey Climbing Mouse	*Dendromus melanotis*	
Highveld Gerbil	*Tatera brantsii*	
Honey Badger	*Mellivora capensis*	
House Mouse	*Mus musculus*	
House Rat	*Rattus rattus*	
Kaokoveld Rock Dassie	*Procavia capensis welwitschii*	
Klipspringer	*Oreatragus oreotragus*	
Kuhl's Pipistrellus	*Pipistrellus kuhlii*	
Large-spotted	*Genetta tigrina*	
Lesser Red Musk Shrew	*Crocidura hirta*	
Lesser Savanna Dormouse	*Graphiurus parvus*	
Mauritian Tomb Bat	*Taphozous mauritianus*	
Multimammate Mouse	*Mastomys coucha*	
Namaqua rock Mouse	*Aethomys namaquensis*	
Natal Multimammate Mouse	*Mastomys natalensis*	
Pangolin	*Manis temminckii*	Vulnerable
Porcupine	*Hystrix africaeaustralis*	

English Name	Scientific Name	Conservation Status
Pouced Mouse	*Saccostomus campestris*	
Pygmy Mouse	*Mus minutoides*	
Red Veld Rock Mouse	*Aethomys chrysophilus*	
Reddish-grey Musk Shrew	*Crocidura cyanea*	
Rock Dassie	*Procavia capensis*	
Rock Dormouse	*Graphiurus platyops*	
Rock Elephant-shrew	*Elephantulus myurus*	Vulnerable
Schreibers's Long-fingered Bat	*Miniopterus schreibersii*	
Scrub Hare	*Lepus saxatilis*	
Serval	*Leptailurus serval*	
Short-snouted Elephant Shrew	*Elephantulus brachyrhynchus*	
Single-striped Mouse	*Lemniscomys rosalia*	
Slender Mongoose	*Galerella sanguinea*	
Small-spotted	*Genet Genetta genetta*	
Smith's Red Rock Rabbit	*Pronolagus radensis*	
Southern African Hedgehog	*Atelix frontalis*	Rare
Southern Lesser Bushbaby	*Galago moholi*	
Springhares P	*Pedetes capensis*	Vulnerable
Steenbok	*Raphicerus campestris*	
Striped Mouse	*Rhabdomys pumilio*	
Striped Polecat	*Ictonyx striatus*	
Striped Weasel	*Poecilogale albinucha*	
Sundevall's Leaf-nosed Bat	*Hipposideros caffer*	
Temminck's Hairy Bat	*Myotis tricolour*	
Tree Mouse	*Thallomys paedulcus*	
Tree Squirrel	*Paraxerus cepapi*	
White-tailed Mongoose	*Ichneumia albicauda*	
Woodland Dormouse	*Graphiurus murinus*	
Yellow House Bat	*Scotophilus dinganii*	
Yellow Mongoose	*Cynictis penicillata*	

Table 8: List of Birds possibly occurring in the area surrounding the Rhovan Plant and Open-cast Area.

Rob	English Name	Scientific Name	General Status
85	Abdim's Stork	*Ciconia abdimii*	NBM-U
212	African Crake	*Crecopsis egregia*	BM-U
375	African Cuckoo	*Cuculus gularis*	BM-U
361	African Green Pigeon	*Treron calva*	R-U
137	African Hawk Eagle	*Hieraaetus spilogaster*	R-C
451	African Hoopoe	*Upupa africana*	R-VC
165	African Marsh Harrier	*Circus ranivorus*	R-U
711	African Pied Wagtail	*Motacilla aguimp*	R-U
396	African Scops Owl	*Otus senegalensis*	R-C
418	Alpine Swift	*Tachymarptis melba*	BM-U
595	Anteating Chat	*Myrmecocichla formicivora*	E-U
560	Arrowmarked Babbler	*Turdoides jardineii*	R-VC
552	Ashy Tit	*Parus cinerascens*	E-C
667	Ayres' Cisticola	*Cisticola ayresii*	R-U
534	Banded Martin	*Riparia cincta*	BM-U/C
392	Barn Owl	*Tyto alba*	R-C
645	Barthroated Apalis	*Apalis thoracica*	R-U
487	Bearded Woodpecker	*Dendropicos namaquus*	R-U

Rob	English Name	Scientific Name	General Status
481	Bennett's Woodpecker	*Campethera bennettii*	R-U
547	Black Crow	*Corvus capensis*	R-VC
378	Black Cuckoo	*Cuculus clamosus*	BM-U
538	Black Cuckooshrike	*Campephaga flava*	R-C
694	Black Flycatcher	*Melaenornis pammelaina*	R-C
168	Black Harrier	*Circus maurus*	NBM-U
126	Black Kite	*Milvus migrans*	NBM-U
158	Black Sparrowhawk	*Accipiter melanoleucus*	R-U
792	Black Sunbird	*Chalcomitra amethystina*	R-VC
412	Black Swift	*Apus barbatus*	BM-U
864	Black Widowfinch	*Vidua funerea*	R-U
143	Blackbreasted Snake Eagle	*Circaetus pectoralis*	R-C
847	Blackcheeked Waxbill	*Estrilda erythronotos*	R-C
685	Blackchested Prinia	*Prinia flavicans*	E-VC
464	4Blackcollared Barbet	*Lybius torquatus*	R-VC
744	Blackcrowned Tchagra	*Tchagra senegala*	R-VC
568	Blackeyed Bulbul	*Pycnonotus tricolor*	R-A
63	Blackheaded Heron	*Ardea melanocephala*	R-VC
545	Blackheaded Oriole	*Oriolus larvatus*	R-VC
127	Blackshouldered Kite	*Elanus caeruleus*	R-VC
258	Blacksmith Plover	*Vanellus armatus*	R-VC
870	Blackthroated Canary	*Serinus atrogularis*	R-VC
305	Blackwinged Pratincole	*Glareola nordmanni*	NBM-C
208	Blue Crane	*Anthropoides paradisea*	E-U
844	Blue Waxbill	*Uraeginthus angolensis*	R-A
840	Bluebilled Firefinch	*Lagonosticta rubricata*	R-U
440	Bluecheeked Bee-eater	*Merops persicus*	NBM-U/C
746	Bokmakierie	*Telophorus zeylonus*	E-VC
136	Booted Eagle	*Hieraaetus pennatus*	NBM-U
857	Bronze Mannikin	*Lonchura cucullata*	R-VC
142	Brown Snake Eagle	*Circaetus cinereus*	R-C
435	Brownhooded Kingfisher	*Halcyon albiventris*	R-VC
533	Brownthroated Martin	*Riparia paludicola*	R-C
741	Brubru	*Nilaus afer*	R-U
218	Buffspotted Flufftail	*Sarothrura elegans*	R-U
719	Buffy Pipit	*Anthus vaalensis*	R-U
391	Burchell's Coucal	*Centropus burchellii*	R-VC
762	Burchell's Starling	*Lamprotornis australis*	E-VC
656	Burntnecked Eremomela	*Eremomela usticollis*	R-C
723	Bushveld Pipit	*Anthus caffer*	R-U
700	Cape Batis	*Batis capensis*	R-U
400	Cape Eagle Owl	*Bubo capensis*	R-U
557	Cape Penduline Tit	*Anthoscopus minutus*	E-U
601	Cape Robin	*Cossypha caffra*	R-VC
803	Cape Sparrow	*Passer melanurus*	E-A
354	Cape Turtle Dove	*Streptopelia capicola*	R-A
122	Cape Vulture	*Gyps coprotheres*	E-C
713	Cape Wagtail	*Motacilla capensis*	R-VC
813	Cape Weaver	*Ploceus capensis*	E-VC
796	Cape White-eye	*Zosterops virens*	E-VC
587	Capped Wheatear	*Oenanthe pileata*	R-C
486	Cardinal Woodpecker	*Dendropicos fuscescens*	R-C
252	Caspian Plover	*Charadrius asiaticus*	NBM-U
71	Cattle Egret	*Bubulcus ibis*	R-A

Rob	English Name	Scientific Name	General Status
515	Chestnutbacked Finchlark	*Eremopterix leucotis*	R-C
701	Chinspot Batis	*Batis molitor*	R-C/VC
666	Cloud Cisticola	*Cisticola textrix*	R-U/C
200	Common Quail	*Coturnix coturnix*	R-U
264	Common Sandpiper	*Actitis hypoleucos*	NBM-C
846	Common Waxbill	*Estrilda astrild*	R-VC
188	Coqui Francolin	*Peliperdix coqui*	R-C
473	Crested Barbet	*Trachyphonus vaillantii*	R-VC
189	Crested Francolin	*Dendroperdix sephaena*	R-C/VC
739	Crimsonbreasted Shrike	*Laniarius atrococcineus*	E-VC
255	Crowned Plover	*Vanellus coronatus*	R-VC
128	128 Cuckoo Hawk	*Aviceda cuculoides*	R-U
820	Cuckoofinch	*Anomalospiza imberbis*	BM-U
855	Cutthroat Finch	*Amadina fasciata*	R-C
658	Desert Barred Warbler	*Calamonastes fasciolatus*	E-U
665	Desert Cisticola	*Cisticola aridulus*	R-C
386	Diederik Cuckoo	*Chrysococcyx caprius*	BM-C
347	Doublebanded Sandgrouse	*Pterocles bicinctus*	E-C
495.2	Eastern Clapper Lark	*Eastern Clapper Lark*	E-U
180	Eastern Redfooted Kestrel	*Falco amurensis*	NBM-U
286	Ethiopian Snipe	*Gallinago nigripennis*	R-U/C
438	Eurasian Bee-eater	*Merops apiaster*	NBM-VC
374	Eurasian Cuckoo	*Cuculus canorus*	NBM-U
543	Eurasian Golden Oriole	*Oriolus oriolus*	NBM-U
164	Eurasian Marsh Harrier	*Circus aeruginosus*	NBM-U
633	Eurasian Marsh Warbler	*Acrocephalus palustris*	NBM-U
404	Eurasian Nightjar	*Caprimulgus europaeus*	NBM-U
446	Eurasian Roller	*Coracias garrulus*	NBM-U/C
518	Eurasian Swallow	*Hirundo rustica*	NBM-VC
411	Eurasian Swift	*Apus apus*	NBM-U
706	Fairy Flycatcher	*Stenostira scita*	NBM-C
589	Familiar Chat	*Cercomela familiaris*	R-C
664	Fantailed Cisticola	*Cisticola juncidis*	R-C
693	Fantailed Flycatcher	*Myioparus plumbeus*	R-U
497	Fawncoloured Lark	*Calendulauda africanoides*	R-U
348	Feral Pigeon	*Columba livia*	R-C
405	Fierynecked Nightjar	*Caprimulgus pectoralis*	R-C
698	Fiscal Flycatcher	*Sigelus silens*	E-VC
732	Fiscal Shrike	*Lanius collaris*	R-A
496	Flappet Lark	*Mirafra rufocinnamomea*	R-U
541	Forktailed Drongo	*Dicrurus adsimilis*	R-A
161	Gabar Goshawk	*Melierax gabar*	R-C
619	Garden Warbler	*Sylvia borin*	NBM-U
402	Giant Eagle Owl	*Bubo lacteus*	R-U
764	Glossy Starling	*Lamprotornis nitens*	E-VC
826	Golden Bishop	*Euplectes afer*	R-C
884	Goldenbreasted Bunting	*Emberiza flaviventris*	R-VC
483	Goldentailed Woodpecker	*Campethera abingoni*	R-U/C
393	Grass Owl	*Tyto capensis*	R-U
661	Grassbird	*Sphenoeacus afer*	E-C
716	Grassveld Pipit	*Anthus cinnamomeus*	R-VC
802	Great Sparrow	*Passer motitensis*	R-C
380	Great Spotted Cuckoo	*Clamator glandarius*	BM-U
785	Greater Doublecollared	*Cinnyris afra*	E-U

