SCOPING REPORT FOR THE TSHIPI BORWA WASTE ROCK DUMP EXTENSION PROJECT

Mamatwan Farm 331 Portion 16 (Portion of Portion 1), 17 (Portion of Portion 2), 18 (Portion of Portion 3) and Portion 8 and Moab Farm 700 (Remaining Extent), Northern Cape Province

JULY 2018

SUBMITTED AS PART OF AN APPLICATION PROCESS FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998) AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (ACT 59 OF 2008) IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (ACT 28 OF 2002) (AS AMENDED)

Name of applicant: Tshipi é Ntle Manganese Mining (Pty) Ltd
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Physical address: Farm Mamatwan 331, Portions 16, 17 and 18
Kuruman Magisterial District, Northern Cape
DMR Reference No: NC/30/5/1/2/2/206MR

SLR Project No.: 710.20008.00041
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SLR Project No	710.20008.00041

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EXECUTIVE SUMMARY

Introduction

Tshipi é Ntle Manganese Mining (Pty) Ltd (Tshipi) operates the Tshipi Borwa open pit manganese mine located on Portions of the farms Mamatwan 331 (mining right and surface use areas) and Moab 700 (surface use area), located approximately 18 km to the south-east of Hotazel in the John Taolo Gaetsewe District Municipality and Joe Morolong Local Municipality of the Northern Cape Province of South Africa.

Tshipi Borwa is an existing opencast manganese mine that has been in operation since 2012. It currently holds a mining right (NC/30/5/1/2/2/0206MR) and an Environmental Management Programme Report (EMPr) approved by the Department of Mineral Resources (DMR) in terms of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). Tshipi also holds a Water Use Licence (WUL) in terms of the National Water Act, 1998 (Act 36 of 1998) (NWA) and Environmental Authorisations in terms of the National Environmental Management Act, 1998 (Act No.107 of 1998) (NEMA).

Proposed Project

Tshipi proposes the following changes to the operation:

- extending the Tshipi East Waste Rock Dump (WRD) in a south-easterly direction towards the mining right boundary and finally to ultimately merge with the nearby Mamatwan WRD, essentially filling the narrow void between these two WRDs;
- extending the Tshipi West WRD in a south-westerly direction onto a portion of Portion 8 of the farm Mamatwan 331, in order to provide additional storage capacity for waste rock;
- constructing an 11kV overhead powerline from an approved Eskom sub-station still to be built, along the southern boundary of Portion 8 onto the existing mining right area, and connecting this new line into the main distribution centre on the mine; and
- constructing an overland conveyor system between the existing crushed product ore stockpiles at the secondary crushing and screening plant, to the existing product ore stockpiles located in close proximity to the train load-out station.

EIA Process and Public participation Process

Prior to the commencement of these activities an Environmental Impact Assessment (EIA) regulatory process must be conducted and approved by the DMR. In addition Tshipi must amend the mine's EMPr in terms of Section 102 of the MPRDA, read with the NEMA EIA Regulations. An EIA is required in terms of the MPRDA, the NEMA and the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008) (NEM:WA). Various water uses will also need to be authorized in terms of the NWA through a water use licence application (WULA) to be submitted to the DWS.

SLR Consulting (Africa) (Pty) Ltd (SLR), an independent firm of environmental consultants, has been appointed by Tshipi to manage the EIA and WULA process.

A public participation process has been initiated and to date has included notification of interested and affected parties (I&APs) through distribution of a Background Information Document (BID), placement of newspaper advertisements, site notices and a public meeting. I&APs will be given the opportunity to review this Scoping Report for a period of 30 days during June and July 2018 and on the EIA report at a later stage. The public participation process will continue throughout the EIA and WULA process and IAPs will be given the opportunity to provide input thereon.

Potential impacts

Potential impacts that were identified during the scoping process are listed below:

- loss and sterilization of mineral resources;
- alteration of natural topography;
- pollution from emissions to air;
- alteration of natural drainage patterns;

- contamination of surface water resources;
- contamination of groundwater resources;
- loss of soil resources and land capability through physical disturbance and pollution;
- change in land use;
- physical destruction and general disturbance of biodiversity;
- negative visual impacts;
- disturbance of roads by project related traffic;
- increase in disturbing noise levels;
- loss of or damage to heritage and/or paleontological resources;
- positive socio – economic impacts (Economic impact);
- negative socio – economic impacts (Inward migration).

These impacts will be investigated as per the Plan of Study included in this Scoping Report.

Conclusions

The EIA process is currently in the scoping phase. The project has the potential to impact on the biophysical, cultural and socio-economic both within and surrounding the project area. Input received from I&APs during the scoping phase will allow for the meaningful assessment of all relevant biophysical, cultural and socio-economic issues. Potential impacts will be investigated as per the Plan of Study included in this Scoping Report. The public participation process will continue throughout the EIA and WULA process.

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
BID	Background Information Document
DAFF	Department of Agriculture, Forestry and Fisheries
DMR	Department of Mineral Resources
DPM	Diesel Particulate Matter
DPRT	Department of Police, Roads and Transport
DRDLR	Department of Rural Development and Land Reform
DRT	Department of Roads and Transport
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme Report
GN	General Notice
GNR	General Notice Regulation
ha	Hectares
I&APs	Interested and/or affected parties
IWWMP	Integrated water and waste management plan
km	Kilometre
kV	Kilovolt
m	Meter
mamsl	Metres above mean sea level
mm	Millimetres
MPRDA	Mineral and Petroleum Resources Development Act, 2002
NEM:AQA	National Environmental Management: Air Quality Act, 2004
NEMA	National Environmental Management Act, 1998
NEM:WA	National Environmental Management: Waste Management Act, 2008
NWA	National Water Act, 1998
NGO	Non-government organisation
RoM	Run-of-mine
SACNASP	South African Council for Natural Scientific Professionals
SAHRA	South African Heritage Resources Agency
SANS	South African National Standards
SLR	SLR Consulting (South Africa) (Pty) Ltd
SMS	Short Message Service
WML	Waste Management Licence
WULA	Water Use Licence Application

INTRODUCTION

INTRODUCTION TO THE PROPOSED PROJECT

Tshipi é Ntle Manganese Mining (Pty) Ltd (Tshipi) operates the Tshipi Borwa open pit manganese mine located on Portions of the farms Mamatwan 331 (mining right and surface use areas) and Moab 700 (surface use area), located approximately 18 km to the south-east of Hotazel in the John Taolo Gaetsewe District Municipality and Joe Morolong Local Municipality of the Northern Cape Province of South Africa. The regional and local settings are illustrated in Figure 0-1 and Figure 0-2: , respectively.

Tshipi currently holds a mining right (NC/30/5/1/2/2/0206MR) and an Environmental Management Programme Report (EMPr) approved by the Department of Mineral Resources (DMR) in terms of the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA). In terms of NEMA read together with the MPRDA, the approved Environmental Management Programme Report (EMPr) (SLR, October 2017) is now deemed to be an Environmental Authorisation (EA). In addition, Tshipi holds the following authorisations:

- EA number NC/KGA/KATHU/37/2008 issued by the Department of Tourism, Environment and Conservation (currently the Department of Environment and Nature Conservation in the Northern Cape Province, as it was known then (currently the Department of Environment and Nature Conservation (DENC)) authorising Listed Activities in terms of Section 24 of National Environmental Management Act (No. 107 of 1998) (NEMA) (NEMA), as read with the Environmental Impact Assessment (EIA) Regulations of 2014, (as amended);
- EA number 30/5/1/2/2/206/0083M issued on 31 January 2018 by the DMR authorising Listed Activities and amending the approved layout plan of Borwa Mine in terms of Section 24 of NEMA, as read with the EIA Regulations of 2014, as amended; and
- Water Use Licence (10/D41K/AGJ/1735) issued by the Department of Water Affairs (currently the Department of Water and Sanitation (DWS) authorising water uses in terms of Section 21 of the National Water Act (NWA) (Act No. 36 of 1998).

A copy of these authorisations and the mining right are provided in Appendix 6.

Tshipi is now proposing the Tshipi Borwa Waste Rock Dump Extension Project (the Project) which includes (refer to Figure 2-1):

- the extension of the existing East Waste Rock Dump (WRD) to the mining right boundary and towards the Mamatwan WRD and eventually filling the void between these dumps, to provide additional overburden storage capacity;
- the extension of the existing West WRD onto Portion 8 of the farm Mamatwan 331;
- the construction of an 11kV overhead powerline along the Portion 8 boundary onto the existing mining right area. This powerline will be fed by an approved Eskom powerline and associated sub-station; and
- the construction of an overland conveyor system from the existing secondary crushing and screening plant to the existing manganese ore product stockpiles.

Prior to the commencement of these activities an EIA regulatory process must be conducted and approved by the DMR. In addition Tshipi must amend the mine's EMPr in terms of Section 102 of the

MPRDA, as read with the NEMA EIA Regulations. An EIA is required in terms of the MPRDA, NEMA and the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008) (NEM:WA).

SLR Consulting (Africa) (Pty) Ltd (SLR), an independent firm of environmental consultants, has been appointed by Tshipi to manage the EIA process.

SUMMARY OF AUTHORISATION REQUIREMENTS

Prior to the commencement of the proposed Project and in support of the application to amend the Tshipi Borwa Mine EMPr in terms of Section 102 of the MPRDA, as read with the NEMA EIA Regulations. Various environmental authorisations are required from the competent authorities. These include:

- an EA from the DMR in terms of NEMA. The proposed project encompasses several activities listed in Government Notice Regulation (GNR) 983 and 984 of 4 December 2014, as amended (EIA 2014 Regulations). This triggers the requirement for Tshipi to obtain an EA prior to the commencement of the activities. The applicable list of activities is provided in Section 2.2 (Table 2-2) of this report;

- a Waste Management License (WML) from the DMR in terms of the NEM:WA. The proposed project includes waste management activities listed in Government Notice Regulation (GNR) 921 of 29 November 2013, as amended. The applicable list of activities as currently set out in the legislation is provided in Section 2.2 (Table 2-2) of this report; and

- a WUL is required from the DWS for the water uses listed in section 21 of the NWA, as triggered by the Project. The applicable water uses in terms of section 21 are provided in Table 2-4. An application will also be lodged with the DWS for exemption from the requirements of relevant conditions in terms of the Regulations on Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources (GNR 704 of 4 June 1999) in terms of the NWA (refer to Table 2-4); and

- Written consent in terms of Section 102 of the MPRDA, as read with the NEMA EIA Regulations to amend Tshipi's existing EMPr.

A Water Use Licence application (WULA) process was initiated with the DWS in 2017, for undertaking water uses related to the changes to mine infrastructure as per the first Tshipi EMPr amendment (SLR, 2017). The water uses related to this Project will be included in the Water Use Licence application still to be submitted to DWS.

Any additional approvals/permits needed for the project will be identified during the course of the EIA process. A detailed list of such requirements will be provided in the Environmental Impact Report (EIR), which will include an EMPr.

Tshipi may be required to obtain other permits and authorisations in terms of health and safety legislation, however, this falls outside the scope of the EIA process.

SUMMARY OF EIA OBJECTIVES

An EIA initiated in terms of regulation 21 of the EIA Regulation 2014, as amended is conducted in two phases. The initial stage is the Scoping Phase and the second is the EIA Phase. The objectives of these phases are briefly outlined below.

Scoping Phase

In the context of the proposed project the aim of the scoping phase is to:

- identify relevant policies and legislation;
- consider the need and desirability;
- consider alternative technologies and sites;
- identify the potential environmental issues;
- determine the level of assessment and public participation required for the EIA phase;
- identify and outline what investigations need to be conducted; and
- identify preliminary measures to avoid, mitigate or manage potential impacts.

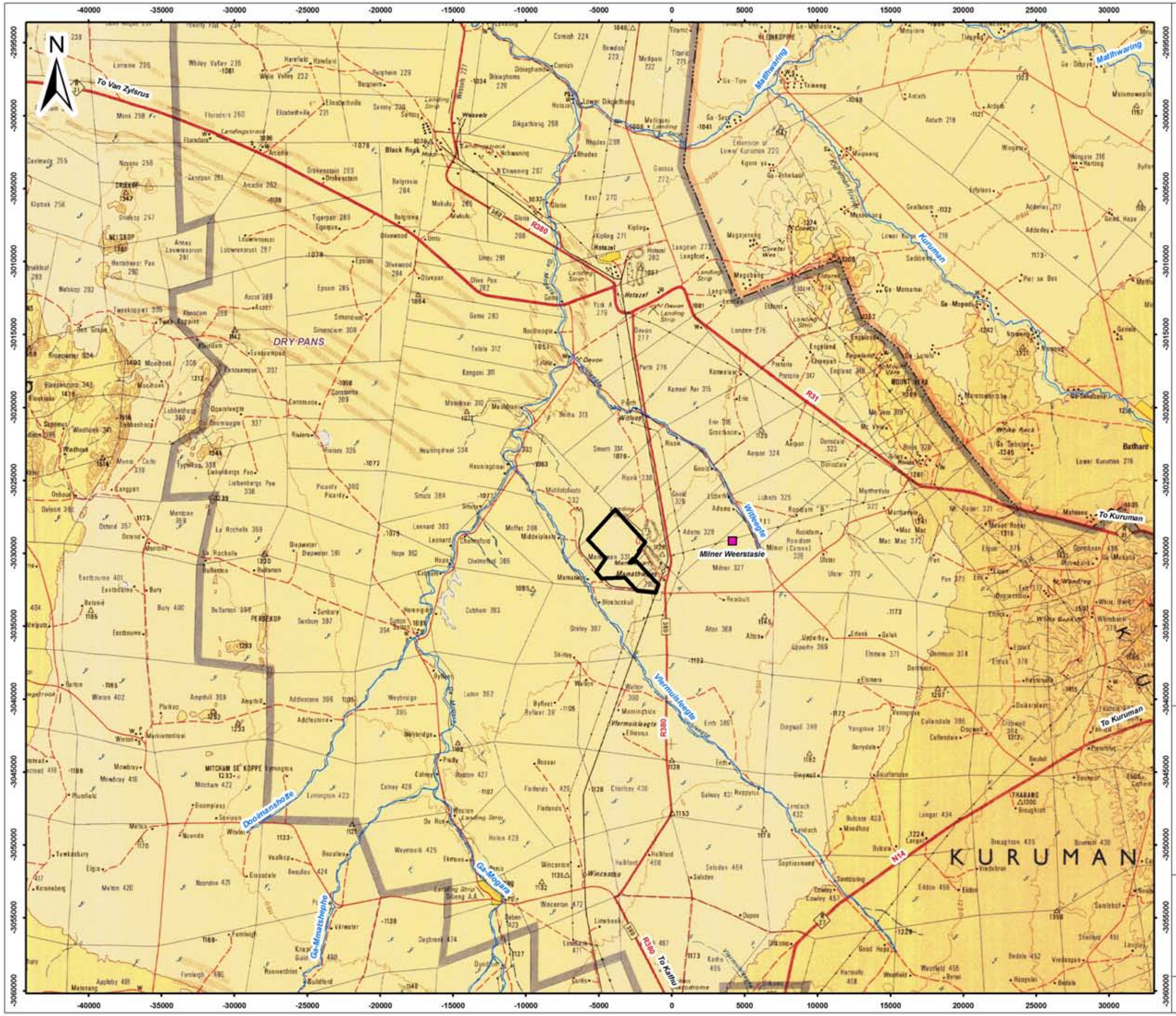
The terms of reference generated for the EIA Phase will enable the meaningful assessment of all relevant bio-physical and socio-economic issues.

EIA Phase

The objectives of the EIA Phase are to assess the potential impacts associated with the preferred project alternatives as per the terms of reference for the assessment that are set out in the Scoping Report. The EIA will document the assessment findings and detail the measures required to avoid, mitigate and/or manage the potential impacts. This phase also includes public participation and provides interested and affected parties the opportunity to contribute to the EIA process.

STRUCTURE OF THE REPORT

This report describes the Scoping Phase for the proposed project. The Scoping Report is structured in accordance with the DMR scoping report template and the NEMA EIA 2014 Regulations, as amended. Refer to Table 3-2 which outlines the structure of this report.



Tshipi é Ntle Manganese Mining (Pty) Ltd

Figure 0-1

Regional Setting

SLR Consulting (Africa) (Pty) Ltd
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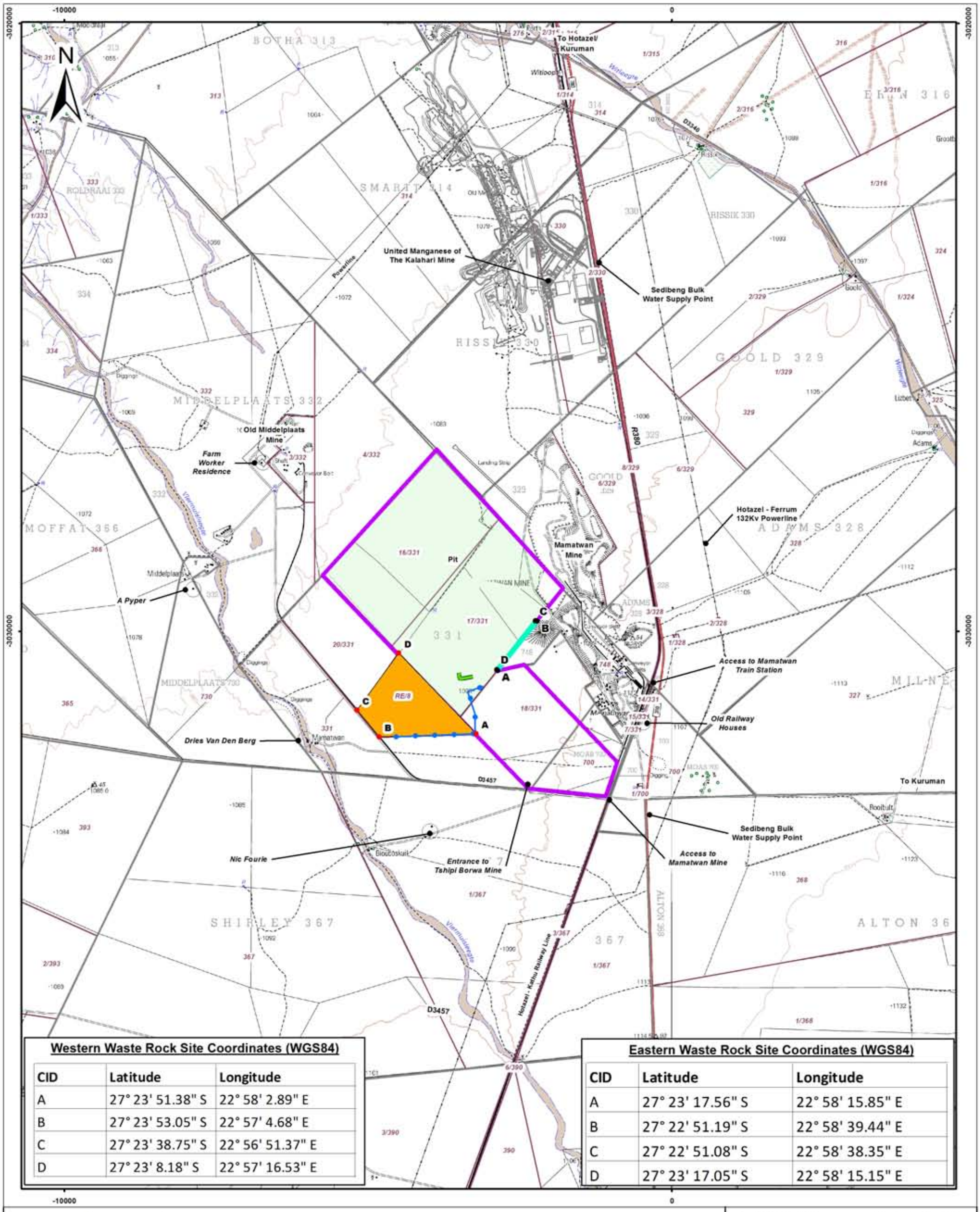
Tel: +27 (11) 467-0945 Fax: +27 (11) 467-0978

710.20008.00041	04/05/2018



Western Waste Rock Site Coordinates (WGS84)

CID	Latitude	Longitude
A	27° 23' 51.38" S	22° 58' 2.89" E
B	27° 23' 53.05" S	22° 57' 4.68" E
C	27° 23' 38.75" S	22° 56' 51.37" E
D	27° 23' 8.18" S	22° 57' 16.53" E

Eastern Waste Rock Site Coordinates (WGS84)

CID	Latitude	Longitude
A	27° 23' 17.56" S	22° 58' 15.85" E
B	27° 22' 51.19" S	22° 58' 39.44" E
C	27° 22' 51.08" S	22° 58' 38.35" E
D	27° 23' 17.05" S	22° 58' 15.15" E

Legend

- Main Road
- Rivers
- 20m Contours
- Power Lines
- Proposed 11kV Power Line
- Proposed Overland Conveyor System
- Proposed West Waste Rock Dump Extension
- Proposed East Waste Rock Dump Extension
- Approved Mining Right Area
- Surface Use Area
- Farm Boundaries
- Farm Portions

0 1 000 2 000 Meters

Scale: 1:60 000 @ A3

Projection: Transverse Mercator

Datum: WGS1984, Lo23

Tshipi é Ntle Manganese Mining (Pty) Ltd

Figure 0-2

Local Setting

SLR Consulting (Africa) (Pty) Ltd
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710.20008.00041 | 07/06/2018

1 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

1.1 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER WHO PREPARED THE REPORT

The details of the Environmental Assessment Practitioners (EAPs) that were involved in the preparation of this scoping report are provided in Table 1-1 below.

TABLE 1-1: DETAILS OF THE EAP

DETAILS	PROJECT MANAGER	REVIEWER
Name of the practitioner	Linda Munro	Jonathan Crowther
Responsibility on the project	EAP	Reviewer
Tel No.:	011 467 0945	+27 82 777 1477
Fax No.:	011 467 0975	+27 21 461 1118
Postal address	PO Box 1596, Cramerview, 2060	
E-mail address	lmunro@slrconsulting.com	-

Neither SLR nor any of the specialists involved in the EIA process have any interest in the project other than fair remuneration for consulting services rendered as part of the EIA process.

1.2 QUALIFICATIONS AND EXPERIENCE OF THE EAP

Both Jonathan Crowther and Linda Munro hold MSc degrees in Environmental Management, are registered as professional natural scientists (Environmental Science) with the South African Council for Natural Scientific Professions (SACNASP) and have over 15 years of relevant experience. Jonathan is certified as an Environmental Practitioner with the Interim Certification Board for Environmental Assessment Practitioners of South Africa (2006). Both Linda and Jonathan have been involved in several impact assessments for large scale mining developments in Africa. Proof of registrations of the respective practitioners is provided in Appendix 1 and relevant curricula vitae are attached in Appendix 2.

2 PROJECT DESCRIPTION

2.1 PROJECT LOCALITY

A description of the property on which the proposed project is located is provided in Table 2-1.

TABLE 2-1: DESCRIPTION OF THE PROPERTY

<table>
<tr><th>Description</th><th>Detail</th></tr>
<tr><td>Farm Name</td><td>Portion 8 of the farm Mamatwan 331;
Portion 16 (Portion of Portion 1) of the farm Mamatwan 331;
Portion 17 (Portion of Portion 2) of the farm Mamatwan 331;
Portion 18 (Portion of Portion 3) of the farm Mamatwan 331; and
The Remaining Extent of the farm Moab 700.</td></tr>
<tr><td>Application area (Ha)</td><td>The proposed East WRD extension area is approximately 13 ha;
The proposed West Waste Rock Dump (WRD) extension area is approximately 142 ha (including access roads).</td></tr>
<tr><td>Magisterial district</td><td>Located in the Kuruman Magisterial District, within John Taolo Gaetsewe District Municipality</td></tr>
<tr><td>Distance and direction from nearest town (Figure 0-1)</td><td>The closest towns are Hotazel and Kathu, located approximately 20 km north and 42 km south of the Tshipi Borwa Mine, respectively.</td></tr>
<tr><td>21 digit Surveyor General Code for each farm portion</td><td>TO00000000000033100016
TO00000000000033100017
TO00000000000033100018
TO00000000000033100008
TO00000000000070000000</td></tr>
<tr><td>Co-ordinates (Figure 0-2)</td><td>The 11kv powerline co-ordinates are as follows:
<table>
<tr><th>CID</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>0</td><td>27° 23' 53.02" S</td><td>22° 57' 14.46" E</td></tr>
<tr><td>1</td><td>27° 23' 51.43" S</td><td>22° 58' 2.57" E</td></tr>
<tr><td>2</td><td>27° 23' 29.05" S</td><td>22° 57' 57.71" E</td></tr>
<tr><td>3</td><td>27° 23' 26.08" S</td><td>22° 58' 7.18" E</td></tr>
</table>
The four corner points of the East WRD extension area include:
<table>
<tr><th>CID</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>A</td><td>27° 23' 17.56" S</td><td>22° 58' 15.85" E</td></tr>
<tr><td>B</td><td>27° 22' 51.19" S</td><td>22° 58' 39.44" E</td></tr>
<tr><td>C</td><td>27° 22' 51.08" S</td><td>22° 58' 38.35" E</td></tr>
<tr><td>D</td><td>27° 23' 17.05" S</td><td>22° 58' 15.15" E</td></tr>
</table>
The four main corner points of the West WRD extension area include:
<table>
<tr><th>CID</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>A</td><td>27° 23' 51.38" S</td><td>22° 58' 2.89" E</td></tr>
<tr><td>B</td><td>27° 23' 53.05" S</td><td>22° 57' 4.68" E</td></tr>
<tr><td>D</td><td>27° 23' 8.18" S</td><td>22° 57' 16.53" E</td></tr>
<tr><td>C</td><td>27° 23' 38.75" S</td><td>22° 56' 51.37" E</td></tr>
</table></td></tr>
</table>

The local and regional setting of the proposed project site is illustrated in Figure 0-1 and Figure 0-2. In addition to this, the regional and local settings have also been included in Appendix 3.

2.2 DESCRIPTION OF THE SCOPE OF THE PROJECT

Tshipi Borwa Mine is an existing opencast manganese mine that has been in operation since 2012. The key infrastructure includes an open pit, haul roads, run-of mine ore tip, a primary crusher, a secondary crushing and screening plant, various stockpiles for crushed and product ore, a train load-out facility, a private siding, offices, workshops, warehouses and ancillary buildings, an access control facility, various access roads, diesel generator house, electrical reticulation, clean and dirty water storage dams, water reticulation pipelines and drains, topsoil stockpiles and overburden waste rock dumps.

The mine uses conventional truck and shovel open pit mining methods. Concurrent backfilling takes place whereby waste rock is used to backfill the pit void in mined-out areas where there is sufficient space to dump safely. Mineral processing entails crushing and screening, and ore is then stored on product stockpiles for selling.