Rob	English Name	Scientific Name	General Status
474	Greater Honeyguide	*Indicator indicator*	R-C
182	Greater Kestrel	*Falco rupicoloides*	R-U/C
526	Greater Striped Swallow	*Hirundo cucullata*	BM-VC
358	Greenspotted Dove	*Turtur chalcospilos*	R-A
457	Grey Hornbill	*Tockus nasutus*	R-VC
373	Grey Lourie	*Corythaixoides concolor*	R-A
558	Grey Penduline Tit	*Anthoscopus caroli*	R-U
657.1	Greybacked BleatingWarbler	*Camaroptera brevicaudata*	R-VC
751	Greyheaded Bush Shrike	*Malaconotus blanchoti*	R-VC
436	Greyhooded Kingfisher	*Halcyon leucocephala*	BM-U
580	Groundscraper Thrush	*Psophocichla litsipsirupa*	R-VC
169	Gymnogene	*Polyboroides typus*	R-C
94	Hadeda Ibis	*Bostrychia hagedash*	R-A
201	Harlequin Quail	*Coturnix delegorguei*	BM-U
203	Helmeted Guineafowl	*Numida meleagris*	R-VC
130	Honey Buzzard	*Pernis apivorus*	NBM-U
416	Horus Swift	*Apus hours*	BM-U
530	House Martin	*Delichon urbica*	NBM-U
801	House Sparrow	*Passer domesticus*	R-VC
625	Icterine Warbler	*Hippolais icterina*	NBM-U
758	Indian Myna	*Acridotheres tristis*	R-VC
152	Jackal Buzzard	*Buteo rufofuscus*	E-U
382	Jacobin Cuckoo	*Clamator jacobinus*	BM-C
841	Jameson's Firefinch	*Lagonosticta rhodopareia*	R-C
615	Kalahari Robin	*Cercotrichas paena*	E-VC
577.1	Karoo Thrush	*Turdus smithi*	E-VC
248	Kittlitz's Plover	*Charadrius pecuarius*	R-C
385	Klaas's Cuckoo	*Chrysococcyx klaas*	BM-U
205	Kurrichane Buttonquail	*Turnix sylvatica*	R-U
576	Kurrichane Thrush	*Turdus libonyanus*	R-VC
172	Lanner Falcon	*Falco biarmicus*	R-U
124	Lappetfaced Vulture	*Torgos tracheliotus*	R-C
887	Larklike Bunting	*Emberiza impetuani*	E-U
355	Laughing Dove	*Streptopelia senegalensis*	R-A
679	Lazy Cisticola	*Cisticola aberrans*	R-U
731	Lesser Grey Shrike	*Lanius minor*	NBM-C
476	Lesser Honeyguide	*Indicator minor*	R-U
183	Lesser Kestrel	*Falco naumanni*	NBM-U/C
815	Lesser Masked Weaver	*Ploceus intermedius*	R-U
527	Lesser Striped Swallow	*Hirundo abyssinica*	BM-VC
677	Levaillant's Cisticola	*Cisticola tinniens*	R-VC
447	Lilacbreasted Roller	*Coracias caudata*	R-VC
159	Little Banded Goshawk	*Accipiter badius*	R-U
444	Little Bee-eater	*Merops pusillus*	R-VC
157	Little Sparrowhawk	*Accipiter minullus*	R-U
417	Little Swift	*Apus affinis*	R-VC
154	Lizard Buzzard	*Lizard Buzzard*	R-C
651	Longbilled Crombec	*Sylvietta rufescens*	R-VC
735	Longtailed Shrike	*Corvinella melanoleuca*	R-VC
832	Longtailed Widow	*Euplectes progne*	R-VC
775	Malachite Sunbird	*Nectarinia famosa*	R-U
89	Marabou Stork	*Leptoptilos crumeniferus*	R-U
695	Marico Flycatcher	*Bradornis mariquensis*	E-VC
779	Marico Sunbird	*Cinnyris mariquensis*	R-VC

Rob	English Name	Scientific Name	General Status
395	Marsh Owl	*Asio capensis*	R-U/C
140	Martial Eagle	*Polemaetus bellicosus*	R-U/C
814	Masked Weaver	*Ploceus velatus*	R-VC
834	Melba Finch	*Pytilia melba*	R-U/VC
492	Melodious Lark	*Melodious Lark*	E-U
493	Monotonous Lark	*Mirafra passerina*	E-U
166	Montagu's Harrier	*Circus pygargus*	NBM-U
586	Mountain Chat	*Oenanthe monticola*	E-C
356	Namaqua Dove	*Oena capensis*	R-VC
196	Natal Francolin	*Pternistis natalensis*	E-U
681	Neddicky	*Cisticola fulvicapillus*	R-C
173	Northern Hobby Falcon	*Falco subbuteo*	NBM-U
626	Olivetree Warbler	*Hippolais olivetorum*	NBM-U
193	Orange River Francolin	*Scleroptila levaillantoides*	R-U
748	Orangebreasted Bush Shrike	*Telophorus sulfureopectus*	R-U
854	Orangebreasted Waxbill	*Amandava subflava*	R-C
727	Orangethroated Longclaw	*Macronyx capensis*	E-VC
1	Ostrich	*Struthio camelus*	R-C
156	Ovambo Sparrowhawk	*Accipiter ovampensis*	R-U
162	Pale Chanting Goshawk	*Melierax canorus*	E-U
696	Pallid Flycatcher	*Bradornis pallidus*	R-C
167	Pallid Harrier	*Circus macrourus*	NBM-U
421	Palm Swift	*Cypsiurus parvus*	R-C
710	Paradise Flycatcher	*Terpsiphone viridis*	BM-VC
862	Paradise Whydah	*Vidua paradisaea*	R-VC
523	Pearlbreasted Swallow	*Hirundo dimidiata*	R-U
398	Pearlspotted Owl	*Glaucidium perlatum*	R-C/VC
171	Peregrine Falcon	*Falco peregrinus*	NBM-U
563	Pied Babbler	*Turdoides bicolor*	E-VC
465	Pied Barbet	*Tricholaema leucomelas*	E-U/VC
548	Pied Crow	*Corvus albus*	R-A
759	Pied Starling	*Spreo bicolor*	E-C
508	Pinkbilled Lark	*Spizocorys conirostris*	E-C
860	Pintailed Whydah	*Vidua macroura*	R-VC
718	Plainbacked Pipit	*Anthus leucophrys*	R-U
761	Plumcoloured Starling	*Cinnyricinclus leucogaster*	BM-VC
740	Puffback	*Dryoscopus cubla*	R-A
449	Purple Roller	*Coracias naevia*	R-C
865	Purple Widowfinch	*Vidua purpurascens*	R-U
432	Pygmy Kingfisher	*Ispidina picta*	BM-C
852	Quail Finch	*Ortygospiza atricollis*	R-C
672	Wattling Cisticola	*Cisticola chinianus*	R-C/VC
824	Red Bishop	*Euplectes orix*	R-VC
733	Redbacked Shrike	*Lanius collurio*	NBM-VC
842	Redbilled Firefinch	*Lagonosticta senegala*	R-C
458	Redbilled Hornbill	*Tockus erythrorhynchus*	R-VC
772	Redbilled Oxpecker	*Buphagus erythrorhynchus*	R-VC
821	Redbilled Quelea	*Quelea quelea*	R-VC
452	Redbilled Woodhoopoe	*Phoeniculus purpureus*	R-VC
524	Redbreasted Swallow	*Hirundo semirufa*	BM-C
507	Redcapped Lark	*Calandrella cinerea*	R-U/C
377	Redchested Cuckoo	*Cuculus solitarius*	BM-C
831	Redcollared Widow	*Euplectes ardens*	R-VC
237	Redcrested Korhaan	*Eupodotis ruficrista*	E-VC