Tshipi is moving towards an alternative closure plan whereby some form of pit void may remain and allow access to mine further mineral resources using underground mining methods. Studies will be undertaken to investigate these options and will be addressed in an EMP amendment process in due course.

Tshipi now proposes to:

- extend the Tshipi East WRD in a south-easterly direction towards the mining right boundary and to finally merge with the nearby Mamatwan WRD, essentially filling the narrow void between these two WRDs: and
- extend the Tshipi West WRD in a south-westerly direction onto Portion 8 of the farm Mamatwan 331, in order to provide additional storage capacity for waste rock.
- construct an 11kV overhead powerline from an approved Eskom sub-station still to be built, along the southern boundary of portion 8 onto the existing mining right area, and connect this new line into the main distribution centre on the mine
- construct an overland conveyor system between the existing crushed product ore stockpiles at the secondary crushing and screening plant, to the existing product ore stockpiles located in proximity of the train load-out station.

More detail of the proposed project is provided in the sections below. A conceptual layout plan of the project, showing the location of the proposed infrastructure, as well as existing infrastructure is provided in Figure 2-1.

For the purposes of this report, the project area is defined as the approved Tshipi mining right area (Mamatwan 331) and the proposed West WRD extension area (Portion 8 of Mamatwan 331).

2.2.1 Listed and specified activities

The activities associated with the proposed project are listed in Table 2-2 and

Table 2-3. In each case the relevant listed activity is identified and includes the NEMA and NEM:WA activities for which application is being made.

An infrastructure plan of the project, showing the location and extent of all activities detailed in the tables, is provided in Appendix 4.

2.2.2 Description of the activities to be undertaken

An overview of the activities and infrastructure associated with the project are listed in Table 2-5 below and are illustrated in Figure 2-1.

TABLE 2-2: ACTIVITIES ASSOCIATED WITH THE PROPOSED PROJECT

DESCRIPTION OF ACTIVITY	AERIAL EXTENT OF THE ACTIVITY (HA)	LISTED ACTIVITY NUMBER AND APPLICABLE LISTING NOTICE
Selective clearing of vegetation designated for the proposed WRD extensions and supporting infrastructure.	Approximately (~) 13 ha East WRD extension. Approximately (~) 142 ha West WRD extension. Approximately 2,5 km for powerline with 22 m servitude.	NEMA: GNR 983 (Activity 27). NEMA: GNR 983 (Activity 28). NEMA: GNR 983 (Activity 30). NEMA: GNR 984 (Activity 15). NEMA: GNR 984 (Activity 17).
Establishment of haul and maintenance roads.	This forms part of the overall ~13 ha of disturbance for the East WRD extension and ~142 ha of disturbance for the West WRD extension.	NEMA: GNR 983 (Activity 24). NEMA: GNR 983 (Activity 56). NEMA: GNR 984 (Activity 17).
Stockpiling waste rock on the WRD extension areas and use of waste rock to establish roads and berms.	This forms part of the overall ~13 ha of disturbance for the East WRD extension and ~142 ha of disturbance for the West WRD extension.	NEMA: GNR 983 (Activity 34). NEMA: GNR 984 (Activity 6). NEMA: GNR 984 (Activity 17). NEM:WA: GNR 921 (Category B Activity 10). NEM:WA: GNR 921 (Category B Activity 11).
Construction of an overland conveyor network from the existing secondary crushing and screening plant to the existing manganese product stockpile	Approximately 1,2 km and falls within existing mining area.	N/A
Construct 11kv powerline	Approximately 2,5 km for powerline with 22 m servitude.	N/A

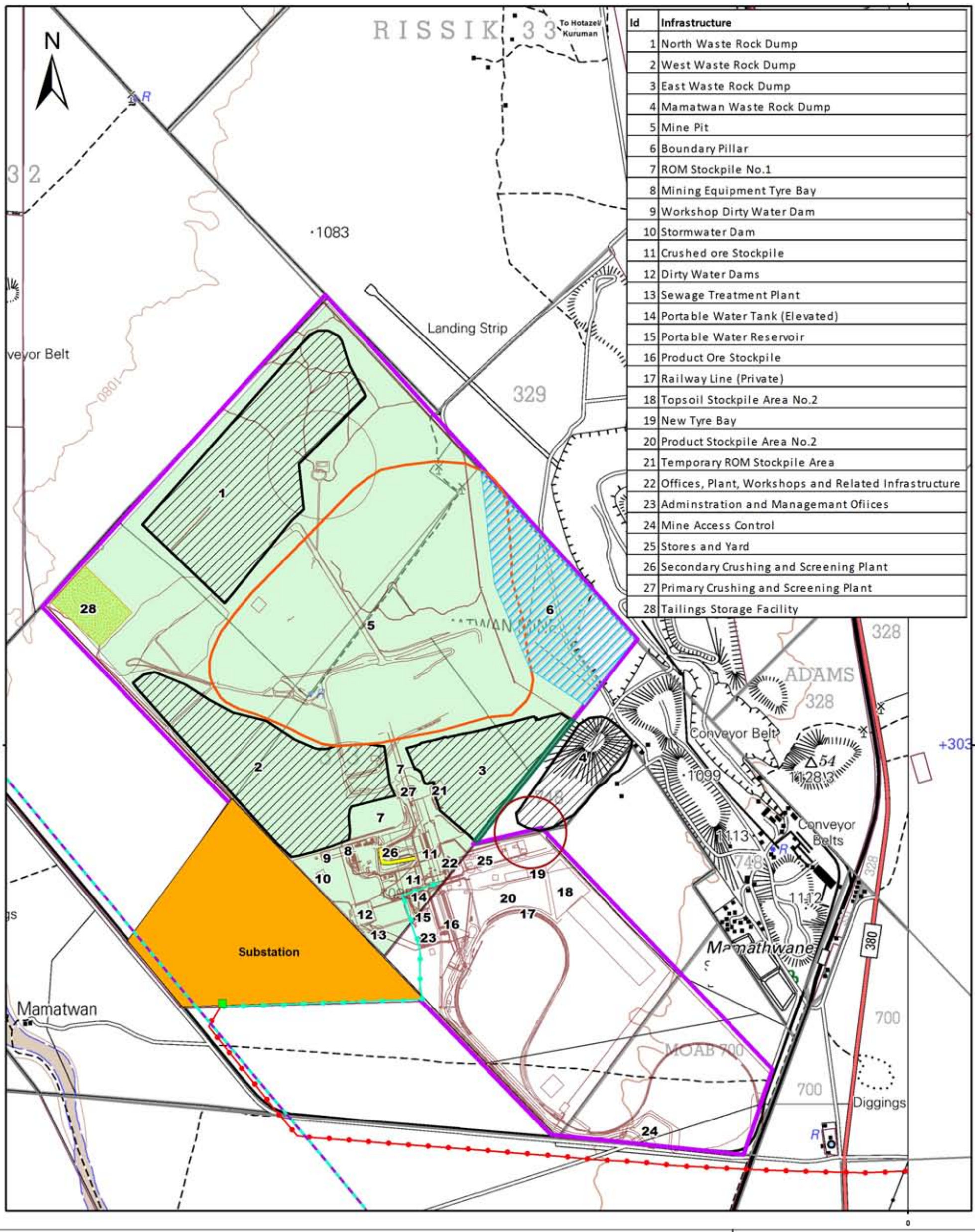
TABLE 2-3: DESCRIPTION OF THE EIA REGULATIONS LISTED ACTIVITIES APPLIED FOR AS PART OF THE PROPOSED PROJECT

ACTIVITY NUMBER	LISTED ACTIVITY
NEMA LISTING NOTICE 1 GNR.983	
Activity 24:	The development of– (ii) a road with a reserve wider than 13.5 metres, or where no reserve exists where the road is wider than 8 metres;
Activity 27:	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for– (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
Activity 28:	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;
Activity 30:	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
Activity 34:	"The expansion or changes to existing facilities for any process or activity where such expansion or changes will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions or pollution, excluding-" "(i) where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or" "(ii) the expansion of or changes to existing facilities for the treatment of effluent, wastewater or sewage where the capacity will be increased by less than 15 000 cubic metres per day; or " "(iii) the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic meters or less per day."
Activity 56:	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre– (i) where the existing reserve is wider than 13.5 metres; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.
NEMA LISTING NOTICE 2: GNR.984	
Activity 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.
Activity 15:	The clearance of an area of 20 hectares or more of indigenous vegetation.

ACTIVITY NUMBER	LISTED ACTIVITY
Activity 17:	Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including— (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing
NEM:WA LISTED ACTIVITIES GNR 921	
Category B Activity 10	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).
Category B Activity 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).

TABLE 2-4: DESCRIPTION OF WATER USES TO BE AUTHORISED AND REGULATION 704 EXEMPTIONS REQUIRED FOR THE PROPOSED PROJECT

NWA SECTION 21 LISTED WATER USES
21 (a) Taking water from a water resource – abstraction of water from boreholes.
21 (g) Disposing of waste in a manner which may detrimentally impact on a water resource – proposed WRD extensions; using water from the mine's dirty water system for dust suppression.
REGULATION 704 EXEMPTION REQUIRED
Condition 5 - Waste rock will be used in the construction of roads and berms.



Id	Infrastructure
1	North Waste Rock Dump
2	West Waste Rock Dump
3	East Waste Rock Dump
4	Mamatwan Waste Rock Dump
5	Mine Pit
6	Boundary Pillar
7	ROM Stockpile No.1
8	Mining Equipment Tyre Bay
9	Workshop Dirty Water Dam
10	Stormwater Dam
11	Crushed ore Stockpile
12	Dirty Water Dams
13	Sewage Treatment Plant
14	Portable Water Tank (Elevated)
15	Portable Water Reservoir
16	Product Ore Stockpile
17	Railway Line (Private)
18	Topsoil Stockpile Area No.2
19	New Tyre Bay
20	Product Stockpile Area No.2
21	Temporary ROM Stockpile Area
22	Offices, Plant, Workshops and Related Infrastructure
23	Adminstration and Managemant Ofiices
24	Mine Access Control
25	Stores and Yard
26	Secondary Crushing and Screening Plant
27	Primary Crushing and Screening Plant
28	Tailings Storage Facility

Legend

- Approved Eskom 33/11/kV 10mVA Substation
- Approved Eskom Power Line
- Approved 400kV Eskom Powerline
- Proposed 11kV Power Line
- Proposed Overland Conveyor System
- Mine Infracture
- Proposed West Waste Rock Dump Extension
- Proposed East Waste Rock Dump Extension
- Approved Mining Right Area
- Surface Use Area
- Waste Rock Dumps
- Tailings Storage Facility
- Mine Pit
- Boundary Pillar

Kilometers
0 0.5 1

Scale: 1:60 000 @ A3
Projection: Transverse Mercator
Datum: WGS1984, Lo23

Tshipi é Ntle Manganese Mining (Pty) Ltd

Figure 2-1

Site Layout

SLR Consulting (Africa) (Pty) Ltd
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710.20008.00041 | 07/06/2018

TABLE 2-5: LIST OF PROJECT ACTIONS / ACTIVITIES / PROCESSES

Main activity/process	Sub-activities	Construction	Operation	Decommissioning	Closure
Site preparation	Vegetation (trees, bushes and grasses) clearing in line with the WRD extension and 11 kV powerline construction schedules.	On-going	On-going		
	Removal of existing structures such as fencing (if present).	On-going	On-going		
	Establishing and maintaining the construction contractor's area	On-going			
Earthworks & civils	Stripping and stockpiling of topsoil resources in line with soil management programme.	On-going	On-going		
	Levelling and excavating activities by dozer, grader, excavator and haul-trucks	On-going	On-going		
	Establishing temporary access and construction roads.	On-going			
	Excavation, preparation and compaction of WRD extension foundations, sub-station foundations, overhead powerline trenches and conveyor system foundations Erection of the overhead powerline wooden poles, stringing of powerlines and construction of the overland conveyor system (concrete work and steelwork)	On-going	On-going (only WRD foundations)		
	Construction of selected earthworks cells in WRD extension areas in a phased manner over the life of the mine	On-going	On-going		
	Establishing and maintaining stormwater controls (berms and channels) as per stormwater	On-going	On-going maintenance		

Main activity/process	Sub-activities	Construction	Operation	Decommissioning	Closure
	management plan				
Waste rock (Mineralised waste) management	Hauling, tipping and dozing of waste rock	On-going	On-going		
	Waste rock stored in cells on the WRD extensions	On-going	On-going		
	Concurrent backfilling of the pit / in-pit dumping		On-going		
	Final disposal / rehabilitation of WRDs (on-site, on surface)			Permanent	Permanent
Stormwater management **continue until infrastructure can be removed or successfully rehabilitated*	Diversion of clean water	On-going	On-going	On-going*	
	Containment of dirty water	On-going	On-going	On-going*	
Transport systems	Construction and maintenance of internal gravel roads	On-going	On-going	On-going	
	Movement of construction vehicles/machinery within the site boundary (via gravel roads)	On-going	On-going	On-going	Limited
	Movement of waste rock with excavators and/or loaders and haul-trucks		On-going	On-going	
Non-mineralised (general and industrial hazardous) waste management	Collection of general and hazardous waste on site	On-going	On-going	On-going	
	Disposal and/or treatment of contaminated soils	On-going	On-going	On-going	
	Removal of waste by contractor for recycling, re-use and/or final disposal at permitted waste disposal facilities	On-going	On-going	On-going	
Site support services	Access control and roaming security activities at mine entrance and on mining right and surface right areas	On-going	On-going	On-going	

Main activity/process	Sub-activities	Construction	Operation	Decommissioning	Closure
	Preventing the spreading of veld fires by maintaining firebreaks	On-going	On-going	On-going	
	Maintenance of private roads, fencing and lighting for security	On-going	On-going	On-going	
	Appointment of contractors and workers	On-going	On-going	On-going	
Site management	Site management (monitoring, inspections, maintenance of facilities, security, access control)	At start of phase and on-going	At start of phase and on-going	At start of phase	
	Environmental awareness training and emergency response	On-going	On-going	On-going	On-going
	On-going rehabilitation of facilities/disturbed areas (where possible)	On-going	On-going	On-going	
	Implementing and maintaining management plans	On-going	On-going	On-going	
	Removing contractor's camp infrastructure (if not incorporated into WRD extension footprints)	On-going	On-going	On-going	
Demolition	Dismantling and demolition of fixed infrastructure and removal of equipment.	At end of phase			
	Demolition of ramps, haul and access roads (no longer needed)		For maintenance	On-going	
	Replacing soil resources			On-going	
Rehabilitation	Slope stabilisation, erosion control and landscaping		As required	On-going	
	Re-vegetation of landscaped areas	On-going	On-going	On-going	On-going
	Removal of alien invasive species from rehabilitated sites		Where possible	On-going	For maintenance
	Restoration of natural drainage patterns as far as practically possible		On-going	On-going	On-going

Main activity/process	Sub-activities	Construction	Operation	Decommissioning	Closure
	Initiation of aftercare and maintenance			On-going	
	Monitoring, maintenance and repair of facilities and rehabilitated areas			At end of phase	
Maintenance and aftercare	Monitoring, maintenance and repair of facilities and rehabilitated areas				On-going until rehabilitation measures are successful and a closure certificate is obtained

2.2.3 Construction Phase

The construction of the East and West WRD extensions will entail the preparation of the foundations for the WRDs by levelling, excavating and compaction, the construction of service/access roads, cut-off drains, berms and dump starter-walls.

The construction of the 11kV powerline will include the preparation of the corridor by levelling and clearing, the excavation of holes, the erection of poles and the stringing of power-lines.

The construction of the overland conveyor system will include; the levelling of the conveyor routes (over disturbed ground within the mining area), the excavation and casting of foundations and the erection of conveyor structures.

2.2.3.1 **Facilities**

Temporary facilities will be established on site to support the construction phase of the WRDs, the 11kV overhead line and the conveyor system. These facilities are likely to include a fenced construction yard on a prepared terrace, with various temporary buildings and facilities including;

- temporary access road – from existing mine service roads and access control;
- lighting;
- lay-down area;
- portable site office;
- temporary store and yard;
- temporary workshop;
- temporary potable water storage (header tank) and reticulation
- portable ablution and kitchen facilities,
- a temporary (buried) sewage tank for effluent and French drain;
- stormwater management arrangements.

In the case of the WRD extension construction, which will continue during operations, these facilities will be semi-permanent.

2.2.3.2 **Waste Rock Dump Extensions**

Site clearance of the WRD footprint will include the removal of trees, bushes and vegetation and any defunct structures. Thereafter, topsoil will be excavated, loaded and hauled to the dedicated topsoil stockpile in accordance with the mines' soil management procedure.

Both site clearance and topsoil striping of the WRD extensions will be undertaken in phases with cells being developed as additional waste rock storage capacity is required.

The East WRD will be extended in a south-easterly direction, to the mining right boundary. Currently the Tshipi East WRD and the Mamatwan WRD are only separated by service roads on either side of the

mining right boundaries. It is the long-term intention to fill the void between each of these dumps thereby minimising the effective dump surfaces that must be rehabilitated. Water management infrastructure such as berms around the existing WRDs will be adapted as required to manage run-off from the WRD once the void is filled. This will be addressed in the design process during the EIA phase.

It is anticipated that the West WRD extension footprint will be approximately 127 ha. A buffer of approximately 30m, which will include the WRD access road, cut-off drains and berms will be maintained from the toe of the WRD to the property boundary. This area will be utilised for the water management infrastructure (berms) ramps and access/service roads around the WRD. These are provisional parameters and will be refined in the West WRD extension design process during the EIA phase.

The East WRD and West WRD extension foundations will be established in accordance with geotechnical requirements and the base preparation will be in accordance with the required barrier system determined by a waste classification in accordance with GNR632 and GNR634, promulgated in terms of NEM:WA. Further detail on the design of the proposed East WRD and West WRD extensions will be included in the EIR.

The extension foundations will be designed taking cognisance of the geotechnical conditions and the base preparation will be in accordance with the required barrier system determined by a waste classification in accordance with regulations GNR632 and GNR634, promulgated in terms of NEM:WA. Further detail on the design of the proposed East and West WRD extensions will be included in the EIR.

2.2.3.3 **11 kV Overhead Powerline**

The 11kV overhead powerline will be approximately 2,5 km in length and consist of aluminium cables strung along wooden poles, to be erected along the centre-line of a 22 m wide strip of ground adjacent to the southern boundary of Portion 8. This strip will be cleared of all trees and bushes and to prevent the powerline being overgrown or the poles from being affected by veld fire. A single-lane service road will be graded within the strip to provide access to the overhead power line for maintenance.

2.2.3.4 **Overland Conveyor System**

The overland conveyor system will be approximately 1,2 km in length and will be erected within the existing mining right area – refer to Figure 2-1. The route of each conveyor will be levelled before foundations are constructed for the conveyor gantries, drive arrangements, head/tail-ends and transfer chutes.

The conveyor system will consist of numerous conveyors that will receive crushed manganese ore from the stockpiles at the existing crushing and screening plant and will transfer it to the manganese product stockpiles adjacent to the train load-out station.

2.2.3.5 **Transport System – Site Access and Roads**

There is an existing public district road adjacent to the south and west of the mine and a provincial road (R380) to the east of the mine. There is also a network of private internal access and service gravel roads within the mining right area as illustrated in Figure 0-2. No additional roads and/or access points to the mine from the public road network will be required for the proposed project. New access points and haul roads to the proposed West WRD extension area will be constructed to tie in with the mine's existing internal gravel road network in order to transport staff, material, equipment, and waste to and from the construction site. These roads will be maintained throughout the construction phase as part of

the current road maintenance programme. The access road will be constructed using selected (inert), suitably sized and compacted waste rock obtained from the existing WRDs.

A service road will be graded along the route of the 11kV powerline from the sub-station, adjacent to the overhead line and connect with the existing service road network on the mine site.

2.2.3.6 **Water Supply and Management**

Construction water supply and use

Water will be required during the construction phase for ground compaction, mixing of concrete, dust suppression and as general wash-down water. This water will be sourced from the mine's existing dirty water containment facilities and supplied by means of water bowsers and/or the mines existing piped water network.

Potable water, for human consumption will be piped from a header tank into ablution and kitchen facilities and drinking water will be provided in water coolers and/or as bottled water.

Stormwater Management

Clean and dirty areas will be delineated and separated by the construction of clean and dirty water diversion berms and cut-off drains, as well as dirty water containment facilities. Clean water diversion berms will be constructed to divert clean water away from dirty water generating areas (i.e. intercepting clean water run-off and diverting this water around construction activities).

2.2.3.7 **Non-mineralised Waste Management**

Domestic and Industrial Waste

General and hazardous wastes as defined under the NEM:WA generated during the construction phase will be managed in accordance with the approved EMPr (SLR, October 2017). The project will not add to or alter the types of waste generated at the mine.

Sewage

During the construction phase portable toilets will be utilised and the sewage removed by specialist contractor and treated at the mine's approved sewage treatment plant.

2.2.3.8 **Electricity Supply and Use**

The construction of the proposed East WRD and West WRD extensions will only require electrical power at the construction site for lighting and electrical points in the offices, store, workshop, ablution, and kitchenette. This electrical power will be supplied from the nearest existing on-mine sub-station in the case of the WRD construction camp and the overland conveyor system.

The construction camp for the 11kV overhead powerline will use a portable generator as power supply due its remote locality and temporary nature.

2.2.3.9 **Employment and Housing**

During the construction phase of the East WRD and West WRD extensions, specialist contractors will deploy managers, supervisors, senior artisans and machine operators from other sites but will employ junior skilled and semi-skilled staff from the local communities. A limited number of permanent positions may be created as construction will be on-going with operations.

Employment opportunities for the construction of the 11kV overhead powerline and the overland conveyor system will be temporary and of a limited duration i.e. 12 - 18 months. Specialist contractors will deploy managers, supervisors and senior artisans from other sites but will employ junior skilled and semi-skilled staff from the local communities.

Contractors will be expected to house their workers in nearby towns and no housing will be provided on site.

2.2.3.10 **Operating Hours**

It is anticipated that the construction phase will consist of one shift per day for conventional construction activities from 06:00 to 18:00 from Monday to Saturday. Should construction fall behind, or emergency work must be undertaken then working hours may be extended as Tshipi has permission for twenty-four hours per day, seven days per week operations. Shift rotation will be implemented to ensure work hours do not exceed that permissible by law.

2.2.3.11 **Timing**

Construction of the proposed East WRD and West WRD extensions is expected to take place in a staggered manner throughout the life of the facilities and construction of new cells will coincide with the operation of established cells.

Construction of the 11kV powerline will be of short duration, 12 - 18 months.

2.2.3.12 **Security and Access Control**

To prevent unauthorised and/or inadvertent access during the construction phase, a fence will be erected around the perimeter of the proposed East WRD and West WRD extension construction zones if they are not enclosed by existing fencing.

A similar arrangement will apply to the 11kV overhead powerline route

The overland conveyor system will be located within Tshipi's security area.

2.2.4 Operational Phase

The WRD operational phase will entail the hauling of waste rock from the mine pit over existing and new haul-roads onto the WRDs and the dumping and dozing of the waste rock on the WRD. In-pit dumping of waste rock will also take place through concurrent backfill as per current practice at the mine. This section provides an overview of the expected facilities, activities and services needed during the operational phase.

Activities during the operational phase of 11 kV overhead powerline will be limited to inspections and periodic maintenance.

Typical activities during the operational phase of the overland conveyor system will include attendance by operators including lashing of spillage and electro-mechanical maintenance activities.

2.2.4.1 **Surface Infrastructure**

The proposed operational phase surface infrastructure will include the following:

- Surface clean and dirty water management measures in compliance with Regulation 704, 4 June 1999 (R704);
- Lighting facilities at the proposed East WRD and West WRD extension and at the 132/11kV substation, and along the overland conveyor system.
- Haul roads;
- Access/service roads; and
- Security fencing, access control and roaming security facilities on the Tshipi mining right boundaries.

This description may be refined during the course of the EIA.

2.2.4.2 Transport System – roads and access points

The internal access, service and haul roads required during the construction phase will be planned such that they will become the permanent access, service and haul during operational phase and will be maintained throughout the operational phase (refer to Figure 2-1).

2.2.4.3 Water Supply and Management

Water supply and use

Potable water for the mine is sourced from the Sedibeng Vaal Gamagara Water Supply pipeline. The proposed project will not require an additional potable water supply.

Process water will be required during the operational phase for dust suppression and maintenance e.g. cleaning. This will be sourced from the mine's existing process water supply system and will be piped to the respective areas or supplied by means of water bowsers. Process water is provided by a combination of water from the Sedibeng Vaal Gamagara Water Supply pipeline (when make-up water is required), dewatering from the open pit, the collection of stormwater run-off and from planned water supply boreholes within the mining right area.

Stormwater management

The mine has an existing stormwater management system to divert clean water around dirty water generating areas (i.e. intercepting clean water runoff and diverting this water around the WRDs and the pit) in order to contain dirty water. The stormwater management system will be revised in order to contain runoff from the proposed East WRD and West WRD extensions.

2.2.4.4 Mineralised Waste Management

Mineralised waste will be disposed of onto the WRDs.

The volume of waste rock to be dumped on the West WRD extension is approximately 49 820 000m^3 and the height of the extension is expected to be between 60 and 80 m. These are provisional parameters and will be refined in the WRD design process during the EIA phase.

As indicated previously, the East WRD extension will fill the void between the existing Tshipi East WRD and the existing Mamatwan WRD. The expected volume of this area is 5 627 590 m^3 and will reach the height of the existing East WRD. Cells will be created between the toe of each dump with competent

rock e.g. banded iron formation. As each cell is filled with waste rock new cells will be created, stepping back each time to maintain the design slope angle, until the final design height is reached.

2.2.4.5 Non-mineralised Waste Management

Domestic and industrial waste

General and hazardous wastes as defined under the NEM: WA generated by the proposed activities will be managed in accordance with the approved EMPr (SLR, October 2017). The project will not add to and/or alter the types of waste generated at Tshipi currently.

Sewage

During the operational phase portable toilets will be utilised and the sewage removed by specialist contractor and treated by the specialist contractor off-site or treated at the mine's approved sewage treatment plant.

2.2.4.6 Employment and Housing

Limited if any permanent and/or temporary employment opportunities will be created by the described activities and no housing of new staff will be required during the operational phase.

2.2.4.7 Operating Hours

As per the approved EMPr (SLR, October 2017), mining and related activities take place continuously (24 hours per day, 7 days a week). There will be no change for the operations at the proposed East and West WRD extensions.

2.2.4.8 Life of mine

The mine has been operational for seven years and the anticipated remaining life of mine for the open pit operations, using current economic parameters, is approximately 25 years.