Rob	English Name	Scientific Name	General Status
567	Redeyed Bulbul	*Pycnonotus nigricans*	E-VC
352	Redeyed Dove	*Streptopelia semitorquata*	R-VC
426	Redfaced Mousebird	*Urocolius indicus*	R-VC
856	Redheaded Finch	*Amadina erythrocephala*	E-U/VC
819	Redheaded Weaver	*Anaplectes rubriceps*	R-U
192	Redwing Francolin	*Scleroptila levaillantii*	R-U
769	Redwinged Starling	*Onychognathus morio*	R-VC
181	Rock Kestrel	*Falco rupicolis*	R-U
529	Rock Martin	*Hirundo fuligula*	R-VC
349	Rock Pigeon	*Columba guinea*	R-VC
284	Ruff	*Philomachus pugnax*	NBM-U/C
406	Rufouscheeked Nightjar	*Caprimulgus rufigena*	BM-C
494	Rufousnaped Lark	*Mirafra africana*	R-VC
498	Sabota Lark	*Calendulauda sabota*	E-U
91	Sacred Ibis	*Threskiornis aethiopicus*	R-VC
532	Sand Martin	*Riparia riparia*	NBM-U
806	Scalyfeathered Finch	*Sporopipes squamifrons*	E-VC
454	Scimitarbilled Woodhoopoe	*Rhinopomastus cyanomelas*	R-VC
118	Secretarybird	*Sagittarius serpentarius*	R-U/C
861	Shafttailed Whydah	*Vidua regia*	E-U
478	Sharpbilled Honeyguide	*Prodotiscus regulus*	R-U
191	Shelley's Francolin	*Scleroptila shelleyi*	R-C
583	Shorttoed Rockthrush	*Monticola brevipes*	E-U/C
528	South African Cliff Swallow	*Hirundo spilodera*	BM-C
554	Southern Black Tit	*Parus niger*	E-VC
736	Southern Boubou	*Laniarius ferrugineus*	E-VC
804	Southern Greyheaded Sparrow	*Passer diffusus*	E-VC
459	Southern Yellowbilled Hornbill	*Tockus leucomelas*	E-VC
424	Speckled Mousebird	*Colius striatus*	R-VC
506	Spikeheeled Lark	*Chersomanes albofasciata*	E-VC
214	Spotted Crake	*Porzana porzana*	Rare
297	Spotted Dikkop	*Burhinus capensis*	R-C
401	Spotted Eagle Owl	*Bubo africanus*	R-C
689	Spotted Flycatcher	*Muscicapa striata*	NBM-C
811	Spottedbacked Weaver	*Ploceus cucullatus*	R-U
867	Steelblue Widowfinch	*Vidua chalybeata*	R-U/C
149	Steppe Buzzard	*Buteo vulpinus*	NBM-C
133	Steppe Eagle	*Aquila nipalensis*	NBM-U
596	Stonechat	*Saxicola torquata*	R-VC
881	Streakyheaded Canary	*Serinus gularis*	R-C
381	Striped Cuckoo	*Clamator levaillantii*	BM-U
437	Striped Kingfisher	*Halcyon chelicuti*	R-VC
720	Striped Pipit	*Anthus lineiventris*	R-U
199	Swainson's Francolin	*Pternistis swainsonii*	E-VC
445	Swallowtailed Bee-eater	*Merops hirundineus*	R-U
850	Swee Waxbill	*Estrilda melanotis*	E-U
683	Tawnyflanked Prinia	*Prinia subflava*	R-VC
300	Temminck's Courser	*Cursorius temminckii*	R-U
743	Threestreaked Tchagra	*Tchagra australis*	R-U/VC
671	Tinkling Cisticola	*Cisticola rufilatus*	R-U
621	Titbabbler	*Parisoma subcaeruleum*	E-VC
722	Tree Pipit	*Anthus trivialis*	NBM-U
845	Violeteared Waxbill	*Granatina granatina*	E-U/VC
135	Wahlberg's Eagle	*Aquila wahlbergi*	BM-U

Rob	English Name	Scientific Name	General Status
670	Wailing Cisticola	*Cisticola lais*	R-C
260	Wattled Plover	*Vanellus senegallus*	R-VC
760	Wattled Starling	*Creatophora cinerea*	R-U/VC
179	Western Redfooted Kestrel	*Falco vespertinus*	NBM-U
753	White Helmetshrike	*Prionops plumatus*	R-VC
83	White Stork	*Ciconia ciconia*	NBM-C
425	Whitebacked Mousebird	*Colius colius*	E-C
123	Whitebacked Vulture	*Gyps africanus*	R-U
233	Whitebellied Korhaan	*Eupodotis barrowii*	E-U
787	Whitebellied Sunbird	*Cinnyris talatala*	R-VC
613	Whitebrowed Robin	*Cercotrichas leucophrys*	R-U/VC
799	7Whitebrowed Sparrowweaver	*Plocepasser mahali*	R-U/VC
397	Whitefaced Owl	*Ptilopsus granti*	R-C
443	Whitefronted Bee-eater	*Merops bullockoides*	R-C
415	Whiterumped Swift	*Apus caffer*	BM-C
620	Whitethroat	*Sylvia communis*	NBM-U
602	Whitethroated Robin	*Cossypha humeralis*	E-C
520	Whitethroated Swallow	*Hirundo albigularis*	BM-C
829	Whitewinged Widow	*Euplectes albonotatus*	R-C
643	Willow Warbler	*Phylloscopus trochilus*	NBM-C
433	Woodland Kingfisher	*Halcyon senegalensis*	BM-U
878	Yellow Canary	*Serinus flaviventris*	E-U
714	Yellow Wagtail	*Motacilla flava*	NBM-C
653	Yellowbellied Eremomela	*Eremomela icteropygialis*	R-C
126.1	Yellowbilled Kite	*Milvus aegyptius*	BM-U
869	Yelloweyed Canary	*Serinus mozambicus*	R-VC
470	Yellowfronted Tinker Barbet	*Pogoniulus chrysoconus*	R-VC
827	Yellowrumped Widow	*Euplectes capensis*	R-U
346	Yellowthroated Sandgrouse	*Pterocles gutturalis*	R-U
805	Yellowthroated Sparrow	*Petronia superciliaris*	R-C

R=Resident, E=Endemic, BM=Breeding Migrant, NBM=Non-Breeding Migrant, V=Vagrant A=Abundant, VC=Very Common, C=Common, U=Uncommon, R=Rare, #=Rare Bird record. (Roberts' Multimedia Birds of Southern Africa Version 3 © 1997-2002)

Table 9: List of Snakes possibly occurring in the RM area.

Common name	Scientific name
Aurora House Snake	*Lamprophis aurora*
Black Mamba	*Dendroaspis polylepis*
Black-headed Snake	*Aparallactus capensis*
Blind Snakes	*Typhlops sp.*
Blind Snakes	*Rhinotyphlops sp.*
"Boomslang"	*"Dispholidus typus*
Brown House Snake	*Lamprophis fuliginosus*
Cape Wolf Snake	*Lycophidion capense*
Common Brown Water Snake	*Lycodonomorphus rufulus*
Common Egg-eater	*Dasypeltis scabra*
Common Night Adder	*Causus rhombeatus*
Common Slug Eater	*Duberria lutrix*
Egyptian Cobra	*Naja annulifera*
Green Water Snake	*Philothamnus hoplogaster*
Herald Snake	*Crotaphopeltis hotamboeia*
Mole Snake	*Pseudaspis cana*
Mozambique Spitting Cobra	*Naja mossambica*

Puff Adder	*Bitis arietans*
Rinkhals	*Hemachetus haemachatus*
Southern African Rock Python	*Python sebae*
Spotted Bush Snake	*Philothamnus semivariegatus*
Spotted Skaapsteker	*Psammophylax rhombeatus*
Thread Snakes	*Leptotyphlops sp.*
Twig Snake	*Thelotornis capensis*

The proposed projects will be located on existing impacted areas near the mining and processing plant area. The likelihood of endangered, vulnerable or rare species occurring in the area is highly unlikely. The vulnerable species mentioned in ***Table 7, 8 and 9***, might however occur in this region.

4.1.1.14 Air Quality

The project area and surrounding land can be described as being rural and mainly used for mining operations and small residential villages. The nearest villages to the site being Bethanie (~1 km to the northeast), Berseba (~2.7m to the northwest) and Modikwe (~3.8 km to the northwest). The Brits-Rustenburg region is the industrial hub of the North West Province with all the platinum, chromium and vanadium mines located in this region. The main sources of pollution include:

- Industrial and commercial - including Scheduled Processes and fuel burning appliance operated by businesses, hospitals and schools;
- Mining - specifically wind-blown emissions from mine tailings impoundments;
- Waste treatment and disposal - waste incineration, landfills and waste water treatment works;
- Transport - petrol and diesel driven vehicle tailpipe emissions, brake and tyre wear fugitives and rail-related emissions;
- Residential fuel combustion (particularly coal and wood used by lower income communities;
- Informal / miscellaneous - tyre burning, wild fires and fugitive dust emissions from open areas and agricultural activities.

The RM operations comprise both open pit mining activities, and a processing and smelter plant. Sources of atmospheric pollutants identified include dust from drilling and blasting operations in the open pit, raw materials handling operations such as tipping and material loading, wind erosion from the open storage piles, vehicle entrained dust from roads and conveyor transfer points. Crushing and screening are also significant sources of fugitive dust. The dust and gasses produced by smelting processes are collected by hoods and vented to baghouse(s) or scrubbers and then to atmosphere. Tapping operations are a significant source of both fugitive dust and fumes from vaporised slugs and all exposed metal and slag surfaces.

The proposed development will likely be a source of dust during the construction and operational phase. The proposed operation of the Test Kiln and Baghouse, evaporation plant and Dust Control Baghouse, will likely have a beneficial impact on the fugitive and ambient emissions. The impact of the proposed projects will be assessed as part of the EIA Phase. The location of the existing PM10 and Dust Fall Out monitoring stations are illustrated in ***Figure 21.***

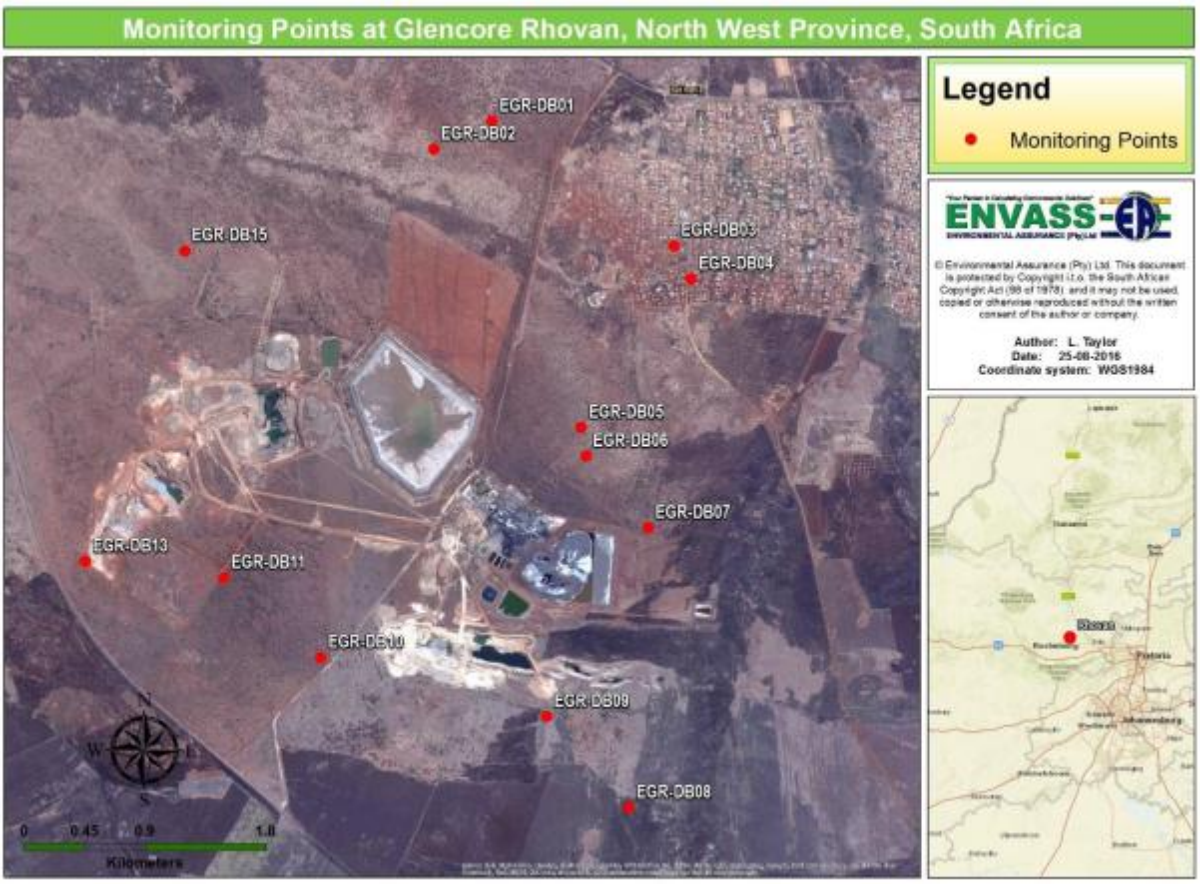

Figure 21: Monthly dust fallout monitoring locations.

4.1.1.15 Noise

The Rhovan area is relatively flat, i.e. there will be very little screening provided by the topography of the area. However, the ground is quite densely vegetated with shrubs and trees of small to medium height, which will provide additional absorption of sound as noise travels over longer distances over the ground.

The main sources of noise in the area are the following:

- The Rhovan Plant;
- The Opencast Mining Operations;
- Traffic on the R556, the main road that connects the Pretoria and Johannesburg areas to Sun City and which can at times carry heavy traffic;
- Noise caused by the communities themselves.

Of these sources it is only the Rhovan Plant and the road traffic that constitute sources of continuous noise. Rhovan currently monitors its noise impacts once a year. The location of the monitoring points is illustrated in ***Figure 22***, below. The proposed projects will be located inside the RM boundary. The construction phase of the proposed projects will likely have cumulative noise impact, however it will be temporary. The operation of the filter press and conveying of dewatered slimes to the pits will potentially have a cumulative impact on the ambient noise levels.

4.1.1.1 Visual quality

The RM is situated on a relatively flat topography and vegetation cover. The visual quality of the area is relatively moderate. The quality has been affected by the intrusion of anthropogenic influences such as mining activities, processing, cultivated lands and infrastructure. The existing RM facilities are visible from many significant vantage points such as the settlements of Modikwe, Berseba and Bethanie, as well as the R556 Road and the asphalt road directly north of Bethanie and Modikwe. However, the visibility of the mine and plant is greatly reduced from within the townships, due to obstruction by houses and vegetation.

Figure 22: Location of the Noise monitoring points.

The proposed projects are located within the RM boundary and processing plant. The infrastructure will not increase the current visual impact of the RM, but is likely to have a beneficial impact as opencast pits will rehabilitated in a more rapidly manner, and the highly visible impact of an additional/future slimes dam will be reduced.

4.1.1.2 Socio-Economic Environment

The North West Province is broken down into five regions. The RM is located in the Far-Eastern Region, District of Odi. Though this is the smallest region of the North West Province in terms of surface area (5.1% of total surface area), it is the home of the largest percentage of the population (28.1%).

The Far-Eastern Region distinguishes itself from the other regions in that it succeeded in creating more new formal employment opportunities than the entire Province. In employing more than 400 people, Rhovan is a major role player in the

socio-economic upliftment in this region, in creating a positive economic impact and upliftment of the region through stimulation of other economic sectors such as manufacturing, services, transport, etc.

Local Community and Stakeholders

Rhovan operates in terms of a lease agreement from ground belonging to the Bakwena-Ba-Mogopa Tribal Authority and is surrounded by 5 villages. Although Rhovan and the Tribal Authority are the two main stakeholders, together with the Rustenburg Metropolitan Council, other granite quarries in the tribal area are also involved in community development aid schemes.

The social economic environment will be addressed as part of the EIA Phase.

4.1.1.3 Heritage Environment

Heritage resources in the North-West Province constitute a rich and diversified range (comprising the 'national estate') as outlined in Section 3 of the National Heritage Resources Act, 1999 (Act No 25 of 1999).

Rhovan is located to the north of the Magaliesberg which is known for its rich and diverse range of heritage resources (De Beer 1975). Stone Age sites are scattered along the Magaliesberg and are also found in caves and rock shelters in the mountain. Rock engraving sites are located further towards Maanhaarrand and Rustenburg in the west. Blockhouses along the Magaliesberg and colonial farm homesteads are still common in Marikana and on the outskirts of Brits (Madibeng). The most abundant heritage, however, are those that date from the Late Iron Age and which are associated with the numerous Tswana chiefdoms who occupied this region during the last four centuries.

The proposed projects will be located inside the RM boundary and already impacted areas. It is highly unlikely that heritage resources will be affected.

4.1.2 Description of the current land uses.

Rhovan is situated on the following properties:

- Portion 1 of the Farm Berseba 397 JQ,
- Remainder of portion 1 of the Farm Losperfontein 405 JQ,
- Portion 3 (a portion of portion 2) of the remainder of the Farm Losperfontein 405 JQ,
- Portion 3 of the Farm Waaikraal 396 JQ,
- Remainder of the Farm Berseba 397 JQ, and
- Certain portion of the Farm Leeuwpen 403 JQ.

The proposed project will be located on the following properties:

- Portion 3 (a portion of portion 2) of the remainder of the farm Losperfontein 405 JQ - B0JQ00000000040500002;
- Remainder of portion 1 of the Farm Losperfontein 405 JQ - B0JQ00000000040500001;
- Portion 1 of the farm Berseba 397 JQ - B0JQ00000000039700001;
- Remainder of the farm Berseba 397 JQ - B0JQ00000000039700000; and
- Certain portion of the farm Leeuwpen 403 JQ - B0JQ00000000040300000.

The abovementioned properties are owned by Bakwena Ba-Ga-Mogopa Tribe. The property is leased to Rhovan Operation for mineral exploration and processing.

Other than the mining and mineral processing infrastructure situated on the properties, the properties are also utilised for agricultural uses (i.e. grazing, etc.); auxiliary uses (i.e. workshops, offices, mine clinic and training centre); and services (i.e. electricity and roads).

4.1.3 Description of specific environmental features and infrastructure on the site.

As mentioned above the proposed project will be located within the boundary of the RM and within the processing plant of the Rhovan operations ***(Refer to Figure 23: Aerial plan of the Rhovan Operations and the existing infrastructure.*** The

environmental features that may potentially be impacted by the proposed Alternative include the following:

- Groundwater;
- Air;
- Noise;
- Visual; and
- Surface Water.

The abovementioned environmental features will be assessed in the Environmental Impact Assessment Phase.

4.2 Environmental and current land use map.

(Show all environmental and current land use features)

The Rhovan Operation has been segregated into 6 operational management areas based on the geographical locality, site inventory and facilities as well as the intended processes and flow of material in support of integrated environmental management. The 6 operational management areas are listed below:

- Eastern Mining Management Area
- Western Mining Management Area
- Beneficiation Plant Management Area
- Slimes Disposal Management Area
- Calcine Disposal Management Area
- Open Veld Management Area

Each of these operational management areas has operations which serve specific purposes and the infrastructure on site is thus addressed according to each of these operational management areas. A map indicating the major activity infrastructure on site is depicted as ***Figure 23*** below.