2.2.5 Decommissioning and Closure

A preliminary mine closure plan has been compiled for Tshipi Borwa mine in accordance with the NEMA Regulations (GNR 1147 of 2015) pertaining to the financial provision for mining operations (SLR, March 2017). This closure plan will be updated to include the addition of the proposed infrastructure. The closure plan will be included as part of the EIR.

As is required by the MPRDA and the regulations made thereunder (GNR 527 of 23 April 2004), a detailed closure plan will be submitted to the DMR prior to decommissioning and closure. This process will also involve other regulatory authorities and I&APs in a similar manner to the public participation process undertaken in terms of the EIA process. The detailed closure plan will determine specific closure strategies and action plans taking regulatory, environmental, social, economic and sustainable development principles into account.

3 POLICY AND LEGISLATIVE CONTEXT

This section outlines the key legislative requirements applicable to the Project. The table below provides a summary of the applicable legislative context and policy.

TABLE 3-1: LEGAL FRAMEWORK

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
Mineral and Petroleum Resources Development Act (No. 28 of 2002) as amended (MPRDA) and regulations made thereunder (GNR 527 of 23 April 2004)	Introduction and Table 3-2	Tshipi will apply for a Section 102 Amendment in terms of the MPRDA as read with the NEMA EIA Regulations. The EMPr will support this application.
National Environmental Management Act No. 107 of 1998) (NEMA)	Introduction and Table 3-2	NEMA and NEM:WA applications have been lodged. A copy of the application form is attached in Appendix 7.
GNR 982 of 4 December 2014 (EIA Regulations 2014), as amended		
National Environmental Management: Waste Act (No 59 of 2008) as amended (NEM:WA), as well as any applicable Norms and Standards published under NEM:WA		
SANS 10234: Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as per Waste Classification and Management Regulations (GNR.634 of 23 August 2013) and the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN R.635 of 23 August 2013)	Section 7.2	A waste assessment was undertaken for the Tshipi Borwa Mine by Golder Associates.
Guideline on the need and desirability in terms of the Impact Assessment (EIA) Regulations, 2010, GNR. 891 of 2014.	Section 1	Need and desirability has been taken into account as part of project planning. See section 4 of the Scoping Report
National Water Act (No. 36 of 1998) (NWA)	Introduction and Table 6-27	New Water Uses must be approved through a Water Use Licence (WUL). In addition to this, Tshipi should ensure compliance with GN R704 for the separation of clean and dirty water.
GNR 704 of 1999 Regulations on Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources in terms of the NWA		

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
National Dust Control Regulations GNR 827 of 1 November 2013	Section 2.2.3.6	Dust fallout monitoring data provided in Table 6-15.
National Forest Act (No. 84 of 1998) (NFA)	Table 6-27	Applications will have to be submitted to obtain the required permits to remove and/or translocate protected species. Applicable to the new area to be disturbed for the West WRD extension.
Northern Cape Nature Conservation Act No. 9 of 2009 (NCNCA)		
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 6.4.1.5 and Table 6-27	Biodiversity will be taken into account as part of project planning.
National Environmental Management: Biodiversity Act (No. 10 of 2004) Alien Invasive Species Regulations (2014)		
South African National Botanical Institute (SANBI) Integrated Biodiversity Information		
National Freshwater Ecosystem Priority Areas 2011 (NFEPA)		
National Protected Areas Expansion Strategy 2008 (NPAES)		
Conservation of Agricultural Resources Act (No. 43 of 1993) (CARA)		
Mining Biodiversity Guideline (2012)		
Important Bird and Biodiversity Areas (IBAs)		
National Heritage Resource Act (No. 25 of 1999)	Section 6.4.1.12 and Table 6-27	Heritage resources will be taken into account as part of project planning.

This document has been prepared in accordance with the DMR Scoping Report template format, and was informed by the guidelines posted on the official DMR website. This is in accordance with the requirements of the MPRDA. This report also complies with the requirements of the NEMA and EIA Regulations (2014) GNR 982, as amended.

The table below provides a summary of the requirements, with cross references to the report sections where these requirements have been addressed.

TABLE 3-2: STRUCTURING OF THE SCOPING REPORT

Legal and Regulatory Requirement		Cross Reference to Report Section
As per the DMR template	As per the GNR 982 Appendix 2 Section 2.	
	A scoping report must contain the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process:	Noted. Below we show where the specific requirements have been met.
The EAP who prepared the report; Expertise of the EAP.	(a) details of: (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	See Table 1-1, Appendix 1 and Appendix 2.
Description of the property.	(b) the location of the activity, including: (i) The 21 digit surveyor general code of each cadastral land parcel; (ii) Where available, the physical address and farm name; (iii) Where the requirement information in terms (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	See Table 2-1.
Locality plan.	(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	See Figure 0-2.

Legal and Regulatory Requirement		Cross Reference to Report Section
As per the DMR template	As per the GNR 982 Appendix 2 Section 2.	
Description of the scope of the proposed overall activity, including listed and specified activities; Description of the activities to be undertaken.	(d) a description of the scope of the proposed activity: (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure.	See Section 2.2.
Policy and legislative context.	(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning framework and instruments that are applicable to this activity and are to be considered in the assessment process;	See Section 3.
Need and desirability of the proposed activity.	(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	See Section 1.
Period for which the environmental authorisation is required.		See Section 1.
Description of the process followed to reach the proposed preferred site.	(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including:	See Section 6.
Details of the alternatives considered.	(i) details of all the alternatives considered;	See Section 6.1.
Details of the public participation process followed.	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	See Section 6.2.
Summary of issues raised by IAPs.	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were	See Section 6.3.

Legal and Regulatory Requirement		Cross Reference to Report Section
As per the DMR template	As per the GNR 982 Appendix 2 Section 2.	
	incorporated, or the reasons for not including them;	
Environmental attributes associated with the sites.	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	See Section 6.4.
Impacts identified.	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cb) can be avoided, managed or mitigated;	See Section 6.5.1.
Methodology used in determining the significance of environmental impacts.	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	See Section 6.6.
The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternative will have on the environment and the community that may be affected.	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	See Section 6.7.
The possible mitigation measures that could be applied and the level of risk.	(viii) the possible mitigation measures that could be applied and level of residual risk;	See Section 6.8.

Legal and Regulatory Requirement		Cross Reference to Report Section
As per the DMR template	As per the GNR 982 Appendix 2 Section 2.	
The outcome of the site selection matrix. Final site layout plan.	(ix) the outcome of the site selection matrix;	See Section 6.9.
Motivation where no alternative sites were considered.	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	See Section 6.10.
Statement motivating the preferred site.	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	See Section 6.11.
Plan of study for the environmental impact assess process;	(i) a plan of study for undertaking the environmental impact assessment process to be undertaken, including:	See Section 7.
Description of alternatives to be considered including the option of not going ahead with the activity	(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	See Section 7.1.
A description of the aspects to be assessed as part of the environmental impact assessment process	(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;	See Section 7.2.
Description of aspects to be assessed by specialists.	(iii) aspects to be assessed by specialists;	See Section 7.3.
Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives.	(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;	See Section 7.4.
Proposed method of assessing duration significance.	(v) a description of the proposed method of assessing duration and significance;	See Section 7.5.
The stages at which the competent authority will be consulted.	(vi) an indication of the stages at which the competent authority will be consulted;	See Section 7.6.

Legal and Regulatory Requirement		Cross Reference to Report Section
As per the DMR template	As per the GNR 982 Appendix 2 Section 2.	
Particulars of the public participation process with regard to the impact assessment process that will be conducted.	(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and	See Section 7.7.
Description of the tasks that will be undertaken during the environmental impact assessment process.	(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;	See Section 7.8.
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.	(ix) identify suitable 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.	See Section 7.9.
Undertaking regarding correctness of information;	(j) An undertaking under oath or affirmation by the EAP in relation to: (i) The correctness of the information provided in the report; (ii) The inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	See Section 9 and Appendix 5.
Undertaking regarding level of agreement.	(k) An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	See Section 9.
Other information required by the competent authority.	(l) Where applicable, any specific information required by the competent authority; and	No request received to date.

Legal and Regulatory Requirement		Cross Reference to Report Section
As per the DMR template	As per the GNR 982 Appendix 2 Section 2.	
Other matter required in terms of section 24(4)(a) and (b) of the Act.	(m) Any other matter required in terms of section 24(4)(a) and (b) of the Act.	None identified.

4 NEED AND DESIRABILITY OF THE PROJECT

As the Borwa mine has developed it has become apparent to Tshipi, through long-term planning which has determined a longer life of mine, that additional waste rock storage areas are needed to allow continued optimal operation of the mine. The WRD extensions will facilitate the optimisation of the waste rock hauling cycles thereby making the economic viability of the mine more robust. In addition, Tshipi is now an established mine and on-going mine planning, based upon more detailed geological and mining information, has led to the development of an in-pit dumping plan which will limit the quantum of waste rock that must be dumped on the WRDs.

The mine offers significant positive socio-economic benefits including employment, procurement, skills development and taxes on a local, regional and national scale. In addition, the mine indirectly contributes to economic growth in the national, local and regional economies by strengthening the national economy and because the increase in the number of income earning people has a multiplying effect on the trade of other goods and services in other sectors.

More detail relating to the need and desirability of the proposed project will be provided in the EIR.

5 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The most recent long-term planning has determined that the (economic) life of mine is estimated at a further 25 years.

6 PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED ALTERNATIVE

6.1 DETAILS OF ALL ALTERNATIVES CONSIDERED

This section describes land use or development alternatives that have been considered for the proposed infrastructure, alternative means of carrying out the operation and the consequences of not proceeding with the proposed project.

The main project alternatives to be considered include:-

- Property or locality; and
- The “no-go” alternative.

6.1.1 Property or locality

The location of the proposed West WRD extension relied on the identification of a property of sufficient size to accommodate the required volume of waste rock. The area also needed to be located in close proximity to the open pit to optimize the haul distance. It follows that no locality alternatives, other than Portion 8 of the farm Mamatwan 331, meets these criteria. Furthermore, there is no commercial activity i.e. farming being undertaken on this property, and the surface rights are owned by Tshipi.

The void between the Tshipi East WRD and the Mamatwan WRD has already been impacted by the waste rock dumping activities and therefore no other site alternatives were considered.

In terms of surface environmental features an effort was made to avoid locating the East WRD and West WRD extensions within close proximity to the Vlermuisleegte River, approximately two kilometers west of Tshipi Borwa and within close proximity to the nearest local farm residences.

The routing of the 11kV powerline is determined by the approved Eskom sub-station to be constructed and will follow the West WRD property boundary. The conveyor infrastructure is located within the mining area and is determined by the location of the secondary crushing and screening plant and the stockpiles.

Thus no other infrastructure locational alternatives are considered in this EIA.

6.1.2 The “no-go” alternative

The assessment of this option requires a comparison between the options of proceeding with the proposed project with that of not proceeding with the proposed project. Proceeding with the proposed project allows continuation of mining activities with associated potential economic benefits and potential negative environmental and social impacts. Not proceeding with the proposed project would maintain the status quo. This will be detailed further in the EIR.

6.2 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

This section describes the undertaking of the public participation process (PPP) and details the information provided to the community, landowners and interested and affected parties (I&APs). The intention of the PPP is to inform I&APs, in sufficient detail, of what the proposed project will entail, in order for I&APs to contribute meaningfully to the identification of any issues and concerns that they may have during the Scoping Phase.

It should be noted that I&APs were initially informed in September 2017 through advertising, site notices and a Background Information Document (BID) that Tshipi proposed to:

- Change the mine backfill strategy and closure objectives to allow for partial backfilling instead of complete backfilling of its pit; and
- Extend the Tshipi Borwa mines' existing West WRD onto Portion 8 of the farm Mamatwan 331 to provide additional storage capacity.

I&APs have since been informed through advertising, site notices and an updated BID that Tshipi has reconsidered its immediate mine development requirements, and that the current EIA scope would address only the following proposed activities:

- Extend the existing West WRD onto Portion 8 of the farm Mamatwan 331;
- Extend the existing East WRD towards the Mamatwan WRD by filling the void between these dumps to provide additional waste storage capacity;
- Construction of an 11kV overhead powerline from the approved Eskom sub-station along the Portion 8 boundary onto the existing mining right area; and
- Construction of an overland conveyor system between the existing secondary crushing and screening plant and the existing manganese product stockpiles adjacent to the train load-out facility.

Due to changed priorities I&APs were informed that Tshipi would not at this stage apply for a change in the mine backfill/closure objectives.

6.2.1 Competent Authority Consultation

A pre-application meeting was held with the DMR in Kimberley on 11 April 2017. The purpose of the meeting was to discuss the legislative requirements and the approach to the EIA and EMPr amendment process for the application to ensure agreement and compliance. The minutes of this meeting is provided in Appendix 5.

SLR and Tshipi subsequently met with DMR on 8 August 2017 to provide an update of the environmental legal compliance at Tshipi Borwa and to discuss the different environmental authorisation application processes that were in progress at the time. The minutes of this meeting is provided in Appendix 5. At this meeting the DMR tabled two options to Tshipi on how to proceed with the current application:

- Option 1: Submit a letter informing the DMR of layout changes and withdraw the EMPr lodged in 2017 and combine all the changes in the current application.

- Option 2: Continue with the 2017 EMPr process and run the current application to amend the EMPr concurrently with the 2017 EMPr.

Feedback was required from Tshipi management regarding the option to be pursued and a subsequent meeting was held with the case officer, Takalani Khorombi on 29 August 2017 to present the formal response regarding the application option to be pursued. Option 2 was selected to be the way forward. The minutes of this meeting is provided in Appendix 5.

A clarification meeting will be held with the DMR in due course to inform the department of the change in scope for the current EIA and EMP amendment process.

6.2.2 Interested and affected party (I&AP) Database

In addition to landowners, SLR has developed an I&AP database comprising of Non-Governmental Organizations ("NGOs"), community-based organizations, commenting authorities and other key stakeholders with a potential interest in the application. This database included municipal officials, ward councilors, traditional authorities, Government Departments with jurisdiction in the area. The latest copy of the I&AP database is included in Appendix 5.

6.2.3 Landowner and occupier notifications

During the week of 26 August 2017, notification letters and Background Information Documents (BID) were sent via email to all I&APs on the database. In addition, Mr Wezi Banda representing Mamatwan Manganese Mining (Pty) Ltd (Mamatwan), which has a pending mining right application on Portion 20 and Portion 8 of the farm Mamatwan 331, was also sent a notification letter and BID.

Updated notification letters and BIDs were distributed during the week of 28 May 2018.

6.2.4 State department notifications

During the week of 26 August 2017, a notification letter and BID were sent to the following authorities:

- Department of Minerals Resources (DMR);
- Department of Environmental Affairs (DEA);
- Department of Environment and Nature Conservation (DENC);
- Department of Water and Sanitation (DWS);
- South African Heritage Resources Agency (SAHRA);
- Department of Agriculture, Forestry and Fisheries (DAFF);
- Department of Public Works, Roads and Transport (DPWRT);
- Department of Rural Development and Land Reform (DRDLR);
- Northern Cape Department of Agriculture (NCDA);
- John Taolo Gaetsewe District Municipality (JTGDM); and
- Joe Morolong Local Municipality (JMLM).

Updated notification letters and BIDs were distributed to regulators during the week of 28 May 2018.

6.2.5 Site notices and advertisements

On 26 August 2017 and 30 May 2018, site notices (in English) were placed at the entrance to the Tshipi Borwa Mine and at key conspicuous public places in the towns around the project area. These public places included the Kathu Public Library, the Joe Morolong Local Municipal offices, the John Taolo Gaetsewe District Municipal offices, the Hotazel public library and the Black Rock library. Proof of the placement of the laminated A2 site notices is included in Appendix 5.

Press adverts were placed in the following newspapers:

- Kathu Gazette on Thursday 1 September 2017 and 2 June 2018; and
- Kalahari Bulletin on Thursday 7 September 2017 and 31 May 2018.

In addition a general notice was placed and published in the Provincial Gazette of 6 September 2017.

The press adverts, gazette notice and site notifications were undertaken to notify and elicit comment from other I&APs that might not have been identified during the earlier stakeholder identification process. Proof of the press adverts and gazette notices are included in Appendix 5.

6.2.6 Background information document distribution

A notification letter and BID was sent to all the persons listed in the I&AP database in September 2017, and an updated BID was distributed during the week of 28 May 2018. The purpose of the letters and BIDs was to inform I&APs and authorities about the proposed project, the EIA process, environmental attributes, possible environmental impacts and means of providing input into the EIA process. The initial letter and BID also included details of the planned public meeting. The letters and BIDs were made available in English and Afrikaans. Copies of the letters and BIDs are included in Appendix 5.

6.2.7 Public meeting

6.2.7.1 Information-sharing scoping meeting

One general public scoping meeting was held in Hotazel at the Recreation Club on 14 September 2017. The meeting was conducted in English but some questions from I&APs were asked in Afrikaans. The purpose of the meeting was:

- To provide an overview of the proposed project;
- To provide an overview of the EIA process that will be undertaken for the proposed project;
- To provide an overview and obtain input on the existing status of the environment;
- To outline and obtain input on impacts identified for the proposed project;
- To record any comments and issues raised. These issues and concerns will be used to inform the Plan of Study for the EIA Phase; and
- Agree on the way forward and the logistics for report distribution.

Minutes of the public meeting are included in Appendix 5.

6.2.7.2 Regulatory authority scoping meeting

All the authorities in the I&AP database were invited to an authorities meeting which was held in Hotazel at the Recreation Club on 14 September 2017. The aims of this meeting were the same as that of the information meeting described above. Unfortunately, none of the invited authorities were able to attend the meeting. A new meeting will be offered to regulatory authorities during the EIA process.

6.2.8 Review of the draft scoping report

6.2.8.1 Public review of scoping report

The draft scoping report was made available for public review and comment from 14 June 2018 (for 30 days) until close of business on 16 July 2018 at the following venues:

- Hotazel Public Library;
- Kathu Public Library; and
- Electronic copies of the scoping report was made available on the SLR website.

Registered I&APs were notified of the availability of the Scoping report for review via e-mail, normal postage, sms messages and adverts placed in the following newspapers:

- Kathu Gazette on Thursday 14 June 2018; and
- Kalahari Bulletin on Thursday 14 June 2018.

A Summary of the Scoping report was distributed to all registered I&APs via e-mail and normal postage.

Proof of the notifications to I&APs and authorities of the availability of the Scoping report for review are included in Appendix 5.

This final Scoping report was prepared and includes comments and responses to any issues raised by I&APs. This report will be submitted to DMR for their review.

6.2.8.2 Regulatory authority review of scoping report

The scoping report was made available for review by regulatory authorities registered on the I&AP database for a period of 30 days from 14 June 20187 until close of business on 16 July 2018. This final Scoping report includes comment received from regulatory authorities.

6.3 SUMMARY OF ISSUES RAISED BY IAPS

A summary of the issues and concerns raised by regulatory authorities and I&APs in relation to the proposed project and the alternatives are provided in Table 6-1 below.

TABLE 6-1: SUMMARY OF ISSUES RAISED BY REGULATORY AUTHORITIES AND IAPS

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
AFFECTED PARTIES				
Surrounding Land Owners				
Andries van den Berg	14 September 2017 at the public scoping meeting.	X	I live very close to the mine and I am concerned about the dust aside chemicals that wash into my grazing, are the chemicals harmful and how will that be handled? Will the access road be tarred or how will the dust aside runoff be controlled?	The use of dust-a-side is a means of managing the generation of dust along gravel roads. This is in compliance with Tshipi's EMP management actions that stipulate the use of dust binding agents. It is understood that dust-a-side is not considered to be harmful to the environment and will not contribute towards pollution. During the application of the dust-a-side, Tshipi needs to ensure that the dust-a-side is limited to the road surface only.
			What angles are you going to use for the stockpiles? What is the acceptable angle according to the law or best practise and how far will they be from the fence?	During a meeting with the DMR it was confirmed that 18 to 26 degrees would be acceptable. James Manis indicated that the distance between the side slope and the fence would be 30 metres. The EIR will contain detail on the slope angles of the WRDs.
			What stormwater infrastructure will be constructed around the WRD to prevent contaminated runoff running onto my land?	In terms of the legal requirements the stormwater runoff from the WRD must be contained. The EIR will contain detail on how water will be managed at the WRDs.
			In terms of groundwater, I have two boreholes that lie next to the substation and farmhouse on the remainder of the farm Mamatwan 331. The two boreholes have dried up and deliver no water. I would like to know what will happen in future and whether the mine will supply us with water?	The proposed project will not require further dewatering activities. As such the dewatering impacts assessed in the 2017 EMPr remain valid. The dewatering modelling showed that your borehole could experience a drop in water levels of 4 to 7 metres. The Tshipi EMPr includes a commitment to monitor third party boreholes and if borehole users experience any mine related water loss, Tshipi will, in conjunction with other mines in

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
				the area that are contributors to the cumulative impact, provide compensation, which could include an alternative water supply of equivalent water quality and quantity as per the approved EMPr. James Manis from Tshipi confirmed at the meeting that there is a commitment in the approved EMP (SLR, October 2017) in terms of water provision to provide water if it is proven that the mine has compromised water supply to third parties, and that commitment will be carried across into this EMPr.
			I am concerned about the changing rainfall patterns. There seems to be a sharp decline of rainfall on my land surrounding the mine, could the change in the local topography by the pit and WRDs and wind patterns have anything to do with this?	Input has been obtained from Airshed Planning Professionals as follows: Most of the rain over the three years (2015 – 2017) was received during the months of January and February 2017. In total, 2016 had the highest rainfall at Kuruman over the three years. Rainfall is not likely to be significantly influences by local topographical changes and is more likely the result of climate change. The Water Research Commission (WRC) is investigating the changes in extreme rainfall in the medium term (2040 – 2060) and the synoptic drivers of this change in the long term (2070 – 2099). An initial assessment indicates drier than normal conditions projected over much of southern Africa alongside increased possibility of extreme rainfall. (http://www.csag.uct.ac.za/projected-changes-in-extreme-rainfall-over-south-africa/)

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
OTHER INTERESTED AND AFFECTED PARTIES				
L Mathonsi Acting Depot Manager, Transnet, Kimberley	6 September 2017, letter.	X	This office has no objection to the proposal. Transnet and its OD's are not affected as the site lies approximately 2,4 km south-east from the closest development (diesel farm). Technically speaking, from a Civil point of view, we foresee no objections to the proposal. Transnet Freight Rail would however, like the opportunity to re-evaluate our position with regards to this proposal once final plans have been prepared.	Your comment is noted. The EIR will provide more detailed information about the proposed project and you will be given the opportunity to review this report.
Sepalamelo Masthidiso	14 September 2017 at the public scoping meeting.	X	As you have mentioned the involvement of regulatory authorities in your presentation, will you be having another meeting with them?	Yes, a separate meeting was scheduled to take place on 14 September 2017 at 12:00 and all relevant regulatory authorities were invited, however no officials attended this meeting. Meetings were also held with the Department of Mineral Resources (DMR) prior to the commencement of the project (pre-application meetings).
			How will the backfilling process take place? Will Tshipi haul some waste rock from the existing waste rock dump?	Concurrent backfilling takes place as the pit is developed. At the time of this public meeting, Tshipi was considering partial backfill instead of complete backfill of the pit. However Tshipi has subsequently reconsidered its immediate mine development requirements and due to changed priorities it will not at this stage apply for a change in the mine backfill/closure objectives. Therefore, at this stage waste rock from the remaining WRDs will be placed in the final pit void during closure, although some

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
				waste rock may remain on surface in perpetuity.
			Will SLR be involved in implementing the proposed project (i.e. construction) or will they just do the environmental assessment?	SLR is an independent environmental consulting firm and will not be involved in implementing the proposed project. James Manis confirmed that by law, Tshipi requires the services of an independent company to transparently report on any project related-environmental issues to the public.
		X	Following my previous question, will any procurement opportunities be presented?	James Manis confirmed that the procurement process will solely be handled by the mine, depending on whether it receives authorisation for the project.
			Will there be a second round of public participation before the submission of the final EIA?	The public participation process will continue during the EIA phase. As such all I&APs will continue to be informed about the project and have the opportunity to review the reports and provide input at any stage in the EIA process.
Lennox Ka Tong	14 September 2017 at the public scoping meeting.	X	Will Tshipi advertise during the implementation phase of this project?	SLR will not be involved in advertising any tenders or contracts for the project. Tshipi will follow normal procurement and employment procedures during the implementation phase.
Erol Tshelang Motlhatlhedi	3 June 2018 via email	X	I have a small construction company based here in Kathu. My view to this project is that with projects like these it is highly important as this will benefit the unemployed in our region as there is a lot of unemployment	Your comment is noted.

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
			here. At least few men and women will get the opportunity for permanent and temporary jobs and this is the best breaking news also to us local business as we also can have opportunity to make business. My company is Termo Construction (Pty) Ltd, my business is general building construction and supply of goods and materials.	
Hendrik Petrus Venter	2 September 2017 via email	X	We find your proposed project to be in order.	Your comment is noted.
Albertus Viljoen CEO - Tshiping WUA	Via email 26 June 2018	X	The report mentions that a WULA was not submitted to DWS. Please advise on the current situation of such application.	The WULA has not been submitted to DWS as yet and the WULA process has commenced with the placement of the attached notice on site and in public places in Hotazel and Kathu. Please forward any comments in this regard to us.
REGULATORY AUTHORITIES				
Natasha Higgit South African Heritage Resources Agency (SAHRA)	Via email 5 June 2018	X	Thank you for notifying SAHRA of the proposed development. Please note that all development applications are processed via our online portal, the South African Heritage Resources Information System (SAHRIS) found at the following link: http://sahra.org.za/sahris/. Please create an application on SAHRIS and upload all documents pertaining to the Environmental Authorisation Application Process. As per section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage resources must form part of the process and the	An application will be created on SAHRIS as requested. A heritage specialist study will be conducted as part of the EIA and will comply with the relevant legal requirements. The Scoping Report, EIA and EMPr along with relevant specialist reports will be uploaded onto SAHRIS as these become available for review.

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
			assessment must comply with section 38(3) of the NHRA. Once all documents including all appendices are uploaded to the case application, please ensure that the status of the case is changed from DRAFT to SUBMITTED. Please ensure that all documents produced as part of the EA process are submitted as part of the application, and are submitted to SAHRA at the beginning of the Public Review periods. Once all these documents have been uploaded, I will be able to issue an informed comment as per section 38(4) and 38(8) of the NHRA.	
	Via SAHRIS site 12 July 2018 Comment on Scoping Report	X	Thank you for notifying SAHRA of the Environmental Authorisation (EA) for the proposed Tshipi Borwa Waste Rock Dump Extension Project, near Hotazel, Northern Cape Province. As the proposed development is undergoing an EA Application process in terms of the National Environmental Management Act, 107 of 1998 (NEMA), NEMA Environmental Impact Assessment (EIA) Regulations for activities that trigger the Mineral and Petroleum Resources Development Act, No 28 of 2002 (MPRDA)(As amended), it is incumbent on the developer to ensure that a Heritage Impact Assessment (HIA) is done as per section 38(3) and 38(8) of the National	The final scoping report, Draft EIA and appendices, including the heritage assessment and the required palaeontological assessment, will be submitted to the SAHRIS Case application.

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
			Heritage Resources Act, Act 25 of 1999 (NHRA). This must include an archaeological component, palaeontological component and any other applicable heritage components. The HIA must be conducted as part of the EA Application in terms of NEMA and the NEMA EIA Regulations. A draft Scoping Report has been submitted and the report states that the HIA will be done as part of the EIA phase of the EA applications. We await the draft EIA phase and HIA. The quickest process to follow for the archaeological component of the HIA, would be to contract a specialist (see www.asapa.org.za or www.aphp.org.za to provide an Archaeological Impact Assessment (AIA). The AIA must comply with the SAHRA 2007 Minimum Standards: Archaeological and Palaeontological Component of Impact Assessments. Should the project be highly disturbed, the archaeologist may draft a Letter of Recommendation for Exemption for further studies to be completed. The proposed expansion area is located within an area of moderate sensitivity in terms of palaeontological resources. An assessment of the impact of the	

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
			development on palaeontological resources is required to be completed by a qualified palaeontologist. The report must comply with the SAHRA 2012 Minimum Standards: Palaeontological Component of Heritage Impact Assessments (see www.palaeontologicalsociety.co.za for qualified paleontologists). Should the project be highly disturbed, the palaeontologist may draft a Letter of Recommendation for Exemption for further studies to be completed. Any other heritage resources as defined in section 3 of the NHRA that may be impacted, such as maritime archaeology, built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewscapes must also be assessed. The Final Scoping Report, Draft EIA and appendices must be submitted to the SAHRIS Case application so that an informed comment can be issued.	
Jacoline Mans – Chief Forester – Department of Agriculture Forestry and Fisheries	Via email 16 July 2018 Comment on Scoping Report	X	1. The proposed East waste rock dump (WRD) extension area is approximately 13 ha and the proposed West WRD extension area is approximately 142 ha (including access roads), thus a total anticipated footprint of approximately	Your comment is noted.

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
			155 ha in Kathu Bushveld vegetation type. The draft Scoping Report confirmed that the habitat is considered to be in a good condition, and is populated by a high number of the protected tree species *Vachellia erioloba* and *Vachellia haematoxylon*. The Department would like to point out that cumulative impacts on protected trees will be assessed and once a certain threshold is exceeded, the DAFF may request a biodiversity offset.	
		X	2. A Forest Act License NCU 6530516 was granted in 2016, permitting the felling of 1858 *V. erioloba* and 91 *V. haematoxylon* to clear 11.4 ha. The license contained a special condition regarding implementation of a greening project whereby three trees must be planted for every protected tree destroyed under the license. The compliance report was due on 23 May 2018, but is still outstanding. Tshipi Mine should note that the Department will not process any new license applications until the previous license conditions were complied with to the satisfaction of this office and the report submitted.	Your comment is noted. Your correspondence has been submitted to the Tshipi Safety Health and Environmental Manager for his attention and action.
		X	3. The clearing of 11 ha resulted in the loss of almost 2 000 protected trees, therefore clearing of an additional 142 ha may have significant impacts on protected trees. It is important to	Your comment is noted. A specialist biodiversity assessment will be included as part of the EIR. The ToR for the specialist assessment is included in section 7.4.5.

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
			provide an accurate estimation of number and sizes of protected tree species that will be destroyed in the 155 ha proposed development footprint.	
		X	4. Please note that trees with bird nests may not be damaged or disturbed without a valid Fauna Permit from the provincial Department of Environment and Nature Conservation (DENC) under the Northern Cape Nature Conservation Act, Act 9 of 2009 (NCNCA), if affected.	Your comment is noted.
		X	5. The Draft Scoping Report mentioned the construction of a 2.5 km long 11kv overhead powerline along the Portion 8 boundary onto the existing mining right area, with 22 m wide servitude. Page 19 of the report stated that "this strip will be cleared of all trees and bushes…" Kindly note the DAFF has specific guidelines for clearing of protected trees under powerlines. The guidelines were developed in consultation with Eskom and only permits clearing of protected trees directly under and up to 4 meters away on either sides of the outer lines. The whole servitude of 22 meters may not be cleared of protected trees.	Your comment is noted and this management measure will be included in the EMP.
		X	6. The proposed development footprint must be overlaid on the Northern Cape Critical Biodiversity Area (CBA) map and the map must be supplied to the DAFF	Your comment is noted. Refer to the ToR for the biodiversity specialist assessment included in section 7.4.5. The required map will be included in the EIA

I&AP DETAILS	DATE AND MODE OF COMMUNICATION		ISSUE RAISED	RESPONSE (as amended for the purposes of the scoping report)
			and DENC. Impacts on Critical Biodiversity Areas and Ecological Support Areas must be avoided.	report.
		X	7. The report mentioned a number of provincially protected plant species present on site. Some can be rescued and relocated under a Flora Permit, for example *Boophone disticha.* Therefore, prior to disturbance of plant species a suitable qualified botanist must do a search and rescue of plants of conservation concern and where possible relocate such plant.	Your comment is noted and this management measure will be included in the EMP.
		X	8. If a specialist fauna and flora impact assessment is conducted as part of the EIR, please forward a copy thereof to the Forestry Office in Upington.	A biodiversity specialist assessment will be included as part of the EIR. The ToR for the specialist assessment is included in section 7.4.5. A copy of the report will be submitted as requested.

X = indicates I&AP's that were consulted

6.4 ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PROJECT AND ALTERNATIVES

The baseline information is aimed at providing the reader with a perspective on the existing status of the biophysical, cultural and socio-economic environment. More detailed information will be provided in the EIA report once the specialist reports have been concluded.

6.4.1 Type of environment affected by the proposed activity

6.4.1.1 Geology

INTRODUCTION AND LINK TO IMPACT

Geology and associated structural features provide a basis from which to understand:

- The potential for sterilisation of mineral reserves;
- The geochemistry and related potential for the pollution of water from mineralised waste facilities and stockpiles (tailings dam and waste rock dumps); and
- The potential for geological lineaments such as faults and dykes. Faults, dykes and other lineaments can act as preferential flow paths of groundwater which can influence both the dispersion of potential pollution plumes and the inflow of water into mine workings.

Geological processes also influence soils forms (see Section 6.4.1.4) and the potential for palaeontological resources (see Section 6.4.1.12).

DATA SOURCES

Information in this section was sourced from the groundwater study undertaken for the 2017 EMPr amendment project (SLR, July 2017) and the geochemical analysis completed for the approved EMPr (SLR, October 2017).

Regional and local geological data collection was undertaken through review of available literature (SLR, July 2017) and the approved EMPr (SLR, October 2017).

Geochemical analysis was undertaken to determine the potential for acid mine drainage and the potential leachate from mineralised waste (waste rock and tailings) and ore that is stockpiled on surface at the Tshipi Borwa Mine. Samples of different lithologies were taken from the open pit for the geochemical analysis of waste rock material. Tailings material is currently not generated at the mine and as such a tailings sample was generated at the laboratory at the mine (SLR, March 2014). Although the proposed activities do not relate to tailings generation or disposal, the results are included for the purpose of completeness.

DESCRIPTION

Regional geology

The world's largest land based sedimentary manganese deposit is contained in the Kalahari Manganese Field, situated 47 km northwest of Kuruman in the Northern Cape. The general stratigraphic column of the Kalahari Manganese field is included in Table 6-2 below (SLR, July 2017). The Kalahari Manganese Field comprises five erosional, or structurally preserved, relics of the manganese bearing Hotazel Formation of the Paleoproterozoic Transvaal Supergroup. These include the Mamatwan-Wessels deposit (also known as the main Kalahari Basin), the Avontuur and Leinster deposits, and the Hotazel and Langdon Annex/Devon deposits. The Tshipi Borwa Mine is located in the Hotazel Formation (Transvaal Supergroup) towards the southern end of the Kalahari Basin (Metago, May 2009). Three beds of manganese ore are interbedded with the Banded Iron Formation (BIF) of the Hotazel Formation

(Transvaal Supergroup). The BIF of the Hotazel Formation typically consists of repeated thin layers of black iron oxides (magnetite or hematite) alternating with bands of iron-poor shales and cherts.

TABLE 6-2: GENERAL STRATIGRAPHIC COLUMN FOR THE KALAHARI MANGANESE FIELD (SLR, JULY 2017)

Supergroup / Group / Subgroup / Formation				Geological Description
Kalahari Group				Kalahari sands, calcrete, clays & gravel beds
Kalahari unconformity				
Karoo Supergroup				Dwyka tillite
Dwyka unconformity				
Olifantshoek Supergroup			Lucknow Formation	White ortho-quartzite
			Mapedi Formation	Green, maroon and black shales and quartzites
Olifantshoek unconformity				
Transvaal Supergroup	Postmasburg Group	Voelwater Subgroup	Mooidraai Formation	Dolomite, chert
			Hotazel Formation	Banded ironstone (upper)
				Upper Mn Ore Body
				Banded ironstone (middle)
				Middle manganese body
				Banded ironstone (middle)
				Lower manganese body
				Banded ironstone (lower)
		Ongeluk Formation		Andesitic Lava

Local and operational geology

The Hotazel Formation is underlain by basaltic lava of the Ongeluk Formation (Transvaal Supergroup) and directly overlain by dolomite of the Mooidraai Formation (Transvaal Supergroup) as shown in Table 6-2 (SLR, July 2017).

The Transvaal Supergroup is overlain unconformably by the Olifantshoek Supergroup which consists of arenaceous sediments, typically interbedded shale, quartzite and lavas overlain by coarser quartzite and shale. The different formations at the Tshipi Borwa Mine include the Mapedi and Lucknow units. The whole Supergroup has been deformed into a succession with an east-verging dip.

The Olifantshoek Supergroup is overlain by Dwyka Formation which forms the basal part of the Karoo Supergroup. At the Tshipi Borwa Mine this consists of tillite (diamictite) which is covered by sands, claystone and calcrete of the Kalahari Group (SLR, July 2017).

Tshipi is exploiting the manganese from the Hotazel Formation which consists of Banded Iron Formation (BIF). The ore is contained within a 30 to 45 metre thick mineralised zone which occurs along the entire Tshipi Borwa Mine and is made up of three manganese rich zones; the Upper Manganese Ore Body (UMO), the Middle Manganese Ore Body (MMO) and the Lower Manganese Ore Body (LMO) (Table 6-2). The UMO is 10cm to 15cm-thick and comprises moderate deposits of manganese. The poorly mineralised MMO is approximately 1m-thick and not economically efficient. The LMO is highly mineralised and makes up the bulk of the ore body. The ore layer dips gradually to the north-west at approximately five degrees (SLR, July 2017).

Faults and dykes

No significant faults, fractures or other lineaments have been identified on site (Metago, May 2009).

Geochemistry analysis – Acid base accounting (ABA)

Acid base accounting (ABA) is undertaken to determine the potential for mined material to generate acid mine drainage. A total of twenty-three samples were analysed to determine if waste rock, ore and tailings are likely to generate acid mine drainage. The results are presented in Table 6-3 below.

The Acid Base Accounting (ABA) results (Table 6-3) show that the total sulphur content and more importantly the sulphide sulphur content of all samples are below the laboratory detection limit of <0.01% which suggests the potential to generated acid is negligible for waste rock, ore and tailings. In addition, the neutralising potential ratio (NPR) of all samples is above 2, with some significantly above 2, which implies all lithologies have sufficient neutralising potential to offset the low acid potential. This is interpreted to be due to carbonate minerals, as suggested by the generally high inorganic carbon in the samples and the carbonate-rich geology (calcretes, dolomites, etc.) (SLR, March 2014).

TABLE 6-3: ACID BASE ACCOUNTING RESULTS FOR THE TSHIPI BORWA MINE (SLR, MARCH 2014)

Sample ID	Lab ID	Lithology	Elevation (mamsl)	Location	Paste pH	Acid Potential (AP) (kg/t)	Neutralization Potential (NP)	Nett Neutralization Potential (NNP)	Neutralising Potential Ratio (NPR) (NP : AP)	NAG pH: (H_2O_2)	NAG (kg H_2SO_4 / t)	Total Sulphur (%)	Sulphate Sulphur as S (%)	Sulphide Sulphur (%)	Total Carbon (%)	Organic Carbon (%)	Inorganic Carbon (%)
SLR-TB-01	11220	Braunie Lutite	1021.922	East Side	8	0.313	280	280	897	8.4	<0.01	<0.01	<0.01	<0.01	5.6	0.172	5.428
SLR-TB-02	11221	Upper BIF	1020.801	East Side	8.5	0.313	66	66	213	8.3	<0.01	<0.01	<0.01	<0.01	0.86	0.208	0.652
SLR-TB-03	11222	Lower BIF	1018.252	East Side	8.4	0.313	13	13	41	8.8	<0.01	<0.01	<0.01	<0.01	0.148	0.13	0.018
SLR-TB-04	11223	Lower BIF - red in colour	1018.919	East Side	8.4	0.313	130	130	417	8.5	<0.01	<0.01	<0.01	<0.01	4.09	0.202	3.888
SLR-TB-05	11224	VW Ore Zone	1015.028	East Side	8.6	0.313	167	167	535	8.4	<0.01	<0.01	<0.01	<0.01	6.7	0.17	6.53
SLR-TB-06	11225	Top Cut Ore	1013.186	East Side	8.8	0.313	146	145	466	8.4	<0.01	<0.01	<0.01	<0.01	6.91	0.118	6.792
SLR-TB-07	11226	Lower Ore body	1010.049	East Side	8.5	0.313	122	121	389	8.4	<0.01	<0.01	<0.01	<0.01	7.33	0.231	7.099
SLR-TB-08	11227	Pebble bed in calcareous clay	1026.990	North Side	8.3	0.313	4.26	3.95	14	8.2	<0.01	<0.01	<0.01	<0.01	0.07	0.069	0.001
SLR-TB-09	11228	Pebble bed in red calcareous clay	1030.217	North Side	8.5	0.313	323	323	1034	8.3	<0.01	<0.01	<0.01	<0.01	7.8	0.258	7.542
SLR-TB-10	11229	Red clay	1031.184	North Side	8.2	0.313	51	51	163	8.8	<0.01	<0.01	<0.01	<0.01	3.34	0.257	3.083
SLR-TB-11	11230	Lower BIF	1012.341	North Side	8.7	0.313	100	100	322	8.5	<0.01	<0.01	<0.01	<0.01	3.38	0.119	3.261
SLR-TB-12	11231	Red clay	1030.098	South Side	8.2	0.313	74	73	236	8.8	<0.01	<0.01	<0.01	<0.01	1.28	0.247	1.033
SLR-TB-13	11232	White Clay	1052.157	South Side	8.1	0.313	5	4.69	16	7.7	<0.01	<0.01	<0.01	<0.01	0.335	0.331	0.004
SLR-TB-14	11233	White gravel bed	1054.877	South Side	8.6	0.313	5.75	5.43	18	7.8	<0.01	<0.01	<0.01	<0.01	0.278	0.273	0.005
SLR-TB-15	11234	Red Iron Calcareous Sand	1066.225	South Side	8.3	0.313	110	109	351	8.5	<0.01	<0.01	<0.01	<0.01	2.5	0.361	2.139
SLR-TB-16	11235	Pebbly Calcrete	1067.984	South Side	8.5	0.313	79	79	254	8.4	<0.01	<0.01	<0.01	<0.01	2.01	0.203	1.807
SLR-TB-17	11236	Iron rich Ccalcareous Sands	1067.131	South Side	8.4	0.313	106	106	339	8.5	<0.01	<0.01	<0.01	<0.01	2.76	0.272	2.488
SLR-TB-18	11237	Pebbly Calcrete	1072.483	South Side	8.5	0.313	106	105	338	8.5	<0.01	<0.01	<0.01	<0.01	5.41	0.275	5.135
SLR-TB-19	11238	Red Kalaharl Sands	1088.848	East Side	8.1	0.313	2.73	2.41	8.72	7.7	<0.01	<0.01	<0.01	<0.01	0.26	0.255	0.005
SLR-TB-20	11239	Calcrete	1081.302	East Side	8.5	0.313	146	146	467	8.5	<0.01	<0.01	<0.01	<0.01	4.48	0.356	4.124
SLR-TB-21	11240	Pebbly Calcrete	1075.395	-	8.7	0.313	113	113	361	8.3	<0.01	<0.01	<0.01	<0.01	3.32	0.314	3.006
SLR-TB-22	11241	Tailings Sample	-	-	8.4	0.313	101	100	322	8.4	<0.01	<0.01	<0.01	<0.01	11.5	0.203	11.3
SLR-TB-23	11242	Dolomite	998.00	-	8.7	0.313	115	114	367	8.4	<0.01	<0.01	<0.01	<0.01	11.48	0.148	11.33

Geochemistry analysis – leachate

Synthetic Precipitation Leaching Procedure (SPLP) was used to determine the potential drainage quality from the sampled lithologies at the Tshipi Borwa Mine at neutral (pH7) drainage conditions. A total of twenty-three samples were analysed. The results are provided in Table 6-4 below. The results indicated that a number of metals are leachable at concentrations in excess of relevant water quality standards for waste rock, ore and tailing. These include:

- Aluminium (Al) in terms of the SANS 241 (2105) Operational standards for waste rock;
- Iron (Fe) in terms of the SANS 241 (2015) Aesthetic standards for ore;
- Manganese (Mn) in terms of the SANS 241 (2015) Aesthetic standards for ore and waste rock; and
- Electrical conductivity in terms of SANS 241 (2015) Aesthetic for tailings.

TABLE 6-4: LEACHATE RESULTS FOR SAMPLES COLLECTED AT THE TSHIPI BORWA MINE (SLR, MARCH 2014)

Lithology	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
SANS 241 (2015) Operational	N/A	0.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SANS 241 (2015) Aesthetic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.3	N/A	N/A	N/A	0.1	N/A	200	N/A
SANS 241 (2015) Acute Heath	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SANS 241 (2015) Chronic Health	N/A	N/A	0.01	2.4	0.7	N/A	N/A	N/A	0.003	0.5	0.05	2	2	N/A	N/A	N/A	0.4	N/A	N/A	0.07
Braunie Lutite	<0.025	<0.100	<0.010	0.04	<0.025	<0.025	<0.025	14	0.005	<0.025	<0.025	<0.025	<0.025	1.1	<0.025	10	<0.025	<0.025	13	<0.025
Upper BIF	<0.025	<0.100	0.01	<0.025	<0.025	<0.025	<0.025	12	0.005	<0.025	<0.025	<0.025	0.031	<1.0	<0.025	6	<0.025	<0.025	3	<0.025
Lower BIF	<0.025	<0.100	<0.010	0.06	0.072	<0.025	<0.025	10	0.005	<0.025	<0.025	<0.025	0.478	<1.0	<0.025	<2	0.128	<0.025	3	<0.025
Lower BIF - red in colour	<0.025	<0.100	<0.010	<0.025	<0.025	<0.025	<0.025	14	0.005	<0.025	<0.025	<0.025	<0.025	<1.0	<0.025	7	<0.025	<0.025	9	<0.025
VW Ore Zone	<0.025	<0.100	<0.010	0.087	0.079	<0.025	<0.025	9	0.005	<0.025	<0.025	<0.025	<0.025	<1.0	<0.025	6	<0.025	<0.025	7	<0.025
Top Cut Ore	<0.025	<0.100	<0.010	0.05	<0.025	<0.025	<0.025	9	0.005	<0.025	<0.025	<0.025	<0.025	<1.0	<0.025	8	0.119	<0.025	<2	<0.025
Lower Ore body	<0.025	<0.100	<0.010	0.102	<0.025	<0.025	<0.025	10	0.005	<0.025	<0.025	<0.025	<0.025	<1.0	<0.025	8	0.09	<0.025	3	<0.025
Pebble bed in calcareous clay	<0.025	<0.100	<0.010	0.082	0.105	<0.025	<0.025	6	0.005	<0.025	<0.025	<0.025	<0.025	1.3	<0.025	4	<0.025	<0.025	10	<0.025
Pebble bed in red calcareous clay	<0.025	<0.100	<0.010	0.074	0.139	<0.025	<0.025	13	0.005	<0.025	<0.025	<0.025	<0.025	1	<0.025	6	<0.025	<0.025	8	<0.025
Red clay	<0.025	<0.100	0.019	0.12	0.134	<0.025	<0.025	10	0.005	<0.025	<0.025	<0.025	<0.025	1.4	<0.025	6	<0.025	<0.025	14	<0.025
Lower BIF	<0.025	<0.100	0.023	0.074	0.096	<0.025	<0.025	10	0.005	<0.025	<0.025	<0.025	<0.025	<1.0	<0.025	8	<0.025	<0.025	2	<0.025
Red clay	<0.025	<0.100	<0.010	0.073	<0.025	<0.025	<0.025	11	0.005	<0.025	<0.025	<0.025	0.041	1.3	<0.025	6	<0.025	<0.025	12	<0.025
White Clay	<0.025	<0.100	<0.010	<0.025	<0.025	<0.025	<0.025	5	0.005	<0.025	<0.025	<0.025	0.045	1.8	<0.025	3	<0.025	<0.025	9	<0.025
White gravel bed	<0.025	<0.100	<0.010	0.064	0.173	<0.025	<0.025	7	0.005	<0.025	<0.025	<0.025	0.037	1.3	<0.025	4	<0.025	<0.025	7	<0.025
Red Iron Calcareous Sand	<0.025	<0.100	<0.010	<0.025	<0.025	<0.025	<0.025	11	0.005	<0.025	<0.025	<0.025	0.038	1.6	<0.025	6	<0.025	<0.025	9	<0.025
Pebbly Calcrete	<0.025	<0.100	<0.010	<0.025	0.042	<0.025	<0.025	12	0.005	<0.025	<0.025	<0.025	0.069	1.8	<0.025	7	<0.025	<0.025	9	<0.025
Iron rich Calcareous Sands	<0.025	<0.100	0.013	0.146	1.21	<0.025	<0.025	12	0.005	<0.025	<0.025	<0.025	<0.025	1.4	<0.025	6	<0.025	<0.025	14	<0.025
Pebbly Calcrete	<0.025	<0.100	0.012	0.107	1.06	<0.025	<0.025	11	0.005	<0.025	<0.025	<0.025	<0.025	1.3	<0.025	7	<0.025	<0.025	13	<0.025
Red Kalahari Sands	<0.025	1.72	0.022	0.053	0.027	<0.025	<0.025	5	0.005	<0.025	<0.025	<0.025	1.51	4.1	<0.025	3	<0.025	<0.025	2	<0.025
Calcrete	<0.025	<0.100	<0.010	<0.025	<0.025	<0.025	<0.025	14	0.005	<0.025	<0.025	<0.025	<0.025	3	<0.025	8	<0.025	<0.025	42	<0.025
Pebbly Calcrete	<0.025	0.147	<0.010	<0.025	0.028	<0.025	<0.025	10	0.005	<0.025	<0.025	<0.025	0.196	1.9	<0.025	5	<0.025	<0.025	19	<0.025
Tailings Sample	<0.025	<0.100	<0.010	0.126	<0.025	<0.025	<0.025	21	0.005	<0.025	<0.025	<0.025	<0.025	1.1	<0.025	14	<0.025	<0.025	10	<0.025
Dolomite	<0.025	<0.100	0.014	0.129	1.07	<0.025	<0.025	10	0.005	<0.025	<0.025	<0.025	<0.025	<1.0	<0.025	17	<0.025	<0.025	4	<0.025

Lithology	P	Pb	Sb	Se	Si	Sn	Sr	Ti	V	W	Zn	Zr	pH Value at 25˚C	Electrical Conductivity	Alkalinity as $CaCO_3$	Chloride as Cl	Sulphate as SO_4	Nitrate as N	Fluoride as F
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	pH Value	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l
SANS 241 (2015) Operational	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5 - 9.7	N/A	N/A	N/A	N/A	N/A	N/A
SANS 241 (2015) Aesthetic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	N/A	N/A	170	N/A	300	250	N/A	N/A
SANS 241 (2015) Acute Heath	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	500	11	N/A
SANS 241 (2015) Chronic Health	N/A	0.01	0.02	0.04	N/A	N/A	N/A	N/A	0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.5
Braunie Lutite	<0.025	0.02	<0.010	<0.020	6	<0.025	0.029	<0.025	<0.025	<0.025	<0.025	<0.025	10.1	21.1	12	12	7	2	0.3
Upper BIF	<0.025	0.02	<0.010	<0.020	17.2	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	8	11.7	16	<5	<5	<0.2	0.2
Lower BIF	<0.025	0.02	<0.010	<0.020	15.4	<0.025	<0.025	<0.025	<0.025	<0.025	0.098	<0.025	7.9	7.7	12	<5	<5	<0.2	0.2
Lower BIF - red in colour	<0.025	0.02	<0.010	<0.020	6.6	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	8.1	17.1	20	<5	5	1	0.3
VW Ore Zone	<0.025	0.02	<0.010	<0.020	3.1	<0.025	<0.025	<0.025	<0.025	<0.025	0.07	<0.025	8.1	12.7	60	<5	<5	0.3	0.5
Top Cut Ore	<0.025	0.02	<0.010	<0.020	<0.2	<0.025	0.026	<0.025	<0.025	<0.025	<0.025	<0.025	8.2	11.8	64	<5	<5	<0.2	0.2
Lower Ore body	<0.025	0.02	<0.010	<0.020	<0.2	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	8.1	12.5	60	<5	<5	<0.2	0.2
Pebble bed in calcareous clay	<0.025	0.02	<0.010	<0.020	4.7	<0.025	0.042	<0.025	<0.025	<0.025	0.102	<0.025	7.9	11.7	52	<5	<5	<0.2	0.5
Pebble bed in red calcareous clay	<0.025	0.02	<0.010	<0.020	3.6	<0.025	0.06	<0.025	<0.025	<0.025	0.06	<0.025	8.4	14.7	64	<5	<5	0.3	0.5
Red clay	0.072	0.02	<0.010	<0.020	1.3	<0.025	0.065	<0.025	<0.025	<0.025	0.061	<0.025	8.2	16.8	80	<5	6	0.4	0.7
Lower BIF	0.124	0.02	<0.010	<0.020	0.7	<0.025	0.026	<0.025	<0.025	<0.025	0.041	<0.025	8.5	13.6	56	<5	<5	<0.2	0.7
Red clay	<0.025	0.02	<0.010	<0.020	0.7	<0.025	0.061	<0.025	<0.025	<0.025	<0.025	<0.025	8.1	16.7	68	<5	6	0.5	0.9
White Clay	<0.025	0.02	<0.010	<0.020	10.8	<0.025	0.027	<0.025	0.027	<0.025	<0.025	<0.025	7.8	10.9	32	<5	6	1.6	0.8
White gravel bed	<0.025	0.02	<0.010	<0.020	9	<0.025	0.049	0.042	<0.025	<0.025	0.116	<0.025	7.8	11	52	<5	5	1.2	0.3
Red Iron Calcareous Sand	<0.025	0.02	<0.010	<0.020	19.2	<0.025	0.062	<0.025	0.029	<0.025	<0.025	<0.025	9	15.1	64	<5	<5	2.4	0.5
Pebbly Calcrete	<0.025	0.02	<0.010	<0.020	13.9	<0.025	0.076	<0.025	<0.025	<0.025	<0.025	<0.025	8	12.7	68	5	<5	3.4	0.5
Iron rich Calcareous Sands	<0.025	0.02	<0.010	<0.020	19.9	<0.025	0.083	<0.025	<0.025	<0.025	0.211	<0.025	8.2	15.8	72	<5	<5	2.1	0.6
Pebbly Calcrete	<0.025	0.02	<0.010	<0.020	14.8	<0.025	0.081	<0.025	<0.025	<0.025	0.127	<0.025	8.2	16.3	68	<5	<5	2.8	0.5
Red Kalahari Sands	0.207	0.02	<0.010	<0.020	21	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	7.7	6.5	40	<5	11	0.5	0.2
Calcrete	<0.025	0.02	<0.010	<0.020	12.4	<0.025	0.08	<0.025	<0.025	<0.025	<0.025	<0.025	8.1	24.9	60	26	26	18	0.4
Pebbly Calcrete	<0.025	0.02	<0.010	<0.020	11.3	<0.025	0.049	<0.025	<0.025	<0.025	<0.025	<0.025	8.2	24.9	68	6	<5	5.6	0.4
Tailings Sample	<0.025	0.02	<0.010	<0.020	4.1	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	8.3	172	92	<5	33	2	0.4
Dolomite	<0.025	0.02	<0.010	<0.020	<0.2	<0.025	0.03	<0.025	<0.025	<0.025	0.039	<0.025	8.9	0.7	96	<5	<5	<0.2	0.4

CONCLUSION

Where mineralized waste is produced by a project, there is the possibility that sterilization can occur depending on the project design and placement of infrastructure. Geochemical tests and analysis indicate that there is a limited possibility for waste rock dump to generate acid. Leachate could exceed the SANS guidelines for various parameters for waste rock, and this presents a potential pollution risk for both surface and groundwater in the both the short and long term. It follows that short and long term pollution prevention measures must be considered with respect to the establishment of the proposed WRD extensions.