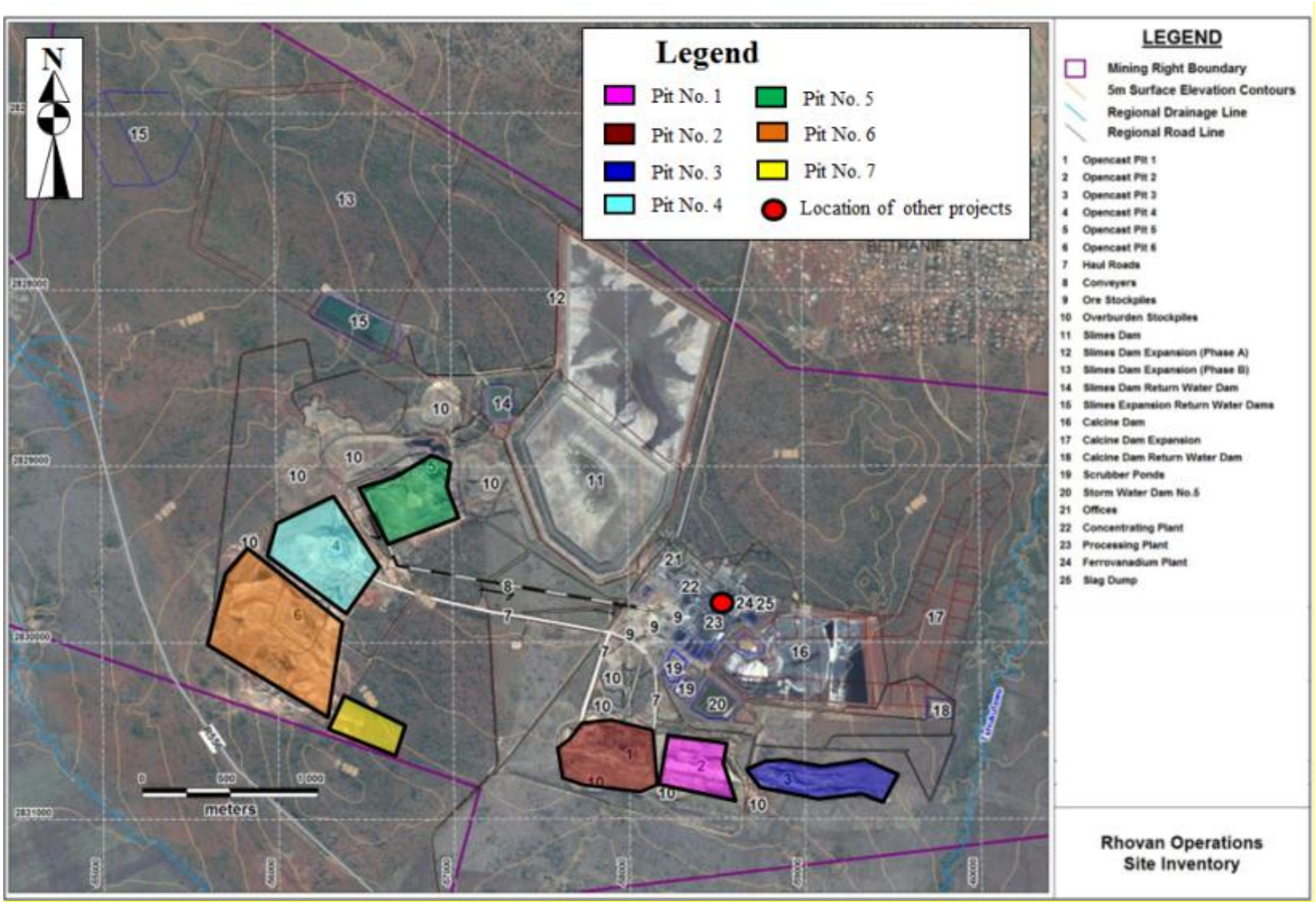

Figure 23: Map illustrating the location of the proposed projects to the existing facilities and other infrastructure

5. IMPACTS IDENTIFIED

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability and duration of the impacts.

This part of the document focuses on the identification of the major potential impacts the activities, processes and actions may have on the surrounding environment. It indicates the major impacts that these activities may have on the environmental components associated with the site, as required in terms of Regulation 21 (3) of R.982 of the EIA Regulations, 2014, under the NEMA, 1998.

5.1 Alternative 1 (Preferred Alternative)

Alternative 1 (Proposed Alternative) will comprise of the following:

- Construction of the Test Kiln and Baghouse;
- Construction of an evaporation plant;
- Deposition of dewatered beneficiation slimes into open pits for rehabilitation The Construction of Dust Control Baghouse; and
- purposes, including the expansion and construction of associated infrastructure.

5.1.1 Project phases and activities to be undertaken

For the purposes of this impact identification, the project timeframe will be subdivided into the following four phases:

- Construction Phase.
- Operational Phase.
- Decommissioning and Closure Phase.
- Post Closure Phase.

Potential cumulative impacts were also identified, where applicable. Please note: the Calcine dump is an existing approved facility that has been authorised in terms of the MPRDA, 2002 and NWA, 1998. The associated impacts have already been

assessed and mitigated to an extent in the existing EMPR (JMA Consulting, 2006), therefore the associated impacts will be highlighted in the EIAR Phase.

5.1.1.1 Construction Phase

Activities that will be carried out during the construction phase include the following:

- Establishing of construction camp.
- Stripping and storing of topsoil.
- Earthworks, i.e. excavation and removal of soil and material.
- Concrete mixing and casting;
- Construction of the:
    - Technical plant baghouse and test equipment;
    - Evaporation plant;
    - Baghouse at the Vanadium Slag Dust Control;
    - Pipeline for the conveying of slimes and return water;
    - Filter presses
    - Pump Station and other associated infrastructure.
- Monitoring of surface and groundwater for pollution;
- Construction camp removal; and
- Rehabilitation of construction areas.

5.1.1.2 Operational Phase

Activities that will be conducted in the operational phase include the following:

- Operation of the Technical plant baghouse and test equipment, Evaporation plant, Baghouse at the Vanadium Slag Dust Control and Filter presses and slimes deposition activities;
- Deposition of dewatered slimes into Pit 5 and 6, and thereafter as required;
- Pumping of reclaimed water to return water dam;
- Continuous inspection of the infrastructure; and
- Monitoring of surface and groundwater for pollution.

5.1.1.3 Decommissioning and Closure Phase

Activities that will be included in the decommissioning phase include the following:

- Closure and rehabilitation of pits once the deposition is completed according to the closure and rehabilitation plan;
- Demolishing the structures and associated infrastructure (Vats, bund walls, pipelines, etc.);
- Monitoring of surface and groundwater for pollution;
- Rehabilitating the area by:

    1. Re-vegetating;
    2. Levelling the area where there were stockpiling; and
    3. Controlling invasive plants.

5.1.1.4 Post-Closure Phase

Post-closure activities will not be conducted until the Closure certificate has been obtained from the Department of Mineral Resources. Possible activities that might be conducted during the Post-closure phase include the following:

- Monitoring of surface and groundwater for pollution;
- Monitoring the rehabilitated areas for signs of erosion, poor vegetation growth, fertility etc.;
- Monitoring the sustainability of rehabilitation; and
- Replacement of topsoil (If topsoil was lost due to erosion).

5.1.2 Impacts identified

The main potential impacts identified for the proposed projects are listed below; these impacts will be further investigated during the EIA phase. The EIR will include a full risk assessment of all environmental impacts. The Environmental Impact Assessment Report (EIAR and Environmental Management Programme (EMP) in terms of NEMA, 1998 will set out mitigation measures to be implemented during the Construction, Operational, Decommissioning and Closure and Post-Closure Phases. Refer to Section 7 of this Scoping Report for the Impact Assessment methodology

that will be followed as part of the EIA process. Please note: the Calcine dump is an existing approved facility that has been authorised in terms of the MPRDA, 2002 and NWA, 1998. The associated impacts have already been assessed and mitigated to an extent in the existing EMPR (JMA Consulting, 2006), therefore the associated impacts will be highlighted in the EIAR Phase.

5.1.2.1 Impacts identified for the Construction Phase

Table 10 below lists the proposed potential impacts during the Construction Phase.

Table 10: Proposed potential impacts during the Construction Phase

a) Air Quality
- Dust from excavations, offloading ad loading of topsoil, etc.
- Dust fallout creating nuisance and health impacts
b) Soil
- Disturbance of soil surface due to construction activities (vehicle movement, excavation)
- Loss of topsoil due to construction activities.
- Soil compaction due to construction activities.
c) Surface Water
- Site clearing and removal of topsoil, may lead to ponding of surface water in the cleared areas during the wet season.
- Sedimentation increase as a result of construction activities.
- Impact on the quality of Storm water
d) Groundwater
- Construction vehicles spillages of oil and fuel
e) Noise
- Noise impact from construction machinery and vehicles.
f) Fauna and Flora
- Establishment of alien invasive plants
g) Waste
- Building Rubble and construction waste will be generated during construction
h) Job creation (Positive)
- Creation of temporary jobs during the construction phase.

i) Land (Positive)
- Existing disturbed area used for the location of the proposed projects.

5.1.2.2 Impacts identified for the Operation Phase

Table 11 below lists the proposed potential impacts during the Operation Phase.

Table 11: Proposed potential impacts during the Operation Phase

a) Air Quality
- Emergency incidents and fires may produce emissions
- Dust and particular matter produced as a result of the slimes deposition activities
- Increased fugitive emissions as a result of new test equipment
- Improvement of occupational conditions as a result of the new abatement infrastructure (positive)
b) Soil
- Leaking pipelines and infrastructure may result in material spilling on the topsoil.
- Structural damage may result in leakages onto soil
- Reduced likelihood of constructing a new slimes dam and impact on soil disturbance (positive)
- Soil pollution as a result of the operation of the slimes deposition activities.
c) Surface Water
- Contamination of storm water due to spillage of material
- Higher recovery of water as a result of the filter presses (positive)
- Reduced evaporation as the likelihood of the construction of a new slimes dam will be reduced (positive)
- Water saving (positive)
d) Groundwater
- Structural damage may result in leakages, which may seep into groundwater.
- Impact on groundwater quality and quantity
- Reduction of possible contamination to groundwater (positive)
e) Noise
- Noise impact from machinery and vehicles.

f) Fauna and Flora
- Establishment of alien invasive plants
- Reduced impact of habitat disturbance as the new slime dam will likely not have to be constructed (positive)
g) Safety of Workers (Positive)
- Reduced safety risk as a new slimes dam will likely not be required.
h) Economic (Positive)
- Reduced environmental and financial liability
- Increased the capacity of existing slimes dam
i) Rehabilitation (Positive)
- Concurrent rehabilitation of pits
- End land-use reached sooner
j) Visual (Positive)
- Reduced visual impact as the likelihood of the construction of the new slime dam will not be required.

5.1.2.3 Impacts identified for the Decommissioning and Closure Phase

Table 12 below lists the proposed potential impacts during the Decommissioning and Closure Phase.