6.4.1.2 Topography

INTRODUCTION AND LINK TO IMPACT

The establishment of the proposed WRD extensions will alter the natural topography of the project area. This in turn may impact on surface water drainage (discussed in section 6.4.1.6), visual aspects (discussed in section 6.4.1.10).

DATA SOURCES

Information in this section was sourced from site visits undertaken by the project team and topographical data.

DESCRIPTION

In general the area surrounding the Tshipi Borwa Mine is relatively flat with a gentle slope towards the north-west. The elevation varies from 1 087 m to 1 107 m above mean sea level (mamsl). The Vlermuisleegte River is located approximately 2 km west from the Tshipi Borwa Mine boundary. The natural topography of the area surrounding the Tshipi Borwa Mine has been influenced largely through mining activities such as the Mamatwan Mine, the old Middelplaats Mine and the United Manganese of Kalahari Mine (see section 6.4.1 for further information). The highest topographical features near the Tshipi Borwa Mine are the Mamatwan waste rock dumps located adjacent to the eastern boundary of the Tshipi Borwa Mine (Figure 0-2).

The majority of the natural topography at the Tshipi Borwa Mine has been disturbed as a result of the existing mining infrastructure and activities. The topography of the undisturbed areas of the Portion 8 WRD is relatively flat with a slight north-west slope towards the Vlermuisleegte River (Figure 0-2).

CONCLUSION

While the topography of the Tshipi Borwa Mine has been altered by infrastructural changes that have already taken place, the establishment of the proposed WRD extension has the potential to alter the topography and the natural state of undisturbed areas.

6.4.1.3 Climate

INTRODUCTION AND LINK TO IMPACT

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

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

DATA SOURCES

Information in this section was sourced from the review of the approved EMPr (SLR, October 2017), the review of available literature undertaken for nearby mining operations (Airshed, September 2015) and the updated stormwater management plan undertaken for the 2017 EMPr amendment project (SLR, June 2017).

DESCRIPTION

Regional climate

The project area falls within the Northern Steppe Climatic Zone, as defined by the South African Weather Bureau (Metago, May 2009). This is a semi-arid region characterised by seasonal rainfall, hot temperatures in summer, and colder temperatures in winter (SLR, June 2017).

Rainfall, rainfall depths and evaporation

Monthly rainfall and evaporation data for the Milner weather station is summarised in Table 6-5 below (SLR, June 2017). Rainfall depth frequency data is summarised in Table 6-6 below.

With reference to Table 6-5 below, the average rainfall at the Milner weather station is 372 mm per annum. Given that the Milner weather station is only 7 km from the project area, similar rainfall levels can be expected at the mine. With reference to Table 6-5 the average evaporation rates recorded at the Milner weather station are 2351 mm per annum for S-Pan and 1972 mm per annum for open water.

TABLE 6-5: SUMMARY OF AVERAGE MONTHLY AND ANNUAL RAINFALL AND EVAPORATION DATA (SLR, JUNE 2017)

Month	Rainfall (mm)	WR2005	WR2005
	Milner (393083 W)	S-Pan Evaporation	Open Water Evaporation
January	59.8	276.9	232.6
February	63.0	209.9	184.8
March	72.3	193.3	170.1
April	39.9	144.1	126.8
May	19.2	114.7	99.8
June	9.1	91.0	77.3
July	1.3	106.0	88.0
August	5.4	153.8	124.5
September	6.4	213.0	172.5
October	19.2	269.7	218.4
November	31.5	248.0	232.9
December	44.5	294.6	244.5
Annual	**372.0**	**2351.0**	**1972.0**

TABLE 6-6: RAINFALL DEPTH FREQUENCY (SLR, JUNE 2017)

Storm Duration (m/h/d)	Return Period (years)						
	2	5	10	20	50	100	200
15 m	15.0	21.3	25.7	30.2	36.3	41.2	46.2
30 m	19.8	28.1	34.0	40.0	48.0	54.4	61.1
45 m	23.3	33.1	40.1	47.1	56.6	64.1	71.9
1 hr	26.1	37.2	45.0	52.8	63.5	72.0	80.7

Storm Duration (m/h/d)	Return Period (years)						
	2	5	10	20	50	100	200
1.5 hr	30.8	43.8	53.0	62.2	74.8	84.7	95.1
2 hr	34.6	49.2	59.5	69.9	84.0	95.2	106.8
4 hr	40.0	56.9	68.8	80.7	97.0	110.0	123.4
6 hr	43.5	61.9	74.9	87.9	105.6	119.7	134.3
8 hr	46.2	65.7	79.5	93.3	112.1	127.1	142.6
10 hr	48.4	68.8	83.3	97.8	117.5	133.1	149.4
12 hr	50.3	71.5	86.5	101.5	122.0	138.3	155.2
16 hr	53.4	75.9	91.9	107.8	129.6	146.9	164.8
20 hr	55.9	79.6	96.2	113.0	135.8	153.9	172.6
24 hr	58.1	82.6	100.0	117.3	141.0	159.8	179.3
1 d	46.7	66.5	80.5	94.5	113.5	128.6	144.3
2 d	56.8	80.8	97.7	114.7	137.9	156.2	175.3
3 d	63.6	90.5	109.5	128.5	154.4	175.0	196.3
4 d	68.2	97.1	117.4	137.8	165.7	187.7	210.6
5 d	72.0	102.5	124.0	145.5	174.9	198.2	222.4
6 d	75.3	107.2	129.6	152.1	182.9	207.2	232.5
7 d	78.2	111.3	134.6	158.0	189.9	215.1	241.4

Temperature

Monthly mean, maximum and minimum temperatures for the project area are provided in Table 6-7 below. Temperatures range between -0.6 C and 35 C. During the day, temperatures increase to reach a maximum at around 15:00 in the afternoon. Ambient air temperature decreases to reach a minimum at around 06:00 just before sunrise (Airshed, September 2015).

TABLE 6-7: MONTHLY TEMPERATURE DATA (AIRSHED, SEPTEMBER 2015)

Months	Minimum	Maximum	Average
January	15.3	35.0	26.4
February	14.1	34.1	25.8
March	10.1	32.5	24.5
April	4.4	29.9	18.7
May	2.4	26.9	15.4
June	-0.6	22.3	10.8
July	1.0	21.7	11.4
August	0.4	28.3	13.1
September	2.1	27.8	16.8
October	6.7	32.3	20.5
November	8.8	34.7	23.3
December	11.9	35.0	25.2

Wind

The average annual, day time and night time wind roses are shown in Figure 6-1, while the seasonal variations are shown in Figure 6-2. Wind direction within the mining area is dominated by winds from the north, northeast and east, with an average wind speed of 3.4 m/s. The strongest winds (more than 6

m/s) are from the east and northeast and occurred mostly during the day (06:00 to 18:00). On average calm conditions occurred 8.55 % of the time. A distinct increase in winds from the south occurred at night (18:00 to 06:00).

Wind direction and speed at the Tshipi Borwa Mine shows considerable differences between the seasons. During summer, autumn and winter the dominant winds are from the east, northeast and south, while in spring, the southerly winds dominate (Airshed, September 2015).

CONCLUSION

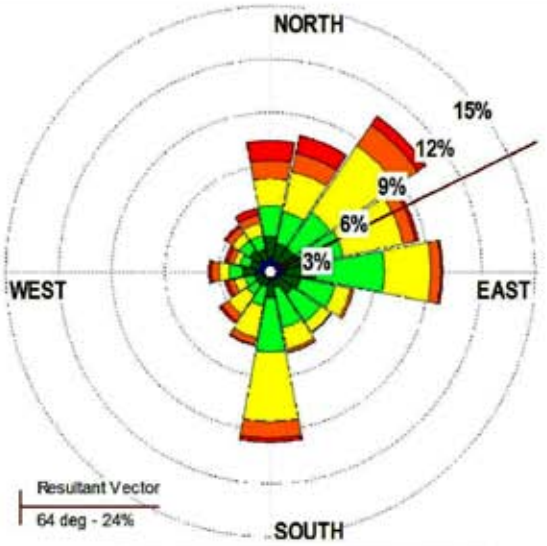
The project area is characterised by hot to very hot summers and cool to warm winters with rain generally occurring in the form of localised thunderstorms that last for short periods at a time during rainy periods (October to April). High evaporation rates reduce infiltration, while rainfall events can increase the erosion potential and the formation of erosion gullies. The presence of vegetation does, however, reduce the effects of erosion. The mixing of layers resulting in the formation of temperature inversions, and the presence of cloud cover limits the dispersion of pollutants. Wind significantly affects the amount of material that is suspended from exposed surface and wind speed determines the distance of downward transport as well as the rate of dilution of pollutants in the atmosphere. Although wind speeds above 5.3m/s do occur, the data shows that on average they are below this value and therefore not able to carry dust particles. These climatic aspects need to be taken into consideration during operations, rehabilitation and surface water management planning.

Period, Day-time and Night-time Wind Roses

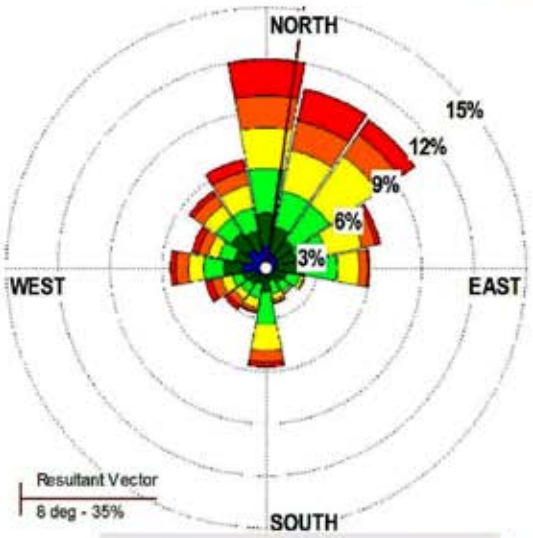
Hotazel MM5 Data for the period 2011 to 2013

Wind speed categories (m/s)

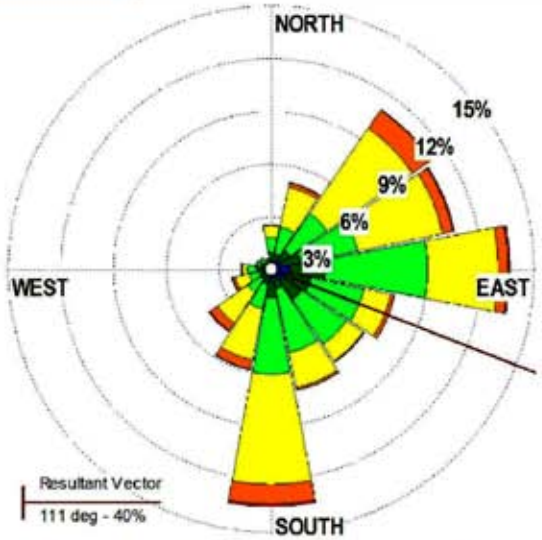
- >= 10.0
- 6.0 - 10.0
- 5.0 - 6.0
- 4.0 - 5.0
- 3.0 - 4.0
- 2.0 - 3.0
- 1.0 - 2.0



Period (8.55% calms)



Day-time (11.16% calms)



Night-time (5.97% calms)

PERIOD WIND FIELD AND DIURNAL VARIABILITY IN THE WIND ROSES (AIRSHED, September 2015)

06/2017

710.20029 00008

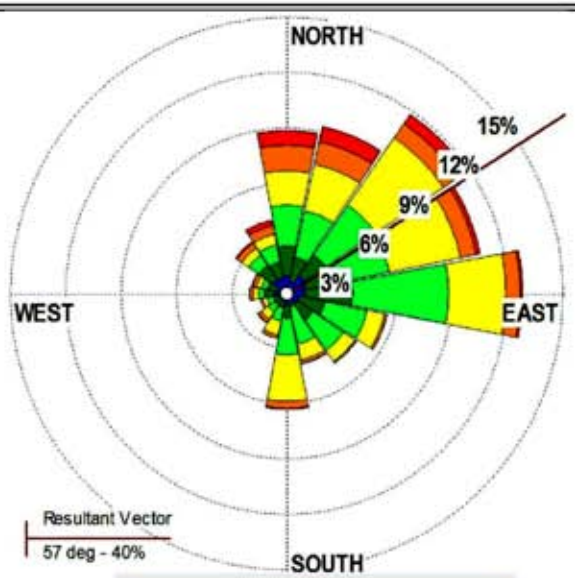
Figure 6-1

Seasonal Wind Roses

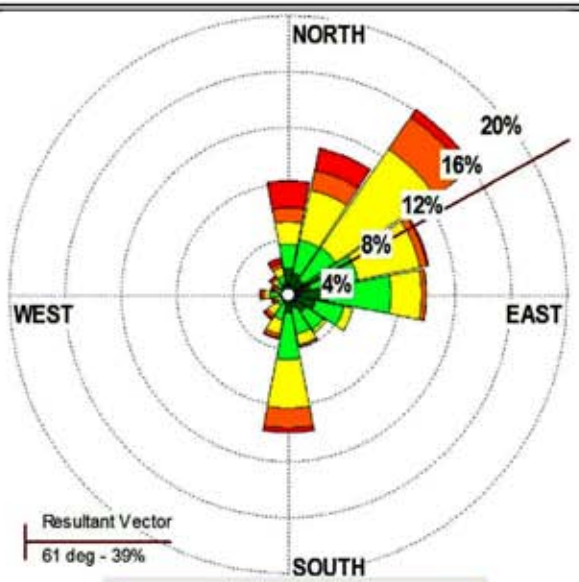
Hotazel MM5 Data for the period 2011 to 2013

Wind speed categories (m/s)

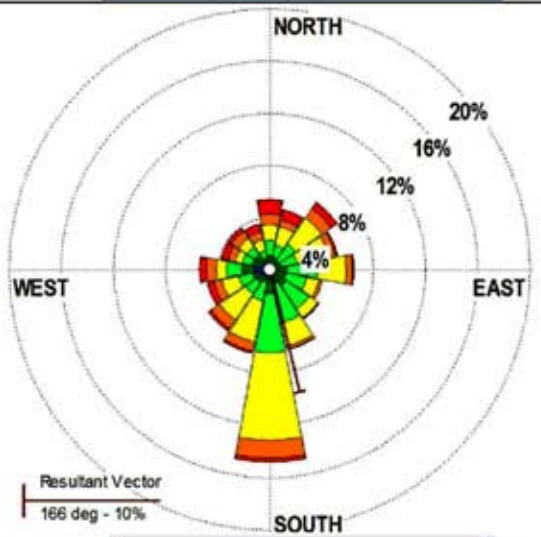
- >= 10.0
- 6.0 - 10.0
- 5.0 - 6.0
- 4.0 - 5.0
- 3.0 - 4.0
- 2.0 - 3.0
- 1.0 - 2.0



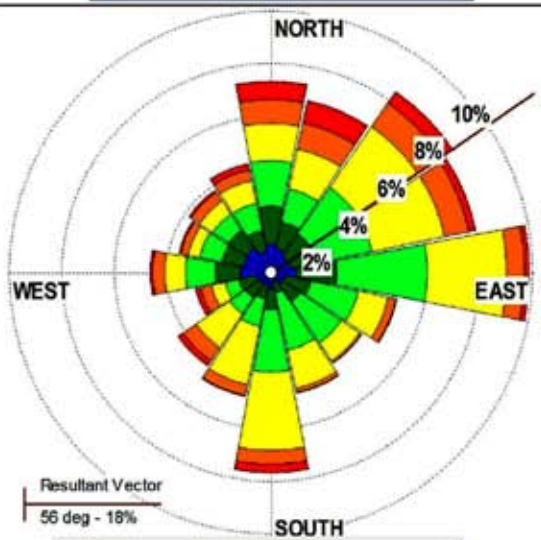
Autumn (8.57% calms)



Winter (8.11% calms)



Spring (7.72% calms)



Summer (9.83% calms)

SEASONAL WIND ROSES (AIRSHED, September 2015)

06/2017

710.20029.00008

Figure 6-2

6.4.1.4 Soil and land capability

INTRODUCTION AND LINK TO IMPACT

Soils are a significant component of most ecosystems. As an ecological driver, soil is the medium in which most vegetation grows and a range of vertebrates and invertebrates exist. In the context of mining operations, soil is even more significant if one considers that mining is a temporary land use where after rehabilitation (using soil) is the key to re-establishing post closure land capability that will support post closure land uses.

Mining projects have the potential to damage soil resources through physical loss of soil and/or the contamination of soils, thereby impacting on the soils' ability to sustain natural vegetation and altering land capability. Contamination of soils may in turn contribute to the contamination of surface and groundwater resources. Loss of the topsoil resource reduces chances of successful rehabilitation and restoration.

DATA SOURCES

Information in this section was sourced from the soil, land use and land capability study undertaken by Terra Africa Consult (Terra Africa, November 2017) as part of the project.

DESCRIPTION

Soil form and physical characteristics

The entire area for the proposed WRD extensions consists of the Hutton soil form which comprises the following physical characteristics (Terra Africa, 2017):

- A homogeneous texture, structure, and soil depth;
- A reddish brown apedal (structure-less) sandy topsoil on yellowish red apedal sandy subsoil;
- A low clay content; and
- It consists of deep (>1.5m) sand without any signs of wetness.

Soil of the Hutton form is highly suitable for stripping and stockpiling for rehabilitation purposes for they are deep and apedal with no horizon differentiation within the sub-surface and no complex pedohydrological systems of water storage depending on the arrangement of soil horizons.

Soil chemical characteristics

The cation levels (calcium, magnesium and potassium) indicate natural low soil fertility in the area as a result of the low cation exchange capacity. The pH levels of soil in the project area range between 4.74 (strongly acidic) and 6.21 (slightly acidic). The phosphorus levels are as low as expected for natural veld conditions in South Africa. The organic carbon content is also very low.

Agricultural potential

Dryland agriculture potential

The Hutton soil form is highly suitable for dryland crop production but the project area receives an average of 460 mm of rain annually, the soils are very well drained and the evaporation rate is high because of high temperatures and therefore commercial crop production would be at high risk of suffering losses as a result of droughts.

Irrigated crop potential

The proposed WRD extension areas do not have any irrigation infrastructure in use. No large dams with irrigation potential have been observed in proximity to the project area. The Hutton soil form identified on the project area is suitable for irrigated crop production if irrigation water is available. Although the

establishment of irrigation infrastructure requires high initial capital investment, the site has potential for this production method should it ever become a future land use possibility.

Grazing potential
The grazing capacity of the veld for the proposed WRD extension areas is 21 to 30 hectares per large animal unit or large stock unit. The area is also suitable for small grazers and browsers such as goats or sheep although the area is most suitable for cattle production.

CONCLUSION
The Hutton soil form found in the proposed WRD extension areas are homogeneous in terms of texture, structure, and soil depth. This soil form is a well-drained sandy soil which allows for high infiltration rates and low organic content. These soils are therefore highly erodible. The rapid drainage nature of the Hutton soil form reduces the dryland production potential as well as the irrigation potential. The soil fertility is low due to a deficiency in key nutrients such as phosphorus. In general the soil form located on the project area is highly suitable for stripping and stockpiling for rehabilitation purposes.

Soil resources have already been influenced through the presence of approved infrastructure and activities at the Tshipi Borwa Mine. The establishment of and the proposed WRD extensions have the potential to contribute to additional sources of soil pollutants and increase the disturbance footprint. The soils of the project area will require appropriate management actions to prevent the loss of soil resources through pollution and erosion.

The land capability in the proposed WRD extension areas is classified as having a grazing and irrigation potential and irrigation potential with a suitable water resource. The establishment of the proposed WRD extensions have the potential to influence the land capability of undisturbed areas. Therefore, impact management and rehabilitation planning is required to achieve acceptable post rehabilitation land capabilities.

6.4.1.5 **Biodiversity**

INTRODUCTION AND LINK TO IMPACT
In the broadest sense, biodiversity provides value for ecosystem functionality, aesthetic, spiritual, cultural, and recreational reasons. The known value of biodiversity and ecosystems are:

- Soil formation and fertility maintenance;
- Primary production through photosynthesis, as the supportive foundation for all life;
- Provision of food and fuel;
- Provision of shelter and building materials;
- Regulation of water flows and water quality;
- Regulation and purification of atmospheric gases;
- Moderation of climate and weather;
- Control of pests and diseases; and
- Maintenance of genetic resources.

The establishment of infrastructure as well as certain supportive activities have the potential to result in the loss of vegetation, habitat and related ecosystem functionality through physical disturbance and/or contamination of soil and/or water resources.

As a baseline, this section provides an outline of the type of vegetation occurring on site and the status of the vegetation, highlights the occurrence of sensitive ecological environments including sensitive/ endangered species (if present) that require protection and/or additional management actions should they be disturbed.

DATA SOURCE

Information in this section was sourced from the biodiversity study conducted by Scientific Terrestrial Services (STS), undertaken for the project. This section also makes reference to the 2017 Ecological Management Services (EMS) study conducted in support of the approved EMPr (SLR, October 2017).

The following available data and mapping information was used:

- Maps, aerial photographs and digital satellite images;
- Previous studies in the project area; and
- Relevant databases included the South African National Biodiversity Institute (SANBI) Threatened Species Programme (TSP), the Northern Cape Spatial Development Framework (2012), Mucina and Rutherford (2006), National Biodiversity Assessment, Important Bird Areas in conjunction with the South African Bird Atlas Project (SABAP2), International Union for Conservation of Nature (IUCN), and Pretoria Computer Information Systems (PRECIS).

Fieldwork was conducted during May and November 2017 in order to confirm the assumptions made during analysis of the maps and to determine the ecological status of the proposed West WRD extension area. A thorough 'walk through' on foot was undertaken in order to identify the occurrence of the dominant floral species and faunal and floral habitat diversities.

All the ecological features of the project area were considered and sensitive areas were delineated with the use of a Global Positioning System (GPS). In addition, identified locations of SCC and SANBI protected species were also marked by means of GPS. A Geographic Information System (GIS) was then used to project these features onto aerial photographs and topographic maps.

RESULTS – CONSERVATION CHARACTERISTICS

Table 6-8 contains data accessed as part of the desktop assessment and indicates that the project area does not fall within any protected or priority areas. This table also describes the vegetation type, Kathu Bushveld, and the dominant species of this vegetation type.

TABLE 6-8: SUMMARY OF THE CONSERVATION CHARACTERISTICS FOR THE PROJECT AREA (STS, DECEMBER 2017)

Details of the project area in terms of Mucina & Rutherford (2006)		Description of the vegetation type(s) relevant to the project area (Mucina & Rutherford 2006)	
Biome	The project area is situated within the **Savanna Biome.**	**Vegetation Type**	Kathu Bushveld
		Climate	Summer and autumn rainfall, very dry winters
Bioregion	The project area is located within the **Eastern Kalahari Bushveld Bioregion**	**Altitude (m)**	960 - 1300
		MAP* (mm)	300
Vegetation Type	The project area is situated within the **Kathu Bushveld**	**MAT* (°C)**	18.5
		MFD* (Days)	27
Conservation details pertaining to the project area (Various databases)		**MAPE* (mm)**	2883
NBA (2011)	The project area falls within an area that is currently not protected	**MASMS* (%)**	85
		Distribution	Northern Cape Province
National Threatened Ecosystems (2011)	The project area falls within an area that is least threatened.	**Geology & Soils**	Aeolian red sand and surface calcrete, deep (>1.2m) sandu soils of Hutton and Clovelly soil forms.
NPAES (2009), SACAD (2017) and SAPAD (2017)	The project area is not located within or near any protected or conservation areas (within a 10km radius)	**Conservation**	Least threatened. Target 16%. None conserved.in statutory
IBA (2015)	Not located within or near an IBA (within 10 km)	**Vegetation & landscape features (Dominant Floral Taxa in Appendix F)**	Medium-tall tree layer with *Vachellia erioloba* in places, but mostly open and including *Boscia albitrynca* as the prominent trees. Shrub layer generally most important with for example *Acacia mellifera, Diospyros lycioides* and *Lycium hirsutum*. Grass layer variable in cover.
Mining and Biodiversity Guidelines (2013)			
According to the Mining and Biodiversity guidelines, the project area is not ranked as a priority area, nor is it located near (within 10km) an area considered to be of biodiversity importance.		**Tall Tree**	*Vachellia erioloba* (d)
		Small Trees	*Senegalia mellifera* subsp. *detinens* (d), *Vachellia. leudertzii* var. *leudertzii* (k), *Boscia albitrunca* (d), *Terminalia sericea,*
Northern Cape Critical Biodiversity Areas (2016)		**Tall Shrubs**	*Diospyros lycioides* subsp. *lycioides* (d), *Dichrostachys cinereal, Grewia flava, Gymnosporia buxifolia, Rhigozum brevispinosum*
The majority of the project area falls within an area considered to be other natural areas. According to the Technical Guidelines for CBA Maps document ONA consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017).		**Low Shrubs**	*Aptosimum decumbens, Grewia retinervis, Nolletia arenosa, Sida cordifolia, Tragia dioica,*
Northern Cape Provincial Spatial Development Framework		**Graminoids**	*Aristida meridionalis* (d), *Brachiaria nigropedata* (d), *Centropedia glauca* (d), *Eragrostis lehmanniana* (d),

Details of the project area in terms of Mucina & Rutherford (2006)	Description of the vegetation type(s) relevant to the project area (Mucina & Rutherford 2006)	
(NPSDF, 2012)		*Schmidtia pappophoroides* (d), *Stipagrostis uniplumis, Tragus berteronianus, Anthephora argentea* (k), *Megaloprotachne albescens* (k), *Panicum kalaharense* (k)
The proposed project area is situated within the Griqualand West Centre of Endemism and the within the Gamagara Corridor. The corridor focuses on the mining of iron and manganese.	**Herbs**	*Acrotome inflate, Erlangea misera, Gisekia Africana, Heliotropium cillatum, Hermbstaedtia fleckii, H. odorata, Limeum fenestratum, L. viscosum, Lotononis platycarpa, Senna italic* subsp. *arachoides, Tribulus* terrestris*, Neuradopsis bechuanensis* (k)

NBA = National Biodiversity Assessment; NPAES = National Protected Areas Expansion Strategy; SAPAD = South African Protected Areas Database; IBA = Important Bird Area; MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MFD = Mean Frost Days; MASMS – Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply), (d) = dominant species; (k) Kalahari endemic

DESCRIPTION– TERRESTRIAL HABITAT UNITS

Two habitat units have been identified within the project area (STS, December 2017) (refer to Figure 6-3):

- **Kathu Thornveld Habitat Unit:** characterised by a well-developed herbaceous layer interspersed with woody species, notably that of *Grewia flava, Vachellia erioloba* and *Vachellia haematoxylon*, which are characteristic for the region. This habitat unit encompasses much of the current mining area. A number of small mammal species, invertebrates and avifauna where observed, evident that anthropogenic activities in this habitat unit are low and have had a minimal impact on the overall habitat utilization and behavior of species. Overall, the habitat is considered to be in a good condition, and is populated by a high number of the protected tree species *Vachellia erioloba* and *Vachellia haematoxylon*, listed in the National Forest Act (1998, as amended in September 2011). Habitat integrity is deemed to be medium-high.

- **Disturbed Habitat Unit:** comprising the mining infrastructure areas, and the small pockets of vegetation remaining therein, or directly adjacent to. This habitat unit, because of the development and daily functioning of the mine, has been subjected to increased levels of dust, vegetation clearing activities, dumping of excavated material and clearing of new roads. As a result, the natural vegetation has decreased, creating an ideal environment for the proliferation of alien and invasive plant species. Although habitat degradation has occurred, there were still several *Vachellia erioloba* and *Vachellia haematoxylon*, listed in the National Forest Act (1998, as amended in September 2011) observed. Habitat integrity is deemed to be moderately low.

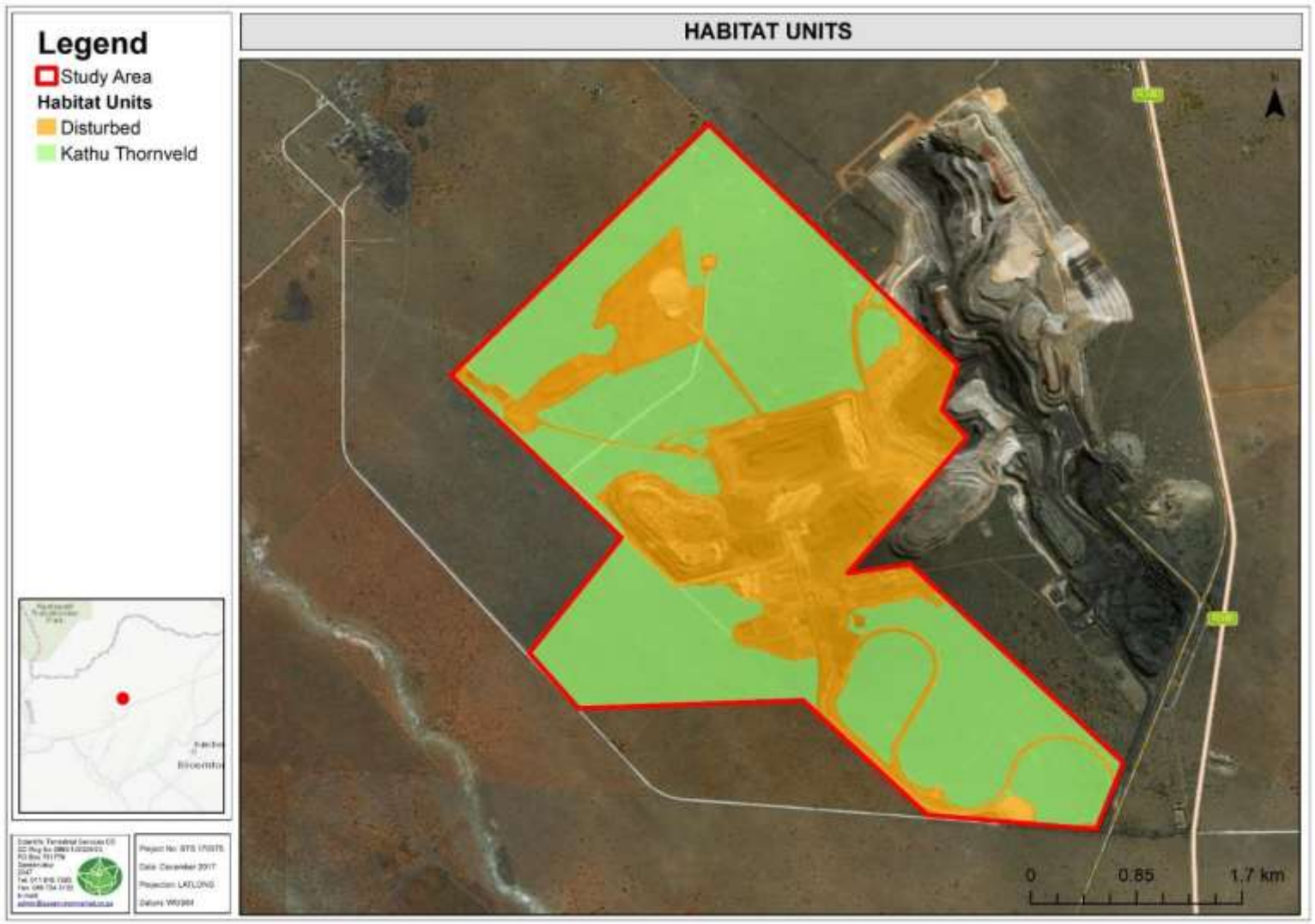


FIGURE 6-3: HABITAT TYPES (STS, DECEMBER 2017)

DESCRIPTION – FLORAL SPECIES OF CONCERN

Two floral species of concern were identified in the project area (STS, December 2017). These included the Camel Thorn (*Vachellia erioloba*) and the Grey Camel Thorn (*Vachellia haematoxylon*) which are protected under the National Forest Act (No. 84 of 1998) (NFA). The EMS report noted other species of concern that are likely to occur in the project area and these are listed in Table 6-9 below.

TABLE 6-9: FLORAL SPECIES OF CONCERN LIKELY TO OCCUR IN THE PROJECT AREA (EMS, 2008)

Species	Common Name	Legislation	Conservational status*
Vachellia erioloba	Camel Thorn	NFA	Protected
Vachellia haematoxylon	Grey Camel Thorn		Protected
Moraea longistyla	Goldblatt	NCNCA	Schedule 2
Moraea pallida	Geeltulp		Schedule 2
Babiana hypogaea	Bobbejaankalkoentjie		Schedule 2
Harpagophytum procumbens	Devil's claw		Schedule 1
Boophone Disticha	Poison bulb		Schedule 2
Brunsvigia radula	Limestone hedgehogs		Schedule 2
Orthanthera jasminiflora	Sandmelktou, Moerwortel		Schedule 2
Boscia albitrunca	Shepherd's Tree		Schedule 2
Crassula capitella	Aanteelrosie		Schedule 2
Kalanchoe brachyloba	Gelobde plakkie		Schedule 2
Ruschia griquensis	-		Schedule 2
Olea europaea	African olive		Schedule 2
Oxalis haedulipes	-		Schedule 2

* Endangered (Schedule 1), protected (schedule 2)

DESCRIPTION – ALIEN INVASIVE SPECIES

Alien invaders are plants that are of exotic origin and invade previously pristine areas or ecological niches. Alien invasive species cause a decline in species diversity, local extinction of indigenous species, ecological imbalance, decreased productivity of grazing pastures and increased agricultural costs. The dominant alien vegetation species within the project area are listed in Table 6-10.

TABLE 6-10: DOMINANT ALIEN VEGETATION SPECIES IDENTIFIED DURING THE 2017 FIELD ASSESSMENT (STS, 2017)

Scientific Name	Common Name	NEMBA Category
Prosopis glandulosa	Glandular Mesquite	2
Argemone mexicana	Yellow-flowered Mexican Poppy	1b
Achyranthes aspera	Burweed	NL
Xanthium spinosum	Spiny Cocklebur	1b
Argemone ochroleuca	White-flowered Mexican Poppy	1b
Opuntia humifusa	Large flowered prickly pear	1b
Atriplex nummularia	Old Man Salt Bush	2
Pennisetum setaceum	Fountain grass	1b

N/L = Not Listed and not categorised

*** National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations, GN R586 of 2016**

Category 1a – Invasive species that require compulsory control.

Category 1b – Invasive species that require control by means of an invasive species management programme.

Category 2 – Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.

Category 3 – Ornamentally used plants that may no longer be planted. Existing plants may remain, except within the flood line of watercourses and wetlands, as long as all reasonable steps are taken to prevent their spread (Bromilow, 2001).

DESCRIPTION – FAUNA

During field assessments, it is not always feasible to identify or observe all faunal species within an area, largely due to the secretive nature of many faunal species, possible low population numbers or varying habits of species. The faunal species listed in Table 6-11 below are considered to have an increased probability of occurring (POC) within the project area.

TABLE 6-11: FAUNAL SPECIES OF CONCERN LIKELY TO OCCUR IN THE PROJECT AREA (STS, DECEMBER 2017)

Scientific Name	Common Name	POC %
Otocyon megalotis	Bat-eared fox	70%
Vulpes chama	Cape fox	60%
Ardeotis kori	Kori Bustard	70%
Neotis ludwigii	Ludwig's Bustard	60%
Python natalensis	African Rock Python	60%
Mellivora capensis	Honey Badger	70%
Atelerix frontalis	South African Hedgehog	70%
Genus: Ceratogyrus, Harpactira and Pterinochilus	Baboon Spiders	80%

DESCRIPTION – SENSITIVITY

STS has assessed the project area to determine sensitivity in terms of the presence or potential for floral and faunal species of conservation concern, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity. The Kathu Thornveld habitat unit is considered to be of moderate to high sensitivity and the Disturbed Habitat is considered to be of moderately low sensitivity. As such the conservation objective for the Kathu Thornveld habitat is to preserve and enhance the biodiversity of the habitat unit, and limit development and disturbance, and the objective for the Disturbed Habitat is to optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects (STS, December 2017). These habitat units are mapped in Figure 6-3.

Aquifer Dependent Ecosystems (ADEs) occur throughout the South African landscape in areas where aquifer flows and discharge influence ecological patterns and processes. They are ecosystems, which require groundwater from aquifers for all or part of their life-cycle (EMS, February 2017). ADEs provide habitats for an array of species, especially in arid areas, and are considered important in ecological processes and making available resources for the biodiversity in an area that would otherwise not be available. A study conducted by David Hoare Consulting (2013) showed that Camel Thorn (*Vachellia erioloba*) trees occurred as scattered to more concentrated individuals throughout the region. However there appeared to be higher densities along the banks of the main channel of the Kuruman and Ga-Mogara Rivers in the area around Hotazel, and this could show that an ADE relationship exists between the ephemeral Rivers and the Camel Thorn *Vachellia erioloba* tree. No information is currently available on the fine scale distribution of ADEs, type of plant association, (singly, in stands or gallery forests), aquifer association, condition of vegetation etc. and therefore a precautionary approach should be taken when developing in and around these systems.

CONCLUSION

The establishment of the proposed WRD extensions has the potential to disturb and/or destroy vegetation, habitat units and related ecosystem functionality including the loss or disturbance of protected species. The proposed East WRD footprint lies within disturbed habitat with no significant

biodiversity present. The proposed West WRD extension footprint lies within the Kathu Thornveld habitat which has a moderate to high sensitivity and contains protected species.

When clearing the proposed West WRD extension footprint, the necessary permits must to be obtained from DAFF should protected trees need to be removed. Management actions need to be formulated to reduce the impacts that the proposed project may have on the Kathu Thornveld habitat.

6.4.1.6 Surface water

INTRODUCTION AND LINK TO IMPACT

Surface water resources include drainage patterns and paths of preferential flow of stormwater runoff. Mine related activities have the potential to alter the drainage of surface water through the establishment of infrastructure and/or result in the contamination of the surface water resources through seepage and/or spillage of process materials, non-mineralised (general and hazardous) and mineralised wastes.

DATA SOURCES

The information in this section was sourced from the approved EMPr (SLR, October 2017) and the updated stormwater management plan undertaken for the SLR EMPr amendment project (SLR, June 2017).

Information pertaining to catchments, mean annual run-off and water management areas was sourced from the Water Resources of South Africa Manual WR2012 (WR 2012). Information regarding the relevant rivers surrounding the mine was sourced from the review of topographical data and on-site observations.

DESCRIPTION

Catchments within the context of South Africa

The project area is located within the Lower Vaal Water Management Area. The major rivers associated with this water management area include the Molopo River, Harts River and the Vaal River which ultimately drain into the Orange River (SLR, October 2017).

Regional hydrology

The project area falls within the quaternary catchment D41K (Figure 6-4) which has a gross total catchment area of 4216 km^2, with a net mean annual run-off (MAR) of 6.53 million cubic meters (mcm) (SLR, June 2017).

The major river within quaternary catchment D41K is the Ga-Mogara drainage channel which is located approximately 6 km north-west of the Tshipi Borwa Mine (Figure 6-4). The Ga-Mogara drainage channel forms a tributary of the Kuruman River. The Kuruman River flows west joining the Molopo River approximately 250 km from the confluence of the Ga-Mogara drainage channel and Kuruman River. The Molopo River drains in a southerly direction eventually joining the Orange River (SLR, June 2017).

Local hydrology

There are no watercourses within the project area and natural drainage across the project area is via sheet flow. The nearest watercourses are the ephemeral Vlermuisleegte River (approximately 1 km west) and the ephemeral Witleegte River (approximately 10km northeast) (Figure 6-4). Both the Vlermuisleegte and the Witleegte Rivers are tributaries of the Ga-Mogara River. The catchment characteristics of the Witleegte and the Vlermuisleegte Rivers are provided in Table 6-12 below. Any natural runoff from the project area will drain in a westerly direction towards the Vlermuisleegte River.

TABLE 6-12: CATCHMENT CHARACTERISTICS

Catchment	Catchment area (km^2)	MAR (nett) (million m^3/annum)	Watercourse length (km)	Drainage density (km/km^2)
Witleegte catchment	661	0.73	70 350	106.4
Vlermuisleegte catchment	487	0.54	47 250	97

(Metago, May 2009)

The normal dry weather flow of watercourses in the region is no flow.

Surface water quality

No water sampling within the project area has been conducted because there are no permanent surface water features. Given this, no surface water quality data is available.

Surface water use

Due to the ephemeral nature of Witleegte and Vlermuisleegte Rivers, there is no third party reliance on surface water.

Floodlines

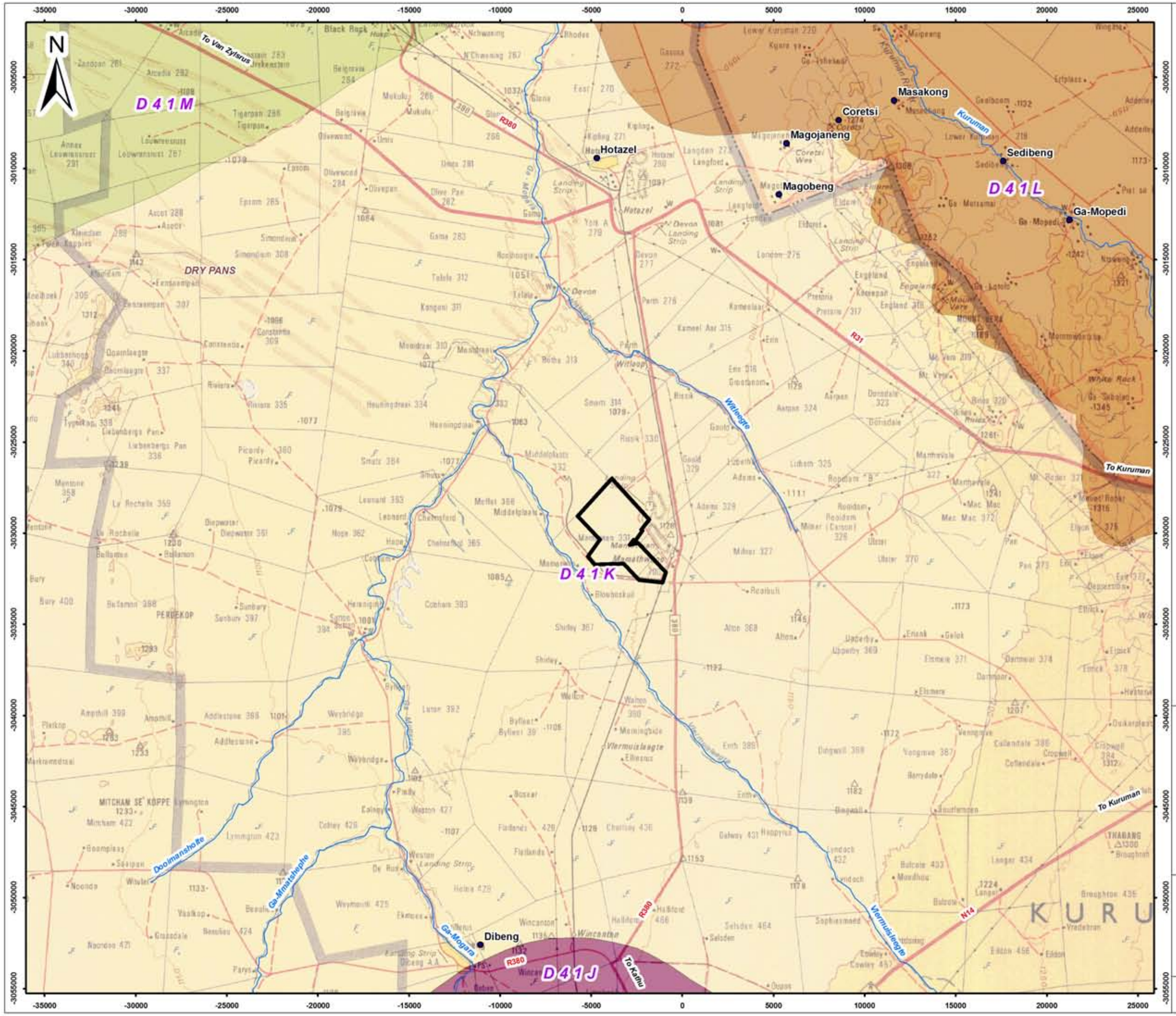
No floodlines were determined, as no watercourses are located within the project area.

Wetlands

No wetlands are located within the project area.

CONCLUSION

Infrastructural changes that have already taken place at the Tshipi Borwa Mine present sources of contaminates that present a potential for the pollution of surface water resources. Further to this, natural run-off is collected in all areas that have been designed with water diversion and water containment infrastructure as required by legislation. It follows that the natural run-off to the catchment has already been influenced by infrastructural changes that have already taken place. The continued operation of the Tshipi Borwa Mine and the establishment of the proposed WRD extensions must be managed/implemented in a way that pollution of water resources is prevented. Moreover, care is required to ensure that surface run-off patterns are disturbed as little as possible to promote the continued flow of water and nutrients



Legend

- Main Roads
- Rivers
- Project Area

Quaternary Catchments

- D41J
- D41K
- D41L
- D41M

Scale: 1:2 000 000 @ A3

Projection:Transverse Mercator
Datum: Hartebeeshoek, Lo 23

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Figure 6-4

Catchment

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6.4.1.7 Groundwater

INTRODUCTION AND LINK TO IMPACT

Groundwater is a valuable resource and is defined as water which is located beneath the ground surface in soil/rock pore spaces and in the fractures of lithological formations. Activities such as the handling and storage of waste rock have the potential to result in the loss of groundwater resources, both to the environment and third party users, through pollution.

DATA SOURCES

Information in this section was sourced from the groundwater assessment (SLR, July 2017) undertaken for the approved EMPr (SLR, October 2017) and data from the on-going groundwater monitoring programme (SLR, June 2017).

Information pertaining to aquifer characteristics was sourced from the Aquifer Classification Map of South Africa.

DESCRIPTION

Presence of groundwater

Two aquifers are present beneath the project area. This includes a shallow aquifer comprising the Kalahari sands and calcrete and a deeper fractured aquifer comprising Dwyka clay and Mooidraai dolomite formation (Metago, May 2009). The aquifers are classified as poor to minor aquifers. These can be fractured or potentially fractured rocks, which do not have a high primary permeability or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although those aquifers seldom produce large quantities of water, they are important both for local supplies and in supplying baseflow for rivers. These aquifers are moderately yielding aquifers (1-5 L/s) of acceptable quality or high yielding aquifer (5-20 L/s) of poor water quality (SLR, July 2017).

Groundwater levels and flow

Groundwater flows across the mine area in accordance with the topography in a west-north-west direction. Average groundwater levels recorded as part of the 2009 EMPr (Metago, May 2009) ranged from 20 m to 45 m below ground level. Groundwater levels are currently being monitored as part of Tshipi's on-going groundwater monitoring programme. In this regard, the groundwater levels within and around the project area range between 41 m to 74 m below groundwater level (SLR, June 2017). It follows that since the commencement of the mine, there has been a decrease in the groundwater levels.

Groundwater use

The majority of the groundwater is used to supply drinking water for cattle and in some instances supply water for domestic use.

Groundwater quality

Borehole samples collected during the hydrocensus undertaken as part of the 2009 EMPr (Metago, May 2009) were analysed and the results were compared to the South African National Standards (SANS) standard for domestic use (SANS 241:2005). The results were also classified in terms of their suitability for domestic water supplies based on the classification compiled by the Water Research Commission (WRC) together with DWAF and the Department of Health. Table 6-13 shows the various classes defined.

TABLE 6-13: WATER CLASS GUIDELINE VALUE

Class 0	Ideal water quality - suitable for lifetime use
Class 1	Good water quality - suitable for use, rare instances of negative effects
Class 2	Marginal water quality - conditionally acceptable. Negative effects may occur in some

	sensitive groups.
Class 3	Poor water quality - unsuitable for use without treatment. Chronic effects may occur.
Class 4	Dangerous water quality - totally unsuitable for use. Acute effects may occur.

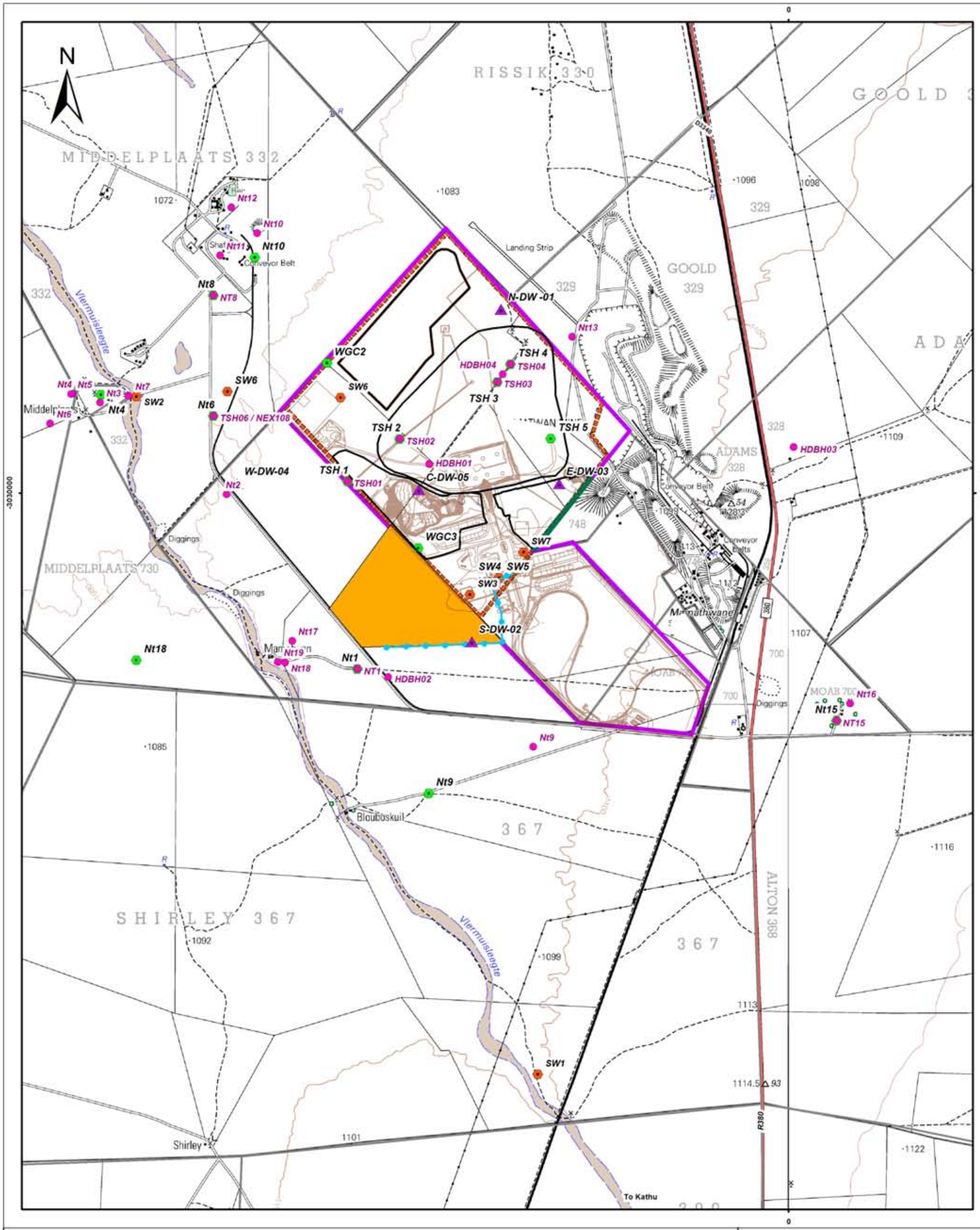
The sampling results showed that the groundwater quality in the area ranged from marginal to dangerous (DWAF classification of Class 2 and 4). This was mainly due to elevated nitrate levels (refer to Table 6-14). These trends are most probably linked to anthropogenic pollution from farming or mining activities.