Table 12: Proposed potential impacts during the Decommissioning and Closure Phase

a) Flora
- Establishment of alien invasive plants due to lack of vegetation
- Lack of functional vegetation due to lack of adequate rehabilitation.
- Lack of functional vegetation due to lack of monitoring
- Lack of functional vegetation due to lack of corrective follow-up action
b) Soil
- Soil degradation due to lack of rehabilitation
- Structural damage may result in leakages onto soil
- Surface subsidence of rehabilitated pits

c) Groundwater
- Lack of rehabilitation may result in contamination of groundwater
- Downstream movement of a deeper groundwater pollution plume.
d) Noise
- Noise impact from machinery and vehicles used to demolish structures
e) Waste
- Waste will be generated when the associated infrastructure will be demolished.
f) Visual (positive)
- Reduced visual impact as the likelihood of the construction of the new slime dam will not be required.

5.1.2.4 Impacts identified for the Post-Closure Phase

Table 13 below lists the proposed potential impacts during the Post-Closure Phase.

Table 13: Proposed potential impacts during the Post-Closure Phase

a) Groundwater
- Lack of rehabilitation may result in contamination of groundwater
- Downstream movement of a deeper groundwater pollution plume.
g) Soil
- Soil degradation due to incorrect rehabilitation
- Surface subsidence of rehabilitated pits
h) Flora
- Establishment of alien invasive plants due to lack of vegetation
- Lack of functional vegetation due to lack of adequate rehabilitation.
- Lack of functional vegetation due to lack of monitoring
- Lack of functional vegetation due to lack of corrective follow-up action

5.1.2.5 Cumulative Impacts

The proposed potential cumulative impacts, as presented in ***Table 14*** below, have been identified and will be investigated further during the EIA phase.

Table 14: Proposed potential cumulative impacts

General description of existing cumulative impacts	Contribution of the proposed projects to cumulative impacts
Biodiversity-Alien species	
Invading alien plants are the single biggest threat to plant and animal biodiversity through the effects of predation, alteration of habitat or disruption of ecosystem process and services.	Alien and invasive species tend to establish in disturbed surface areas, which will be evident during the Construction Phase. Unless appropriately managed, it is likely that alien and invasive species will encroach into natural vegetation areas; and especially into areas that are newly disturbed or rehabilitated.
Groundwater	
Groundwater is used for irrigation and domestic consumption in the surrounding agricultural region.	The extent and quality of pollution plumes emanating from the mining activities may potentially affect the groundwater quality in the area. This can potentially impact on the water users in the area.
Raw water	
The current slimes management system utilises significant volumes of water.	The utilisation of filter presses to dewater the slimes will potentially recycle 70% of the water from the slimes produced by the processing plant. The water that will be recovered will be routed to the return water dam and re-used in the processing plant. The intervention will reduce the raw water required for the process and have a beneficial cumulative impact on the drought prone area.

5.2 Alternative 2

A technology alternative will be considered for the method of conveying and depositing the slimes in the pits. The alternative would be to convey wet slimes directly from the processing plant into the pits through a pipeline. The slimes will be deposit via spigot system and a accumulated water will be pumped out via a barge. An alternative location was also considered for the return water pipeline in Alternative 1. Refer to ***Figure 8*** for the location of the two pipeline alternatives.

No other location alternatives for the projects were considered as the Pits, Plant and infrastructure are existing and fixed. The impacts will be similar to Alternative 1, with the exception of potential 70% less water recoveries (Refer to ***Table 10-14***). The impacts will be further investigated in the EIAR Phase.

6. METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process were determined in order to decide the extent to which the initial site layout needs revision).

The potential impacts were determined by evaluating the different phases associated with the establishment and development of the proposed project. These phases were determined to be as follow:

- Pre-Construction Phase (I)
- Construction Phase (C)
- Operational Phase (O)
- Closure and Post-Closure Phase (P)

Different impacts are associated with the different phases of the proposed activity. The significance will be determined by both the extent and duration of the impact. The environmental risk of any aspect is determined by a combination of parameters associated with the impact. Each parameter connects the physical characteristics of an impact to a quantifiable value to rate the environmental risk. A description of the parameters used in this impact assessment is given in ***table 15*** below.

Table 15: Impact Assessment Methodology.

Parameter	Description
Extent:	**Area extent affected by the potential impact:** • **Onsite – Within specific site boundary (weight value – 1)** • **Local – Within municipal boundary (weight value – 2)** • **Regional – Outside municipal boundary (weight value – 3)**
Duration:	**Time that the potential impact will be in effect** • **Short term – 1 Year or less (weight value – 1)** • **Medium term – 1-5 Years (weight value –2)** • **Long term – Longer than 5 Years (weight value – 3)**
Intensity:	**The severity of an impact on the receiving environment:** • **Low – Natural and/or cultural processes continue in a modified way and is reversible (weight value – 1)** • **Medium – Natural and/or cultural processes stop and is partially reversible (weight value – 2)** • **High – Natural and/or cultural processes disturbed to an irreversible state (weight value – 3)**
Significance of Impact / Consequence	**Adding the extent, duration and intensity together provides the significance of the impact (High, Medium or Low).** **Extent + Duration + Intensity = High/Medium/Low Impact**
Probability:	**The likelihood of an impact occurring:** • **Unlikely – 0% - 45% chance of the potential impact occurring (weight value – 1)** • **Possible – 46% - 75% chance of the potential impact occurring (weight value – 2)** • **Likely - >75% chance of the potential impact occurring (weight value – 3)**
Environmental Risk Refer to the table below	**Multiplication of the significance of the impact by the probability of the impact occurring produces a final conclusion of the overall risk that an impact poses to the surrounding environment.** **High/Medium/Low Impact X Probability = High/Medium/Low Environmental Risk**

Table 16: Environmental risk and impact significance matrix.

Significance of Impact				
		Low Impact (3 → 5)	**Medium Impact (6 → 8)**	**High Impact (9)**
Probability	**Definite / Very Likely 3**	9 -15 L - M	18 -24 M-H	27 H
	Possible 2	6 - 10 L - M	12 - 16 M	18 M - H
	Unlikely 1	3 - 5 L	6 - 8 L	9 L
Environmental Risk		**Guidelines for Control Strategies**		
(H) - High		Proactively reduce risk level, short term response.		
(M - H) - Medium to High		Proactively reduce risk level, short term response.		
(M) - Medium		Management strategies to reduce risk level, short to medium term response.		

(L - M) - Low to Medium	Management strategies to reduce risk level, short to medium term response, operational control and housekeeping.
(L) - Low	Operational control and housekeeping.

6.1 The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

6.1.1 Alternative 1 (Proposed Alternative)

Refer to ***table 10 - 14*** under section 4.2, for a description of the positive and negative impacts associated with the proposed alternative 1.

6.1.2 Alternative 2 (Technology and location alternative)

The impacts will be similar to Alternative 1, with the exception of potential 70% less water recoveries (Refer to ***Table 10-14***). The impacts will be further investigated in the EIAR Phase.

6.1.3 No-Go Alternative

The no-go option entails that none of the proposed projects be undertaken, including the construction of the Test Kiln and Baghouse, evaporation plant and Dust Control Baghouse. The approved methodology of slimes management will continue. The No-Go alternative poses the following risk due to the compromised structural integrity:

- Potential safety risk associated with the construction of a new slimes facility;
- Limited water recoveries;
- Visual impact associated with building a new slimes dam;
- Limited emission abatement infrastructure.

6.2 The possible mitigation measures that could be applied and the level of risk.

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

Mitigation measures need to be identified to ensure that impacts from the proposed activity are reduced as far as possible. The following mitigation measures objectives will be kept in mind while mitigation measures are identified *during the EIA Phase*:

- To find more environmentally sound ways of undertaking specific activities;
- To enhance any environmental and social benefits of a proposed activity;
- To avoid, minimise or remedy negative environmental impacts; and
- To ensure that any residual negative environmental impacts are environmentally acceptable.

Identifying appropriate mitigation measures will be conducted in a hierarchal manner:

1. Preventative measures will be identified to avoid, where possible, negative impacts that may arise as a result of the proposed activity;

2. Measures will be identified to minimise and/or reduce the negative impacts to "as low as practicable" levels; and

3. Measures will be identified to compensate or remedy residual negative impacts that are unavoidable and cannot be minimised or reduced any further (Department of Environmental Affairs, 2006).

Proposed mitigation measures will be communicated to the applicant for review as part of draft Environmental Management Plan (EMP). The applicant will comment on the feasibility and practicality of implementing the mitigation measures. The mitigation measures may be adjusted based on the applicant's comments.

6.3 The outcome of the site selection Matrix. Final Site Layout Plan

(Provide a final site layout plan as informed by the process of consultation with interested and affected parties).

The proposed site layout plans is attached under Appendix 7.

6.4 Motivation where no alternative sites were considered.

The following Alternatives where considered:

1. *Alternative 1 (Proposed Alternative)*
    - Construction of the Test Kiln and Baghouse;
    - Construction of an evaporation plant;
    - The Construction of Dust Control Baghouse; and
    - Deposition of dewatered beneficiation slimes into open pits for rehabilitation purposes, including the expansion and construction of associated infrastructure.

The proposed activities essentially have been selected to ensure the Processing Plant can be optimised and environmental liability be reduced. The proposed activities are located within the established Rhovan Surface Area, where the necessary services (i.e. electricity supply, roads and water supply) have already been developed. Majority of the proposed activities footprints, except for the pipelines have previously been disturbed by mining and anthropological activities. The utilisation of dewatered slimes will potentially reduce the raw water usage and save water. Using the slimes as backfill retrospectively promotes the waste management hierarchy and has a knock-on beneficial effect on the environmental and closure liability.

2. *Alternative 2 (Alternative Slimes deposition Methodology and return water pipeline route):*

A technology alternative will be considered for the method of conveying and depositing the slimes in the pits. The alternative would be to convey wet slimes directly from the processing plant into the pits through a pipeline. The slimes will be deposit via spigot system and accumulated water will be pumped out via a barge. An alternative location was also considered for the return water pipeline in Alternative 1. No other location alternatives for the projects were considered as the Pits, Plant and infrastructure are existing and fixed.