TABLE 6-14:SUMMARY OF GROUNDWATER QUALITY (METAGO, MAY 2009)

Analyses in mg/l	SANS water quality guidelines for domestic use		Site Reference							
	Class 1	Class 2	Nt6	Nt8	Nt9	Nt14	Nt15	Nt17	Nt18	WGC2
pH Value at 25°C	5.0 – 9.0	4.0 – 10.0	7.3	7.7	7.9	7.5	7.0	7.4	7.2	8.2
EC in mS/m	<150	150 – 370 (7yrs)	96.6	179	82.0	101	**396**	186	243	95.6
Total Dissolved Solids at 180°C	<1000	1000 – 2400 (7 yrs.)	696	1208	420	592	**2910**	1340	1650	622
Total Alkalinity as $CaCO_3$	N/A	N/A	392	264	316	380	264	304	292	240
Nitrate as N	<10	10–20 (7 yrs.)	11	0.2	14	16	**175**	**111**	**101**	**21**
Chloride as Cl	<200	200–600(7 yrs.)	50	176	40	56	**743**	172	304	88
Sulphate as SO_4	<400	400–600 (7 yrs.)	16	481	25	47	51	52	126	45
Fluoride as F	<1.0	1 – 1.5 (1 yr.)	0.5	0.6	0.2	0.2	<0.2	0.4	0.4	0.5
Calcium as Ca	<150	150-300 (7 yrs.)	83	132	48	84	**377**	141	175	23
Magnesium as Mg	<70	70-100 (7 yrs.)	52	59	36	45	**184**	**104**	**123**	48
Sodium as Na	<200	200–400(7 yrs.)	46	152	74	45	62	85	88	100
Potassium as K	<50	50-100 (7 yrs.)	4.4	2.6	3.0	2.8	6.0	6.6	7.0	5.7
Classification of the water (the parameter listed are those responsible for the class of the water)			Nitrate	EC, TDS, SO4	Nitrate	Nitrate	Nitrate	Nitrate	Nitrate	Nitrate

Groundwater and surface water monitoring has been undertaken at the mine on a quarterly basis since 2012. When comparing results against relevant water quality standards, chemicals of concern that were identified include:

- Electrical Conductivity (EC): Concentrations in boreholes NT15 and TSH05 generally exceed the SANS 241:2015 Aesthetics limit. The baseline EC concentration measured in 2009 (Metago, May 2009) in NT15 also exceeded the SANS 241:2015 Aesthetics limit;
- Total Dissolved Solids (TDS): Concentrations in NT15 exceeded the DWAF Target Water Quality Guideline (TWQR) for Livestock Watering and SANS 241:2015 Aesthetic limit. The baseline TDS concentration (Metago, May 2009) in NT15 already exceeded both of these limits;
- Nitrate (NO_3): Concentrations in NT15 exceeded the SANS 241:2015 Acute health and the SANS and the DWAF TWQR for Livestock Watering limits. The baseline NO_3 concentration measured in 2009 (Metago) in NT15 already exceeded these limits;
- Chloride (Cl): Concentrations in NT15 exceeded the SANS 241:2015 Aesthetic limit (300 mg/L). The baseline Cl concentration measured in 2009 (Metago, May 2009) in NT15 already exceeded this limit;
- Manganese (Mn): Concentrations in NT15, NT8, TSH01, TSH02, TSH03, TSH05, TSH06 exceeded the SANS 241:2015 Chronic health limit. No baseline Mn data is available;
- Molybdenum (Mo): Concentrations in NT8 exceeded the SANS 241:2015 Aesthetic limit. NT15 and TSH06 also exceeded this limit at times. No baseline Mo information is available; and
- Lead (Pb) concentrations in TSH03, TSH01 and TSH06 exceeded the SANS 241:2015 Chronic health limit at times, while TSH01 also exceeded the DWAF TWQR for Livestock Watering limit once. No baseline Pb data is available.



Legend

- Dust Monitoring Points
- Hydrocensus Points
- Surface Water Monitoring Points
- Ground Water Monitoring Points
- Mine Infrastructure
- Proposed 11kV Power Line
- Proposed West Waste Rock Dump Extension
- Proposed East Waste Rock Dump Extension
- Surface Use Area
- Approved Mining Right Area
- Farm Boundaries

Scale: 1:60 000 @ A3
Projection: Transverse Mercator
Datum: WGS1984, Lo23

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Figure 6-5

Monitoring Points

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710.20008.00041 | May 2018

Groundwater yield

The groundwater yield is anticipated to be 2L/s.

CONCLUSION

The nature of mining infrastructure and the activities proposed are such that they present potential for pollution of groundwater resources. Baseline groundwater quality results indicate that prior to the establishment of the Tshipi Borwa Mine, groundwater quality had been influenced by anthropogenic pollution from farming and surrounding mining activities. The project must be implemented/managed in a way that pollution of groundwater resources is taken into consideration.

6.4.1.8 Air quality

INTRODUCTION AND LINK TO IMPACT

Existing sources of emissions in the region and the characterisation of existing ambient pollution concentrations is fundamental to the assessment of cumulative air impacts. A change in ambient air quality can result in a range of impacts which in turn may cause a disturbance and/or health impacts to nearby receptors. To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCES

Information in this section was sourced from the air quality study undertaken by Airshed Planning Professionals (Airshed, April 2009) as part of the 2009 EMPr (Metago, May 2009). Dust fallout monitoring data was sourced from the annual monitoring report compiled by Boletshe Trading Enterprise CC (Boletshe, March 2016).

DESCRIPTION

Ambient air quality within the region

The following regional sources of emissions were identified:

- Fugitive dust: Occur as a result of vehicle entrainment of dust from local paved and unpaved roads, wind erosion from open areas and dust generated by agricultural activities. Given that the agriculture in the area is primarily restricted to livestock and game farming, agriculture is not anticipated to contribute significantly to ambient dust rates. Vehicle entrainment from the various unpaved farm and public roads is anticipated to be a significant but localised source of dust;

- Current mining operations in the area: Particulates represent the main pollutant of concern at mining operations, whether it is underground or opencast. The amount of dust emitted by these activities depends on the physical characteristics of the material, the way in which the material is handled and the weather conditions. Current mining operations in relatively close proximity to the mining area include Kalagadi, Mamatwan, Black Rock, Gloria, Wessels, Sebilo, UMK and Kudumane (Figure 6-7);

- Biomass burning: biomass burning emissions include with carbon monoxide (CO), methane (CH_4) and nitrogen dioxide (NO_2) gases;

- Veld burning: represent significant sources of combustion-related emissions in many areas of the country;

- Rail related emissions: Emissions from diesel generated locomotives include particulates, nitrogen oxides (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO) and various volatile organic compounds including polycyclic aromatic hydrocarbons;

- Household fuel combustion: It is likely that households within the district municipality utilise coal or wood for cooking and space heating (during winter) purposes. Emissions from domestic

burning include PM10, nitrogen dioxide (NO_2), carbon dioxide (CO_2), carbon monoxide (CO), polycyclic aromatic hydrocarbons, particulate benzo(a)pyrene and formaldehyde; and

- Vehicle tailpipe emissions: Significant primary pollutants include carbon dioxide (CO_2), carbon monoxide (CO), hydrocarbons (HCs), sulphur dioxide (SO^2), oxides of nitrogen (mainly NOx), particulates. Secondary pollutants include NO^2, photochemical oxidants (ozone), sulphur acid, sulphates and nitric acid;

Emission sources associated with the Tshipi Borwa Mine

The activities associated with the Tshipi Borwa Mine that contribute to ambient air quality include:

- Diesel generators;
- Vehicle tail pipe emissions;
- Material handling such as crushing, tipping of waste rock and ore, conveying of ore, stockpiles;
- Dust generation from open pit operations (blasting and material handling);
- Vehicle activity on paved and unpaved roads;
- Wind erosion from exposed working surfaces;
- Excavations;
- Earthworks; and
- Removal of soil.

These emissions contribute towards both nuisance value, mainly in the immediate area of the source (large particle deposition) and potential increased health impacts (PM10).

Dust fallout data

Tshipi has a monthly dust fallout monitoring programme that commenced in February 2012 and consists of five directional dust buckets. Annual dust fallout monitoring results for the period January 2016 to December 2016 is provided in Table 6-15 below. Dust fallout monitoring results are compared to the industrial dust fallout limits (600<D<1200) for DW-01, DW-02 and DW-03 in accordance with the National Dust Control Regulations (NDCR). DW-04 is located outside of the Tshipi Borwa Mine and as such is monitoring results are compared to the residential dust fallout limits (< 600) in accordance with the NDCR.

Based on the results provided below, dust fallout limits for DW-01, DW-02 and DW-04 remain within the prescribed NDCR industrial and residential acceptable dust fall rates. Dust fallout for DW-03 and DW-05 exceeded the NDCR non-residential rates six times during 2016. The NDCR allows for the exceedance of the non-residential limits (600 <D< 1200) two times in a year with no sequential months. It follows that DW-03 and DW-05 are in exceedance of the alert dust fall threshold rate of 1200mg/m^2/day and the permitted frequency of the non-residential dust fall rate.

TABLE 6-15: DUST FALLOUT MONITORING DATA (BOLETSHE, MARCH 2017)

DIRECTION	MONTHS											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
DW-01 – Northern mine boundary												

DIRECTION	MONTHS											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
North	57	56	61	531.0	531.0	541.3	244.8	280.7	ND	273.3	177	72
East	140.0	55.0	9.0	428.0	428.1	168.9	178.2	63.8	ND	214.6	91.0	64.0
South	64.0	57.0	74.0	278.0	278.4	171.2	179.9	122.6	ND	167.3	380.8	ND
West	79.0	323.0	47.0	585.0	584.5	444.3	93.5	397.1	ND	380.8	111.0	74.0
DW-02 – Southern mine boundary												
North	81.0	54.0	126.0	436.0	435.7	237.0	297.7	246.9	ND	148.0	219.0	74.0
East	96.0	84.0	167.0	412.0	411.9	406.6	147.4	206.2	ND	213.4	117.0	62.0
South	73.0	99.0	88.0	421.0	421.1	317.7	428.6	295.1	ND	198.9	168.0	70.0
West	70.0	113.0	113.0	147.0	147.4	209.0	142.4	156.0	ND	177.3	191.0	70.0
DW-03 – Eastern mine boundary												
North	673.0	1964.0	879.0	2438.0	2437.7	1079.3	1632.2	5603.7	ND	423.1	370.0	91.0
East	1165.0	2028.0	370.0	1745.0	1744.8	1348.3	1308.9	5176.4	ND	483.4	175.0	168.0
South	717.0	1067.0	783.0	1696.0	1696.0	251.5	1113.2	4246.4	ND	663.9	177.0	148.0
West	592.0	982.0	1148.0	1218.0	1217.8	852.3	943.2	5535.9	ND	441.4	742.0	187.0
DW-04 – Western mine boundary												
North	37.0	51.0	62.0	349.0	349.4	185.8	134.5	160.6	ND	131.0	104.0	94.0
East	63.0	57.0	15.0	196.0	196.3	306.4	51.2	134.7	ND	69.7	78.0	56.0
South	68.0	57.0	50.0	253.0	252.7	224.5	141.5	212.8	ND	72.3	41.0	54.0
West	69.0	65.0	28.0	294.0	294.3	221.0	92.4	86.3	ND	84.2	41.0	117.0
DW-05 – Central location												
North	388	4360.0	639.0	639.0	1367.5	2960.5	1803.9	ND	ND	1863.5	ND	185.0
East	298	3264.0	522.0	1370.0	1370.2	1727.0	1343.6	ND	ND	2290.2	ND	180.0
South	469	3064.0	832.0	1118.0	1118.1	2031.5	1613.6	ND	ND	2494.8	ND	51.0
West	602	3027.0	736.0	1151.0	1151.5	2171.9	1536.5	ND	ND	2274.5	ND	109.0

* No data

The most recent dust fallout and PM10 monitoring reported by Boletsche in May 2018 showed the following (refer to Figure 6-5 for the location of the monitoring points):

Dust fallout

- All of the single dust buckets recorded a dust fall-out rate above the Non-residential Area limit value of 1200 mg/m2/day.
- Wind direction was predominantly north-noth-east.

PM10:

- Five of the six PM 10 sampling points recorded concentrations above Unacceptable Concentration Limit of 120 ug/m3.
- The highest PM10 concentration recorded was 708.33 ug/m^3 at the South dust bucket (S-DW in Figure 6-5).
- Silo sampling point (SL-SB in Figure 6-5) recorded concentrations of 625 ug/m^3
- The South, East (DW-03) and Silo sampling points showed exceedances of more than 5 in the 24 hour sampling period.

Potential air receptors

Potential receptors include the isolated residences and farmhouses on the surrounding farms, ranging between 1 and 2.5 km from the mine (refer to Figure 6-8). These are owned and/or occupied by farmers and farm workers.

CONCLUSION

Air quality within and surrounding the Tshipi Borwa Mine has already been influenced through the presence of approved infrastructure and activities. In this regard, monitoring results indicate that mining and surrounding activities and infrastructure contribute towards sources of emissions such as dust fallout that occasionally exceed relevant NAAQS and NDCR limits. The establishment of the proposed WRD extensions and associated activities presents additional sources of pollutants that may influence existing pollutant concentrations. The activities should therefore be carefully managed to ensure that contributions from the project remain within acceptable limits with associated acceptable impacts.

6.4.1.9 **Noise**

INTRODUCTION AND LINK TO IMPACT

Certain noise generating activities associated with the mine and proposed establishment of the WRD extensions could cause an increase in ambient noise levels in and around the mining area. This may cause a disturbance to nearby receptors. Land uses surrounding the mine have been described in Section 6.4.1. To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCE

Information in this section was sourced from the approved EMPr (SLR, October 2017).

DESCRIPTION

The greater area is generally defined by rural features and is not subjected to elevated noise levels. Noise in the vicinity of the project area is mainly caused by surrounding farming activities, localised traffic, train movements, and mining operations. Previously measured pre-Tshipi ambient noise levels varied from 39 dBA during the day to 33 dBA during the night. These levels are typical of ambient noise levels for rural areas as defined by SANS 10103:2008, which range between 45 dBA during the day and 35 dBA at night.

Potential noise receptors include the isolated residences and farmhouses on the surrounding farms, ranging between 1 and 2.5 km from the West WRD extension area. These are owned and/or occupied by farmers and farm workers.

CONCLUSION

The proposed WRD extensions have the potential to increase ambient noise levels within and surrounding the project area. It is however important to note that the current mining activities at the Tshipi Borwa Mine already generate noise. Potential human noise receptors include the isolated residences and farmhouses within 1 and 2.5 km of the West WRD extension area. Careful planning should therefore be taken into consideration for the project in order to minimise increasing disturbing noise levels.

6.4.1.10 **Visual aspects**

INTRODUCTION AND LINK

Mining infrastructure has the potential to alter the landscape character in the project area and surrounding area through the establishment of both temporary and permanent infrastructure. To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCE

Information in this section was sourced from on-site observations by the SLR project team and the review of relevant maps.

DESCRIPTION

Landscape character

The landscape character within the project area has been transformed due to Tshipi's current approved mining infrastructure and activities. The landscape character towards the south east, south and west of the project area is characterised by flat open areas associated with semi-arid vegetation, the ephemeral drainage line (Vlermuisleegte River), isolated farmsteads, the regional road (R380), a gravel road (D3457) and the regional powerline. The landscape character directly to the east of the project area has been extensively disturbed by existing mining operations associated with the Mamatwan Mine, the regional road (R380), a gravel road (D3457), railway line and powerline infrastructure. The landscape character to the north and north west of the project area consists of a combination of open flat areas associated with semi-arid vegetation and ephemeral drainage patterns (Witleegte River), existing mining operations (United Manganese (Pty) Ltd and the old Middelplaats mine), the regional road (R380) and powerline infrastructure.

Scenic quality

The scenic quality of the project area and surrounding area is linked to the type of landscapes that occur within an area. In this regard, scenic quality can range from high to low as follows:

- High – these include the natural features such as mountains and koppies and drainage systems;
- Moderate – these include agricultural activities, smallholdings, and recreational areas; and
- Low – these include towns, communities, roads, railway line, industries and existing mines.

The scenic quality within the project area is considered to be low due the presence of existing mining activities.

Although the area surrounding the project area has been influenced by the presence of existing mining operations, road infrastructure, powerline infrastructure and isolated residences and farmhouses, the overall scenic quality is considered to be moderate given the presence of undisturbed areas that provide open views of the natural bushveld and the Vlermuisleegte River.

Sensitivity of Visual Resource

It follows that the highest value visual resource described above is also the most sensitive to changes. In contrast, areas, which are not considered to have a high scenic value, are expected to be the least sensitive to change such as the mining and infrastructure areas.

Sense of place

The sense of place results from the combined influence of landscape diversity and distinctive features. The primary informant of these qualities is the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historic use and habitation of the area. The project area is located within a "mining belt". Surrounding existing mining operations and the infrastructure that supports these mines dominates the area to the east, north and North West of the project area. It follows that the immediate area within and surrounding the project area has a relatively weak sense of place (when the viewer is within the mining belt). However, seen in context with the site surrounded by large open spaces of arid vegetation the harsh nature of the mining activities is "softened". When the viewer views the area from outside the "mining belt", the larger area has a stronger sense of place.

Visual receptors

When viewed from the perspective of tourists and residences within the area, mining operations could be associated with a sense of disenchantment. People who benefit from the project (employees, contractors, service providers etc.) may not experience this disenchantment but rather see the mine with a sense of excitement and anticipation.

It follows that the sensitive viewer locations are located towards the west and southwest of the project area (isolated residences and farmhouses) and third parties travelling along the R380 and D3457.

CONCLUSION

When considering landscape character, scenic quality, visual resource, sense of place and visual receptors, the area to the southwest and west of the project area has a high visual value. The areas within the project area as well as areas located to the north, northwest and east of the surface use area that have been disturbed have a low visual value. This indicates that mining and infrastructure activities impact on the available visual resources and that visual resource management must be considered for the current activities at Tshipi as well as for the establishment of the proposed WRD extensions as part of the project.

6.4.1.11 **Traffic**

INTRODUCTION AND LINK

Traffic from mining developments has the potential to affect the capacity of existing road networks as well as result in noise, air quality and public road safety issues. This section provides an overview of the current road network, conditions and road use. Understanding the layout, use and conditions of transport systems relevant to the mine provides a basis for understanding a change as a result of project contributions.

DATA COLLECTION

Information was sourced from the traffic specialist study (Siyazi, June 2017) supporting the approved EMPr (SLR, October 2017).

The study comprised sourcing relevant data from a site inspection of the existing road network, consultations with the roads authorities, traffic counts, calculations and reference to relevant traffic impact assessment guideline documents.

DESCRIPTION

Existing road network

There are no public roads traversing the project area. The following public roads are however located outside of the project area:

- The provincial R30 lies to the west of the Tshipi Borwa Mine and Mamatwan Mine and proceeds in a northern direction to Hotazel (Figure 6-7);
- The D3457 lies to the south of Tshipi Borwa Mine towards Kuruman in an easterly direction. The D3457 provides access to both the Tshipi and Mamatwan mines (Figure 6-8); and
- The R31 crosses the R380 north of Tshipi Borwa Mine and provides access to the UMK and Kudumane Mine (Figure 6-7).

Existing traffic data

12-hour manual traffic counts were undertaken at the following intersections (refer to Figure 6-6 and Table 6-16):

- Point A: Intersection of R380 and R31;

- Point B: Intersection of R380 and UMK Mine access road;
- Point C: Intersection of R380 and D3457;
- Point D: Intersection of D3457 and Mamatwan Mine access road;
- Point E1: Intersection of D3457 and Tshipi Borwa Mine Access Gate 1; and
- Point E2: Intersection of D3457 and Tshipi Borwa Mine Access Gate 2.

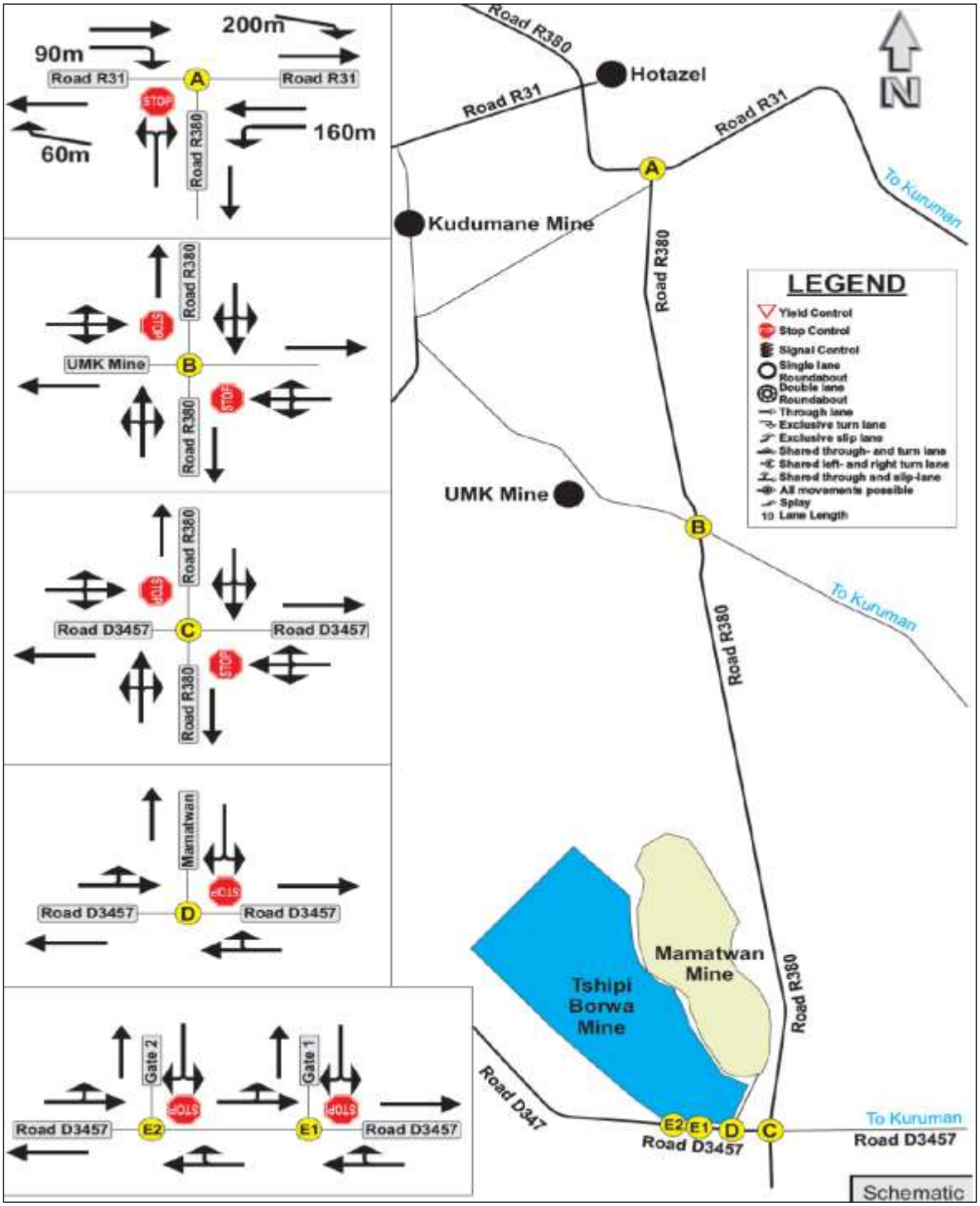


FIGURE 6-6: EXISTING ROAD NETWORK AND TRAFFIC COUNT INTERSECTIONS (SIYAZI, JUNE 2017)

TABLE 6-16: TRAFFIC COUNT INFORMATION (SIYAZI, JUNE 2017)

Point	Intersection	AM peak		PM Peak	
		Time interval	Number of vehicles	Time interval	Number of vehicles
A	R380 and R31	06h00 – 07h00	466	15h30 – 16h30	378
B	R380 and UMK Mine access road	06h15 – 07h15	133	13h15 – 14h15	142
C	R380 and D3457	06h00 – 07h00	258	13h00 – 14h00	193
D	D3457 and Mamatwan Mine access road	06h00 – 07h00	181	13h00 – 14h00	112
E1	D3457 and Tshipi Borwa Mine Access Gate 1	06h00 – 07h00	141	13h00 – 14h00	76
E2	D3457 and Tshipi Borwa Mine Access Gate 2	06h00 – 07h00	53	13h00 – 14h00	43

Based on the results of the manual traffic counts, the peak traffic hours occur between 06h00 and 07h15 in the morning, and 13h00 and 16h30 in the afternoons. The current level of service for all intersections that were investigated were considered to be operating at a good level of service. The result of this traffic study however did indicate that the intersection at the railway crossing on D3457 to the Tshipi Borwa Mine is not adequate from a road safety perspective.

CONCLUSION

The existing road network provides a fair level of service. The establishment of the proposed WRD extensions will not alter the level of service, given that the project will not result in an increase in traffic volumes as existing contractors will be used.