3. *No Go Alternative*

The no-go option entails that none of the proposed projects be undertaken, including the construction of the Test Kiln and Baghouse, evaporation plant and Dust Control Baghouse. The approved methodology of slimes management will continue.

6.5 Statement motivating the preferred site.

(Provide a statement motivation the final site layout that is proposed)

The proposed projects site location is the preferred site based on the following:

1. Close proximity to the existing Rhovan Vanadium Processing plant and opencast pits;
2. The proposed projects will be located on existing disturbed footprint within the RM boundary and processing plant.
3. The opencast pits must be rehabilitated and backfilled as part of the rehabilitation plan.
4. Based on international events on tailings facility failure concerns have been raised, consequently alternative options to managing slimes were required.
5. The projects within the processing plant site are located within a closed water catchment system.
6. Existing monitoring system in place (i.e. ground- and surface water, air and bio-monitoring).
7. Drought conditions over majority of South Africa. Means of raw water saving and re-uses investigated by Rhovan.

6.6 Description of alternatives to be considered including the option of not going ahead with the activity.

Refer to section 1.9 for a description of the proposed alternative and the No-Go option.

6.7 Description of the aspects to be assessed as part of the environmental impact assessment process

(The EAP must undertake to assess the aspects affected by each individual mining activity whether listed or not, including activities such as blasting, Loading, hauling and transport, and mining activities such as Excavations, stockpiles, discard dumps or dams, water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.).

The EAP undertakes to assess aspects identified for each of the following four phases:

- Construction Phase.
- Operational Phase.
- Decommissioning and Closure Phase.
- Post Closure Phase.

Potential cumulative impacts will also be assessed.

6.8 Description of aspects to be assessed by specialists

Detailed specialist studies have been performed for the majority of the areas impacted on by Rhovan (Rhovan operation EMPR, 2006). Existing specialist studies will be revisited to ensure that these are aligned with current regulatory requirements and that newly impacted areas are covered. The studies will include the following aspects:

- Visual;
- Biodiversity assessment;
- Aquatic;
- Heritage, Archaeological and Paleontological assessment;
- Noise impact assessment;
- Sensitive landscapes Soils; Land use and land capability;

- Hydrology (surface water and groundwater);
- Financial Provision and Closure Costing; and
- Closure/rehabilitation plan.

Any new specialist Reports will be compiled in accordance with Regulation 12 of GN R982 of 8 December 2014. Due to the potential impacts that may arise as result of the proposed development and due to the issued raised during the PPP inputs towards the following specialist studies will be investigated during the Impact Assessment Phase:

- Air quality assessment;
- Groundwater Impact Assessment;
- Geochemical Analysis of the slimes; and
- Waste Classification of the slimes.

6.9 Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives

A baseline identification of the major potential impacts has therefore only been included in this Scoping Report. The prediction of the nature of each impact, the evaluation of each impact by rating its significance and the management and mitigation measures adopted to address each impact, will be assessed during the EIR.

Impact assessments should be conducted based on a methodology that includes the following:

- Clear processes for impact identification, predication and evaluation;
- Specification of the impact identification techniques;
- Criteria to evaluate the significance of impacts;
- Design of mitigation measures to lessen impacts;
- Definition of the different types of impacts (indirect, direct or cumulative); and
- Specification of uncertainties.

In broad terms, the impact assessment for this project will include the following:

- All potential impacts of the proposed activity will be identified and assessed;
- The nature, extent, magnitude and duration of all potentially significant impacts will be predicted;
- A range of mitigation measures that could diminish the impacts will be identified; and
- The significant of residual impacts that remain, after the proposed mitigation measures are implemented, will be evaluated.

The construction, operational and decommissioning phases of the project will be considered whilst identifying impacts. A detailed understanding of the proposed activity will be obtained to ensure that all the potential impacts are identified. The following process will be followed to identify and assess the potential impacts of the proposed activity:

- The current environmental conditions will be determined in detail. This will act as a baseline
- against which impacts can be identified and measured;
- The changes that will occur in future, should the proposed activity not occur, will be identified;
- A detailed understanding of the activity will be obtained in order to fully understand its consequences; and
- The significant impacts that will occur as a result of the proposed activity will be identified (should the activity be authorised).

After all impacts have been identified, the nature of each impact can be predicted. The impact prediction will take into account physical, biological, socio-economic and cultural information and will then estimate the likely parameters and characteristics of the impacts. The impact prediction will aim to provide a basis from which the significance of each impact can be determined and appropriate mitigation measures can be developed.

7. PUBLIC PARTICIPATION TO FOLLOW

7.1 The stages at which the competent authority will be consulted

The stages, at which the competent authority will be consulted in the process of compiling the EIR and draft EMP as per the EIA Regulations R.982 (2014), will include amongst other, the following:

- During the Public Participation Process in accordance to EIA Regulations R.982 (2014), the draft EIR will be submitted to the competent authority for a period of 30 days (unless agreed otherwise) to obtain their comments.
- The final EIR will be submitted to the competent authority. They will have 60 days, after acknowledging receipt of the final EIR, to consider the report and in writing accept the report, reject the report or request additional information or amendments to the document [Regulation 982].
- Continued consultation with the competent authority until the decision is issued.

7.2 Particulars of the public participation process with regard to the Impact Assessment process that will be conducted

7.2.1 Steps to be taken to notify interested and affected parties.

(These steps must include the steps that will be taken to ensure consultation with the affected parties identified in (h) (ii) herein).

The PPP undertaken during the Scoping Phase of the project will continue in the Impact Assessment Phase and will be undertaken in terms of Regulations 41 to 44 of GN R982 of 8 December 2014.

All comments received from the I&APs during the Impact Assessment Phase will be incorporated into the Draft EIAR and Final EIAR. The I&APs Register will be updated as necessary (i.e. with new contact details, new I&APs etc.). The I&APs will be informed of the availability of reports for comment, where/how these reports can be accessed and the commenting timeframes and the manner in which comment can be submitted to CHEMC Environmental. Proof of the PPP undertaken during the Impact Assessment Phase will be appended to the Draft EIAR and Final EIAR. Details of the engagement process to be followed.

(Describe the process to be undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings and records of such consultation will be required in the EIA at a later stage).

The compilation of the EIR and draft EMP as per R.982 will include, but is not limited to, the following public participation:

- The Public Participation Process will be conducted in accordance with the EIA Regulations R.982 (2014). This will include submitting the draft EIR to the competent authority and public for a review period of 30 days [Regulation 982];
- All comments, objections and/or representations received during the Public Participation Process will be included and addressed in the final EIR and this document will be finalised; and
- Registered Interested and Affected Parties (I&APs) will be given an opportunity to comment on the EIR as stipulated in R.982. Their comments will be submitted to the competent authority and the EAP or applicant will be copied.

7.2.2 Description of the information to be provided to Interested and Affected Parties.

(Information to be provided must include the initial site plan and sufficient detail of the intended operation and the typical impacts of each activity, to enable them to assess what impact the activities will have on them or on the use of their land).

Tasks to be performed to inform the registered I&APs of the availability of the documents for comment:

All registered and I&APs will be informed of the availability of the reports for comment by means of notices sent via an advertisement, posted letters, e-mails and SMSs;

- The Draft EIAR and subsequent specialist studies will be made available to the public for a 30-day commenting period;
- The Final EIAR and subsequent specialist studies will be made available to the public for a 7-day commenting period;
- These reports will be made available for comment be means of:
  - Placement at the public places listed in Section 2 of this report – the same places used as during the Scoping Phase of the project.

8. PLAN OF STUDY OF THE EIA PROCESS

8.1 Description of the tasks that will be undertaken during the environmental impact assessment process

A full EIA process will be conducted by CHEMC Environmental for the proposed project. The Draft and Final EIAR will be submitted to the competent authority for decision making purposes.

The Scoping Phase is designed to identify impacts and determine whether they require specialist investigation in the Impact Assessment Phase. The Plan of Study (POS) for EIA provides an indication of the tasks to be undertaken during the Impact Assessment Phase of the project, the impact assessment methodology, the PPP an when authority consultation will take place. The purpose of the POS is to layout an effective methodology to be followed during the assessment of impacts, should this be deemed necessary, in order to meet the minimum legal requirements.

8.1.1 Tasks to be undertaken during the Impact Assessment Phase

The objectives of the Impact Assessment Phase will be to:

- Identify and assess the environmental (biophysical and social) impacts of the construction, operation, decommissioning and post closure impacts of the proposed project. The cumulative impacts of the proposed development will also be identified and evaluated;
- Alternative activities and locations will be determined and assessed in parallel with the proposed activity;
- Identify and evaluate potential management and mitigation measures that will reduce the negative impacts of the proposed development and enhance the positive impacts;
- Compile monitoring, management, mitigation and training needs in the EMPr;
- Provide the I&APs with sufficient and accurate information in order to provide informed comment on the proposed development;

- Provide the decision-making authorities with sufficient and accurate information in order to make an informed decision on the proposed development.

8.1.2 Environmental Impact Assessment Methodology:

The anticipated impacts associated with the proposed project have been assessed according to an industry standardised impact assessment methodology. Different impacts are associated with the different phases of the proposed activity. The significance will be determined by both the extent and duration of the impact. The environmental risk of any aspect is determined by a combination of parameters associated with the impact. Each parameter connects the physical characteristics of an impact to a quantifiable value to rate the environmental risk. A description of the parameters used in this impact assessment is given in the ***Table 15***.

Natural and existing mitigation measures, including built-in engineering designs, are included in the pre-mitigation assessment of significance. Measures such as demolishing of infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

8.2 Measures to avoid, reverse, mitigate, or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

The table below provides the preliminary activities, potential impacts, mitigation measures and the potential of residual risk. The activities and potential impacts will be further investigated in the EIAR phase, including the associated mitigation measures.

ACTIVITY **Whether listed or not listed.** **(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.).**	POTENTIAL IMPACT **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc.)**	MITIGATION TYPE (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc.) E.g. Modify through alternative method. Control through noise control. Control through management and monitoring through rehabilitation.	POTENTIAL FOR RESIDUAL RISK
Establishment of temporary construction camp	Soil disturbance	Establish on a historic disturbed area.	Limited
Excavation of the foundations	Dust Noise Soil disturbance Health and Safety	Dust suppression; Noise control; Rehabilitate soil; and Implementation and training of Safety and Health procedures	Limited to footprint area
Construction and operation (incl. maintenance) of Test Kiln and Baghouse;	Air Quality; Dust Noise Soil disturbance Ground- and surface water contamination	Established on a previously disturbed footprint; Dirty water management system; Air Quality monitoring; Dust suppression; Noise control; Operational Controls; Engineering designs; Rehabilitate soil; and Monitor ground- and surface water continuously	Potential residual risk
Construction and operation (incl. maintenance) of the evaporation plant	Air Quality; Dust Noise Soil disturbance Ground- and surface water contamination	Established on a previously disturbed footprint; Dirty water management system; Air Quality monitoring; Dust suppression; Noise control; Operational Controls; Engineering designs; Rehabilitate soil; and Monitor ground- and surface water continuously	Potential residual risk
Construction and operation (incl. maintenance) of the Dust Control Baghouse	Air Quality; Dust Noise Soil disturbance Ground- and surface water contamination	Established on a previously disturbed footprint; Dirty water management system; Air Quality monitoring; Dust suppression; Noise control;	Potential residual risk

		Operational Controls; Engineering designs; Rehabilitate soil; and Monitor ground- and surface water continuously	
Backfilling of the pits with the dewatered slimes, including the establishment of the filter presses, associated infrastructure and return water pipeline.	Dust Noise Soil disturbance Ground- and surface water contamination	Established on a previously disturbed footprint; Dirty water management system; Dust suppression; Noise control; Operational Controls; Engineering designs; Rehabilitate soil; and Monitor ground- and surface water continuously	Potential residual risk
Topsoil Stockpiles	Soil disturbance Invader plant species	Rehabilitate soil; and Implement and maintain the invader plant species programme.	Limited to footprint area
Building waste management (Waste skips)	Soil contamination Ground- and surface water contamination Land pollution	Rehabilitate soil; Train employees on waste management; Monitor ground- and surface water continuously; and Dispose of waste at an approved waste facility.	Potential residual risk
Decommissioning of the temporary construction camp	Soil disturbance Land pollution	Rehabilitate soil.	Limited to footprint area
Rehabilitate and replace the topsoil	Invader plant species	Implement and maintain the invader plant species programme.	Limited to footprint area
Continuous ground and surface water monitoring	None	None	None
Dust suppression and monitoring	Water usage	Monitor water usage.	Potential residual risk
Maintaining and training of emergency preparedness and response plan	Fires Health and safety of workers	Train and implement the emergency incident and response procedure; Install fire equipment	Potential residual risk

8.3 Other Information required by the competent Authority

i) Compliance with the provisions of sections 24(4)(a) and (b) read with sections 24(3)(a) and (7) of the National Environmental Management Act (Act 107 of 1998). The EIA report must include the:-

8.3.1 Impact on the socio-economic conditions of any directly affected person.

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as Appendix 2.19.1 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

The socio-economic impact of the proposed project will be assessed and addressed as part of the EIAR.

8.3.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

The proposed projects will be on existing disturbed areas within the RM boundary and processing plant. No historic features and archaeological features are likely to occur at the proposed sites.

A Heritage Impact Assessment (HIA) was conducted in September 2013 for the Rhovan operations. The findings of the study and a copy of the HIA will be included as part of the EIA Report.

8.3.3 Other matters required in terms of sections 24(4)(a) and (b) of the Act.

(the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as Appendix 4).

The following Alternatives will be considered during the EIAR:

1. *Alternative 1 (Proposed Alternative)* –
    - Construction of the Test Kiln and Baghouse;
    - Construction of an evaporation plant;
    - The Construction of Dust Control Baghouse; and

- Deposition of dewatered beneficiation slimes into open pits for rehabilitation purposes, including the expansion and construction of associated infrastructure.

2. *Alternative 2 (Alternative Slimes deposition Methodology and return water pipeline route):* - A technology alternative will be considered for the method of conveying and depositing the slimes in the pits. The alternative would be to convey wet slimes directly from the processing plant into the pits through a pipeline. Alternative 2 also includes an alternate pipeline route for conveying the recovered water for Alternative 1 to the return water dam.
3. *No-go Alternative* – The no-go option entails that none of the proposed projects be undertaken, including the construction of the Test Kiln and Baghouse, evaporation plant and Dust Control Baghouse. The approved methodology of slimes management will continue.

9. CONCLUSION AND RECOMMENDATIONS

This scoping process has been carried out in accordance with the NEMA and the 2014 EIA Regulations thereunder. The purpose of the DSR is to provide the relevant authorities and I&APs with sufficient information to ensure that all parties have a clear understanding of the Proposed Project. The input and guidance received from all involved will contribute to the rational of the FSR and the subsequent EIA phase.

The DSR was specifically drafted to ensure that the activities undertaken during this phase will lead to a better understanding of the potential impacts of the Proposed Project against the prevailing environmental and social conditions.

The screening and scoping process was based on a review of the existing specialist studies conducted since mining commenced, including the subsequent updated reports as mining progressed. The inputs from the PPP and the comments from stakeholders will be included in the FSR.

The potential impacts that the proposed activities will have on the environment have been identified. The significance of the impacts and mitigation measures to reduce (if not prevent) impacts during the construction, operation, decommissioning and closure, as well as the post closure phase, will be assessed during the EIA phase and included in the EIAR.

I&APs have been identified and notified of the availability of the DSR, in order to review the document and provide important inputs taking the EIA process forward.

10. UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I ***G.S. Barkhuizen*** herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected Parties have been correctly recorded in the report.

_____

Signature of the EAP

DATE:

11. UNDERTAKING REGARDING LEVEL OF AGREEMENT

I ***G.S. Barkhuizen*** herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with interested and Affected Parties and stakeholders have been correctly recorded and reported herein.

_____

Signature of the EAP

DATE:

12. REFERENCES

DACE, 2002. North West State of the Environment Report, s.l.: Department of Agriculture, Conservation and Environment.

Department of Environmental Affairs, 2009.National Environmental Management: Waste Act (59/2008): List of waste management activities that have, or are likely to have a detrimental effect on the environment. Government Gazette 37083, Government Notice 921 of 29 November 2013, Government Printer, Pretoria.

Department of Environmental Affairs, 2013. National Environmental Management Act: Waste Act, Act No. 107 of 1998. Waste Classification and Management Regulations. Government Gazette 36784, Government Notice R 634 of 23 August, 2013, Government Printer, Pretoria.

Department of Environmental Affairs, 2014. National Environmental Management Act, 1998 (Act 107 of 1998). Environmental Impact Assessment Regulations. Government Gazette 38282, Government Notice R 982 of 4 December 2014, Government Printer, Pretoria.

Department of Environmental Affairs, 2014. National Environmental Management Act, 1998 (Act 107 of 1998). Listing Notice 1: List of activities and competent authorities identified in terms of Section No. 24(2) and 24D. Government Gazette 38282, Government Notice R 983 of 4 December 2014, Government Printer, Pretoria.

Department of Environmental Affairs, 2014. National Environmental Management Act, 1998 (Act 107 of 1998). Listing Notice 2: List of activities and competent authorities identified in terms of Section No. 24(2) and 24D. Government Gazette 38282, Government Notice R 984 of 4 December 2014, Government Printer, Pretoria.

Department of Environmental Affairs, 2015. National Environmental Management: Waste Act, Act No 59 of 2008: regulations regarding the planning and management of residue stockpiles and residue deposits. Government Gazette 39020, Government Notice R 632 of 24 July, 2015, Government Printer, Pretoria.

Department of Environmental Affairs, 2015. National Environmental Management: Waste Act, Act No 59 of 2008: Amendments to the list of waste management activities that have, or are likely to have, a detrimental effect on the environment. Government Gazette 39020, Government Notice R 633 of 24 July, 2015, Government Printer, Pretoria.

DWAF, 2006. Best Practice Guideline G1 Storm Water Management, s.l.: Department of Water Affairs and Forestry.

DWAF, 2006. Best Practice Guideline G1 Storm Water Management, s.l.: Department of Water Affairs and Forestry.

Grobbelaar, R., 2013. Rhovan Mine 2013 Annual Water Monitoring Report. JMA Consulting.

IUCN, 2013. IUCN Red List. [Online] Available at: http://www.iucnredlist.org/

IUCN, 2013. IUCN Red List. [Online] Available at: http://www.iucnredlist.org/

JMA Consulting, 2006. Environmental Management Plan Complete Report. Prepared for the Rhovan Vanadium Mine. Report No. JMA 10305.

Mucina, L. & Rutherford, M., 2006. The Vegetation of South Africa, Lesotho and Swaziland., Pretoria: South Africa National Biodiversity Institute.

Pretorius, J.C.C., 2013. An Updated Phase I Heritage Impact Assessment (HIA) Study for Rhovan Operations in the Central Bankeveld of the North-West Province of South Africa.

Rustenburg Local Municipality, 2011. Environmental Management Framework for the Rustenburg Local Municipality. Rustenburg: DEDECT.

South Africa, Republic, 1998. National Environmental Management Act, Act No. 107 of 1998. Government Gazette 19519, Government Printer, Pretoria.

South Africa, Republic, 1998. National Environmental Management Act: Waste Act, Act No. 107 of 1998. Government Gazette 32000, Government Printer, Pretoria.

South Africa, Republic, 1998. National Water Act, Act No. 36 of 1998. Government Gazette 19182, Government Printer, Pretoria.

South Africa, Republic, 2008. Mineral and Petroleum Resources Development Amendment Act, Act No 49 of 2008. Government Gazette 32151, Government Printer, Pretoria.

Weather base, 2015. Rustenburg South Africa. [Online] Available at: http://www.weatherbase.com/weather/weathersummary.php3?s=605015&cityname=Rustenburg%2C+North-West%2C+South+Africa&units.