However, as indicated in the approved EMP (SLR, October 2017), the intersection at the D3457 and R380 to the Tshipi Borwa Mine is not adequate from a road safety perspective. As such the approved EMP includes a commitment that Tshipi will provide data to Transnet regarding the number of vehicles making use of the railway crossing on the D3457. Transnet will be requested to comment on the related safety issues and whether there is a need to upgrade this crossing. If there is a need to upgrade the crossing all relevant role players will have to work together to implement the upgrade (SLR, October 2017).

6.4.1.12 Heritage/cultural and palaeontological resources

INTRODUCTION AND LINK

This section describes the existing status of the heritage and cultural environment that may be affected by the project. Heritage (and cultural) resources include all human-made phenomena and intangible products that are the result of the human mind. Natural, technological or industrial features may also be part of heritage resources as places that have made an outstanding contribution to the cultures, traditions and lifestyles of the people or groups of people of South Africa.

Paleontological resources are fossils, the remains or traces of prehistoric life preserved in the geological (rock stratigraphic) record. They range from the well-known and well publicized (such as dinosaur and mammoth bones) to the more obscure but nevertheless scientifically important fossils (such as paleobotanical remains, trace fossils, and microfossils). Paleontological resources include the casts or impressions of ancient animals and plants, their trace remains (for example, burrows and trackways),

microfossils (for example, fossil pollen, ostracodes, and diatoms), and unmineralised remains (for example, bones of Ice Age mammals).

DATA SOURCE

Information in this section was sourced from the heritage study undertaken by Professional Graves Solutions (PGS, March 2009) as part of the 2009 EMPr (Metago, May 2009). As part of the SLR 2017 EMPr amendment project, the PGS confirmed that the results of the heritage study undertaken in March 2009 is still relevant to the mining right area. In addition to this, information was also sourced from the palaeontological study undertaken by Banzai Environmental (Pty) Ltd (Banzani, February 2017).

Information for the palaeontological study was sourced through the review of available literature (Banzani, February 2017).

DESCRIPTION

The project area is situated in an area that as a whole has a relatively low human presence due to the dryness of the region, and as such if there are human settlements they tend to be located on or near watercourses.

As part of the 2009 heritage study (PGS, March 2009), a single site of low heritage/cultural significance was identified at the Tshipi Borwa Mine. The heritage/cultural site consisted of a large scatter of calcrete excavated during historical prospecting activities. This heritage site has been destroyed due to current activities at the mine. The destruction of the low significance heritage site was in accordance with the recommendation set out in the heritage study undertaken in March 2009 (PGS, February 2017) and SAHRA classification standards. It follows that no heritage sites are located at the Tshipi Borwa Mine however the West WRD extension area will require investigation to confirm the presence of any heritage resources.

The project area is underlain by the Late Caenozoic Kalahari Formation (Cretaceous to Tertiary). No literature record could be found of fossils from the Kalahari Formation close to Hotazel. Palaeontological evidence is restricted to a few pseudo-bone structures that are preserved in the limestone. No proof of any fossil material was collected from the rest of the Kalahari Formation. The project is therefore unlikely to pose a substantial threat to local fossil heritage. In Palaeontological terms the significance is rated as low to very low.

CONCLUSION

There is a low possibility of palaeontological resources occurring in the project area. In addition to this, no heritage/cultural resources are associated with the Tshipi Borwa Mine; however the West WRD extension area will require investigation to confirm the presence of any heritage resources.

Paleontological and heritage resources are important to the history of South Africa and are protected by national legislation. It follows that in the event on any chance finds, SAHRA needs to be notified and where necessary permits need to be obtained prior to disturbance. This in particular applies to the establishment of the proposed WRD extensions as part of the project.

6.4.1.13 **Socio-economic**

INTRODUCTION AND LINK

Mining operations have the potential to result in both positive and negative socio-economic impacts. The positive impacts are usually economic in nature with mines contributing directly towards employment, procurement, skills development and taxes on a local, regional and national scale. In addition, mines indirectly contribute to economic growth in the national, local and regional economies

by strengthening the national economy and because the increase in the number of income earning people has a multiplying effect on the trade of other goods and services in other sectors.

The negative impacts can be both social and economic in nature. In this regard, mines can cause:

- Influx of people seeking job opportunities which can lead to increased pressure on basic infrastructure and services (housing, health, sanitation and education), informal settlement development, increased trespassing, increased crime, introduction of diseases and disruption to the existing social structures within communities; and

- A change to not only pre-existing land uses, but also the associated social structure and meaning associated with these land uses and way of life. This is particularly relevant in the closure phase when the economic support provided by mines ends, the natural resources that were available to the pre-mining society are reduced, and the social structure that has been transformed to deal with the threats and opportunities associated with mining finds it difficult to readapt

DATA SOURCE

Information in this section was sourced from the JMLM Integrated Development Plan of 2016 and StatsSA.

DESCRIPTION

Population

The Northern Cape Province has a population number of 1 145 861. The JTDGM has a population number of 224 797 while JMLM has a total population of 89 531 people. The Hotazel community has a total of approximately 1 755 people.

Dwellings

The most dominant type of dwelling utilized within the Northern Cape Province, the JTGDM, the JMLM and Hotazel is a formally constructed house or brick structure. This consists of 76% in the Northern Cape Province, 73% within the JTGDM, 71% within the JMLM and 82% within Hotazel. Traditional dwellings (e.g. huts/ structures made of traditional material) are the second highest used dwelling type with percentages ranging from 12% to 22% within the JTGDM and the JMLM respectively. No traditional dwellings are located within the town Hotazel, rather the second highest used dwelling type is flats. The second highest dwelling type within the Northern Cape Province is informal dwellings (e.g. shacks).

The population profile of the Northern Cape Province, JTGDM and JMLM demonstrates a consistent average household size of four people per household despite the significant decline in population numbers between the regional levels as reflected in Table 6-17 below. The local community of Hotazel has a slightly more favourable household size with an average of three members per household. These results are relatively typical of rural or semi-rural developing communities, however the low household density within Hotazel may be attributed to the fact that the town is largely a mining community established for and servicing surrounding mines.

TABLE 6-17: SOCIO ECONOMIC PROFILE - POPULATION

Category	Northern Cape Province	John Taolo Gaetsewe District Municipality	Joe Morolong Local Municipality	Hotazel
Number of households	301 405	61 330	23 707	600
Average number of people per household	4	4	4	3

Basic services

In general, despite the relatively formalized housing infrastructure, basic services infrastructure appears to be far less formalized. With reference to Table 6-18, majority of the Northern Cape Province have access to flush toilets and Hotazel primarily utilising the flush toilets, however the JTGDM and the JMLM mostly make use of pit toilets. Similarly, while in general the Northern Cape Province and Hotazel have access to piped water inside dwellings and yards, a large percentage of households rely on piped water to community stands at varying distances from their dwellings in both the JTGDM and the JMLM (Table 6-18). A total of 64% of the households in the Northern Cape Province have their waste removed by the local municipality or a private company once a week. This depicts that basic services are not provided to the whole province, with 36% of the province not receiving refuse removal services (Table 6-20). The occurrence of refuse removal by the JTGDM and JMLM constitutes only 26% and 6% of households respectively, however Hotazel is largely (96%) receiving the required services (Table 6-20).

In general, Hotazel is well formalised in terms of basic services. This may be attributed to the Hotazel area being more urbanized having been developed and supported by surrounding mines in recent years.

TABLE 6-18: SOCIO-ECONOMIC PROFILE – TOILET FACILITIES

Category	Northern Cape Province	John Taolo Gaetsewe District Municipality	Joe Morolong Local Municipality	Hotazel
None	8%	9%	10%	1%
Flush toilet (connected to sewerage system)	60%	26%	6%	97%
Flush toilet (with septic tank)	6%	3%	1%	1%
Chemical toilet	1%	1%	2%	0%
Pit toilet with ventilation (VIP)	9%	22%	40%	0%
Pit toilet without ventilation	11%	34%	37%	1%
Bucket toilet	4%	2%	2%	0%
Other	2%	2%	2%	1%

TABLE 6-19: SOCIO-ECONOMIC PROFILE– POTABLE WATER ACCESS

Category	Northern Cape Province	John Taolo Gaetsewe District Municipality	Joe Morolong Local Municipality	Hotazel
Piped (tap) water inside dwelling/institution	46%	23%	9%	89%
Piped (tap) water inside yard	32%	18%	7%	11%
Piped (tap) water on community stand: distance less than 200m from dwelling/institution	13%	35%	50%	0%
Piped (tap) water on community stand: distance between 200m and 500m from dwelling/institution	4%	13%	18%	0%
Piped (tap) water on community stand: distance between 500m and 1000m (1km) from dwelling /institution	2%	5%	5%	0%

Category	Northern Cape Province	John Taolo Gaetsewe District Municipality	Joe Morolong Local Municipality	Hotazel
Piped (tap) water on community stand: distance greater than 1000m (1km) from dwelling/institution	1%	3%	4%	0%
No access to piped (tap) water	3%	4%	8%	0%

TABLE 6-20: SOCIO-ECONOMIC PROFILE – REFUSE REMOVAL

Category	Northern Cape Province	John Taolo Gaetsewe District Municipality	Joe Morolong Local Municipality	Hotazel
Removed by local authority/private company at least once a week	64%	26%	6%	96%
Removed by local authority/private company less often	2%	1%	1%	1%
Communal refuse dump	2%	2%	1%	0%
Own refuse dump	25%	59%	80%	2%
No rubbish disposal	5%	7%	11%	1%
Other	2%	4%	1%	0%
Unspecified	0%	0%	0%	0%
Not applicable	0%	0%	0%	0%

Education

In general, statistics throughout the identified regions indicate poor educational profiles. With reference to Table 6-21, significant numbers of the population have received no schooling (9% of JTGDM, 13% of JMLM and 8% of the Northern Cape Province) or only limited primary education (35% of JTGDM, 42% of JMLM, 33% of Northern Cape Province and 22% of Hotazel). The average number across the regions profiled of people completing high school education were relatively consistent (on average 25%) however there is greater disparity when considering Grade 12 education, further education and training and tertiary education. The education profile within Hotazel is more positive in terms of the percentage of the population that have received further education and tertiary education when compared to the Northern Cape Province, the JGDM and the JMLM.

TABLE 6-21: SOCIO-ECONOMIC PROFILE – EDUCATION

Category	Northern Cape Province	John Taolo Gaetsewe District Municipality	Joe Morolong Local Municipality	Hotazel
No Schooling	8%	9%	13%	3%
Primary School	33%	35%	42%	22%
High School	28%	24%	21%	27%
Grade 12 / Std 10 / Form 5	14%	12%	7%	17%
Further Education and Training	1%	2%	0%	5%
Tertiary Education	4%	4%	2%	14%
Not applicable	12%	14%	15%	13%
Other	0%	0%	0%	0 %

Economic profile

Majority of the population within the Northern Cape, JGDM and JMLM are not economically active, while 48% of the Hotazel population is employed (Table 6-22). In general, Table 6-22 is an indication of the job scarcity of the area.

TABLE 6-22: SOCIO-ECONOMIC PROFILE – EMPLOYMENT

Category	Northern Cape Province	John Taolo Gaetsewe District Municipality	Joe Morolong Local Municipality	Hotazel
Employed	25%	19%	9%	48%
Unemployed	9%	8%	5%	5%
Discouraged work-seeker	3%	5%	7%	2%
Other not economically active	27%	29%	33%	23%
Not applicable	36%	39%	46%	23%

CONCLUSION

In general mining activities have the potential to influence socio-economic conditions both positively and negatively to which the approved mine already contributes. In the context of the approved mine, positive socio-economic influences include contributions in various ways to the local and regional economies while negative socio-economic influences include inward migration of people with the resultant pressure on basic infrastructure and services. As part of the project care should be taken to avoid influencing negative socio-economic impacts further and allowing for the continuation of the positive socio-economic conditions.

6.4.1 Current land uses

INTRODUCTION AND LINK

Mining activities have the potential to affect land uses both within the mine area and in the surrounding areas. This can be caused by physical land transformation and through direct or secondary impacts. The key related potential environmental impacts are: loss of soil, loss of biodiversity, pollution of water, dewatering, air pollution, noise pollution, damage from blasting, visual impacts and the influx of job seekers with related social ills. To understand the basis of the potential land use impacts, a baseline situational analysis is described below.

DATA SOURCE

Mining right and land ownership details were sourced from Tshipi and a deed search undertaken by SLR as part of the project. On-site and surrounding land use data was sourced from site observations, specialist studies conducted for the mine and the review of topographical maps and satellite imagery.

DESCRIPTION – MINING AND PROSPECTING RIGHTS

Tshipi holds an approved mining right (Reference number NC/30/5/1/2/2/0206MR) on a portion of portion 1 (Currently portion 16) and a portion of portion 2 (Currently portion 17) of the farm Mamatwan 331. The mining right was granted on 7th April 2010 to Ntsimbintle Mining (Pty) Ltd and transferred via a Section 11 MPRDA process to Tshipi on 17th March 2011.

Mamatwan Mining holds prospecting rights on the Remaining Extent and Portion 3 (which includes Portion 18) of the farm Mamatwan 331. Mamatwan also has a pending mining right application on Portion 20 and Portion 8 of the farm Mamatwan 331.

Samancor Hotazel Manganese Mining (Pty) Ltd holds a mining right (NC 252 MR) on portion 3 of the farm Moab 700.

DESCRIPTION - LAND OWNERS WITHIN AND SURROUNDING THE TSHIPI BORWA MINE AREA

The surface right owners and corresponding title deeds numbers of the land in and adjacent to the Tshipi Borwa Mine surface use and mining rights areas is listed in Table 6-23 and Table 6-24 respectively.

TABLE 6-23: LAND OWNERSHIP WITHIN THE TSHIPI BORWA MINE SURFACE USE AND MINING RIGHTS AREAS

Portion	Landowner	Title deed number
Mamatwan 331		
Portion 16 (Portion of portion 1)	Tshipi	T416/2014
Portion 17 (Portion of portion 2)	Tshipi	T416/2014
Portion 18 (Portion of portion 3)	Tshipi	T416/2014
Moab 700		
Remaining extent	Machiel Andries Kruger	T594/1987

TABLE 6-24: LANDOWNERS ADJACENT TO THE TSHIPI BORWA MINE SURFACE USE AND MINING RIGHTS AREAS

Portion	Landowner	Title deed number
Mamatwan 331		
Remaining extent	Andries Mathys Van Den Berg	T594/ 1987
Portion 1	Hotazel Manganese Mines (Pty) Ltd	T2426/2010
Portion 2		T2426/2010
Portion 3		T953/2009
Portion 7	Transnet	T666/1965
Portion 8	Tshipi (proposed WRD site)	T515/1992
Moab 700		
Portion 1	Transnet (Pty) Ltd	T250/1983
Portion 3	Hotazel Manganese Mines (Pty) Ltd	T953/2009
Sinterfontein 748		
Portion 0	Hotazel Manganese Mines (Pty) Ltd	T2426/2010
Middelplaats 332		
Remaining Extent	Saltrim Ranches (Pty) Ltd	T2297/2006
Portion 1	Terra Nominees (Samancor Manganese)	T2397/1996
Portion 4	Hotazel Manganese Mines (Pty) Ltd	T2426/2010
Middleplaats 184		
Whole farm	Abraham Johannes De Klerk	T1135/1965
Adams 328		
Remaining Extent	Saltrim Ranches (Pty) Ltd	T2297/2006
Portion 1	Eskom Holdings	T347/1971
Portion 2		T1162/1982
Portion 3	Transnet	T1107/1992
Portion 4	Hotazel Manganese Mines (Pty) Ltd	T338/2009
Rissik 330		

Portion	Landowner	Title deed number
Portion 0	Gideon Poolman Familie Trust	T3211/2015
Portion 1	Terra Nominees (Samancor Manganese)	T2395/1996
Portion 2	Transnet	T515/1992
Portion 3	United Manganese of Kalahari Pty Ltd	T2092/2009
Goold 329		
Portion 1	Kruger Machiel Andries	T399/1977
Portion 2	Kruger Nicolaas Philippus Fourie	T455/2010
Portion 5	Hotazel Manganese Mines (Pty) Ltd	T2426/2010
Portion 6	Gideon Poolman Familietrust	T3211/2015
Portion 8	Transnet	T515/1992
Portion 9	Hotazel Manganese Mines (Pty) Ltd	T2821/2011
Shirley 367		
Portion 0	Leatitia Penny Trust	T3464/1997
Portion 1	Annalien Elizabeth Fourie	T730/1984
Portion 2	Pretorius Hester Johannes	T718/1979
Portion 3	Transnet	T43/1993
Smartt 314		
Portion 0	Terra Nominees (Samancor Manganese)	T2396/1996
Portion 1	Transnet	T221/1966
Alton 368		
Portion 0	Booysen Jacomina Maria	T285/1979
Portion 1	Andries Matthys Duvenhage Testamentere	T905/2009
Milner 327		
Whole Farm	Kruger Machiel Andries	T26/1931

DESCRIPTION - LAND CLAIMS

According to the Department of Rural Development and Land Reform no land claims have been lodged on the farms Mamatwan 331 and Moab 700. Refer to Appendix 5 for the proof of consultation with the Department of Rural Development and Land Reform.

DESCRIPTION – LAND USE WITHIN THE PROJECT AREA

Land use within the project area includes existing mining activities and infrastructure associated with the mine within the Tshipi Borwa mining rights area. Portion 8 of Mamatwan 331 where the proposed West WRD extension will be located is fenced off therefore ad-hoc livestock grazing can no longer take place here.

Third party prospecting activities (Mamatwan Mining) and mining activities (Samancor Hotazel Manganese Mining (Pty) Ltd) within the surface use area may take place. These will be subject to separate environmental authorisation processes where required.

DESCRIPTION – LAND USE SURROUNDING THE TSHIPI BORWA MINE AREA

Land use surrounding the Tshipi Borwa Mine is a mixture of agriculture, isolated residence/ residential areas, infrastructure/servitudes and mining activities. More detail is provided below:

6.4.1.1 Agriculture

Agricultural activities currently undertaken within the areas surrounding the project area includes game farming and ad-hoc livestock grazing.

6.4.1.2 Isolated residence/ residential area

With reference to Figure 6-7, the nearest residential areas to the project area include:

- The Black Rock mining community located approximately 26 km north west of the Tshipi Borwa Mine;
- Hotazel situated approximately 18 km north of the Tshipi Borwa Mine;
- Kuruman located approximately 50 km south east of the Tshipi Borwa Mine; and
- Kathu located approximately 42 km to the south of the Tshipi Borwa Mine.

Due to the lack of available surface water resources in the area, no informal settlements are located in immediate proximity to the project area. There are sparsely situated residences and farmhouses on the surrounding farms. These are owned and/or occupied by farmers and farm workers and include:

- Farm workers residence located on the farm Middelplaats 332 located approximately 2 km north west from the mine (Figure 6-8);
- A permanent farm homestead (A. Pyper) located on the farm Middelplaats 332 approximately 2 km west of the mine (Figure 6-8);
- A permanent farm homestead (Andries van den Berg) located on the farm Mamatwan 331 approximately 1 km west of the proposed WRD site (Figure 6-7); and
- A permanent farm homestead (Nic Fourie) located on the farm Shirley 367 slightly less than 2 km south of the proposed WRD site (Figure 6-8).

6.4.1.3 Infrastructure and servitudes

A 132 kV powerline passes to the east of the site, alongside the R380 Hotazel to Kathu road (Figure 6-7). In addition, approved Eskom infrastructure will be located on the Mamatwan Portion 8 boundary, which includes a 132 kV overhead powerline, a 132/11/kV substation and an 11kV overhead line.

Eskom also wish to procure a 400 kV overhead powerline servitude along the western boundary of portion 8, from Tshipi.

The Sedibeng Vaal-Gamagara water supply pipeline supplies the Tshipi Borwa Mine with process and potable water. A pipeline connection to the Sedibeng Vaal-Gamagara reservoir is located approximately 500m east of the Tshipi Borwa Mine (Figure 6-8).

The Transnet railway line that services the mines of the Kalahari Basin, from Black Rock in the north to Mamatwan and Tshipi in the south passes to the east of Tshipi with a private siding onto the mine form where ore is loaded and despatched for export, mostly to Port Elizabeth (Figure 6-7).

6.4.1.4 Surrounding mines

Various other mining operations located in the immediate vicinity of the project area include (Figure 6-8):

- The United Manganese of Kalahari Mine (Pty) Ltd) – located approximately 2 km north east of the mine;
- The Mamatwan Mine (South 32 (Pty) Ltd) – Located directly adjacent to the eastern boundary of the mine;
- The dormant / temporarily closed Middelplaats Mine – located approximately 1.6 km north west from the mine;
- The old Adams Mine (dormant/closed) – Located within a kilometre east of the mine; and
- The Sebilo Mine (Sebilo Resources (Pty) Ltd) – Located approximately 7.6 km north from the mine.

Mining operations located further afield from the project area mine include the:

- The Gloria Mine (Assmang (Pty) Ltd) – Located approximately 20 km north from mine;
- The Kalagadi Mine (Kalagadi Manganese (Pty) Ltd) – Located approximately 18 km north west from the mine;
- The Kudumane Mine (Kudumane Manganese (Pty) Ltd) – Located approximately 12 km north from the mine;
- The old Hotazel Mine (dormant/closed) – Located approximately 15 km north east from the mine;
- The old York Mine (dormant/closed) – Located approximately 12.8 km north from the mine; and
- The old Devon mine (dormant/closed) – Located approximately 14.7 km north east from the mine.

6.4.1.5 Solar plant

The Adams Solar Plant (Adams Solar PV Project Two (Pty) Ltd) owned by Enel Green Power (Pty) Ltd is situated approximately 30 km south east from the mine and is located on the farm Adams 328. The Adams Solar Plant will aid the new renewable generation capacity of the national grid and contribute to the 42% share targeted by the Department of Energy for renewable energy (Integrated Resource Plan, 2010-2030). According to the strategy, 8.4 GW of new generation capacity in South Africa will be obtained from the Adams Solar Plant over the next twenty years.

CONCLUSION

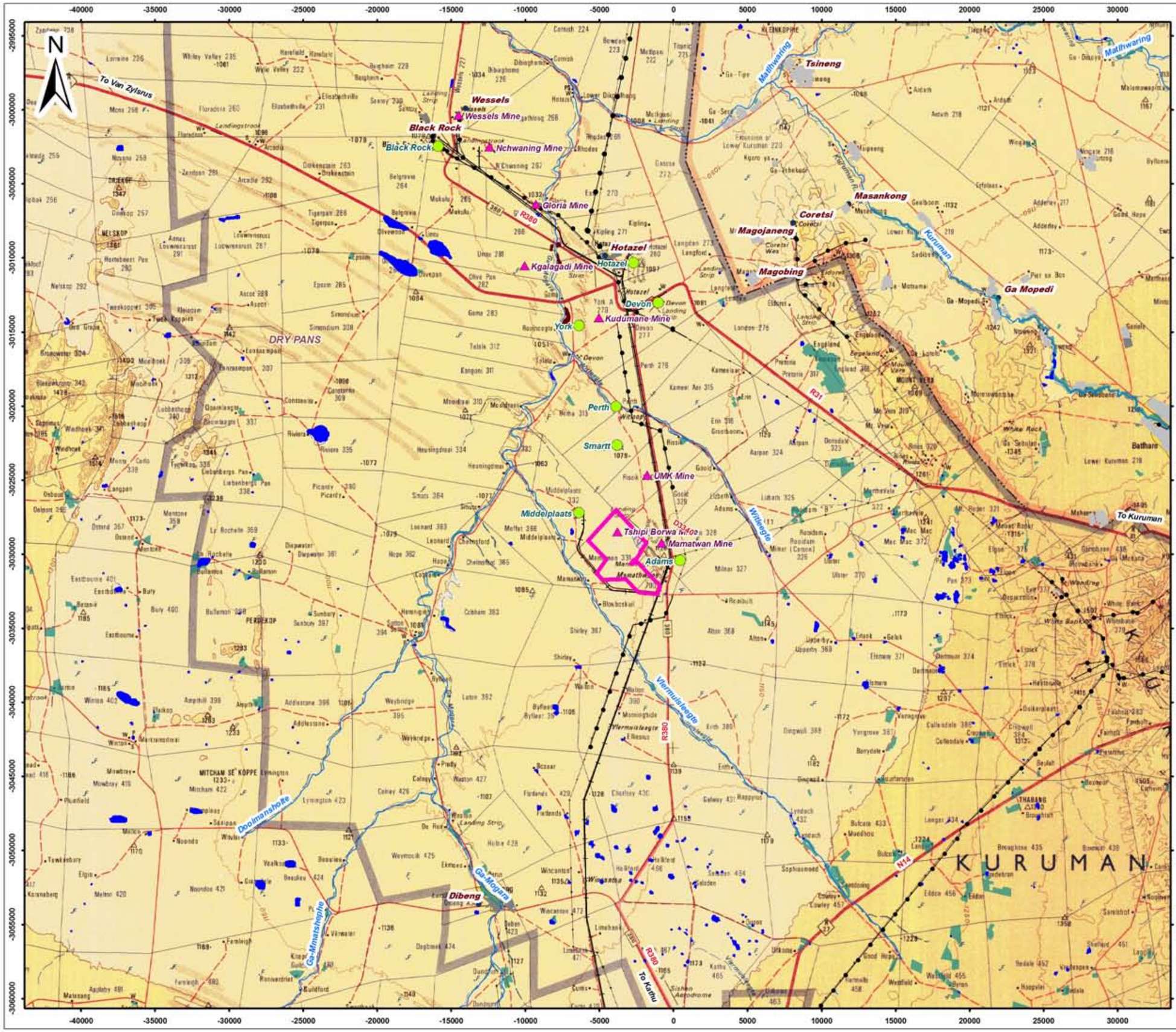
There are a number of land uses within and surrounding the project area which may be influenced by the proposed WRD extension and associated potential environmental impacts. It should however be noted that land has already been significantly influenced through mining and agricultural activities and associated infrastructure and servitudes.

6.4.2 Description of specific environmental features and infrastructure on the site

The environmental features in the project area are described in Section 6.4.1 above, however no notable features are located within the project area. Infrastructure within and close to the project area is discussed in Section 6.4.1 above. The notable infrastructure within the project area includes the railway line, the powerline and the water pipeline.

6.4.3 Environment and current land use map

A conceptual map showing topographical information as well as land uses on and immediately surrounding the project area is provided in Figure 6-7 and Figure 6-8.



Legend

- Operating Manganese Mines
- Closed/Dormant Mines
- Main Roads
- Rivers and Streams
- Railway
- Powerlline
- Project Area
- Barrier Pillar
- High Urban Density
- Low Urban Density
- Cultivated Land
- Historical Borrow Pits
- Wetlands / In-land water

0 4 8 Kilometers

Scale: 1:250 000 @ A3

Projection:Transverse Mercator
Datum: Hartebeeshoek, Lo 23

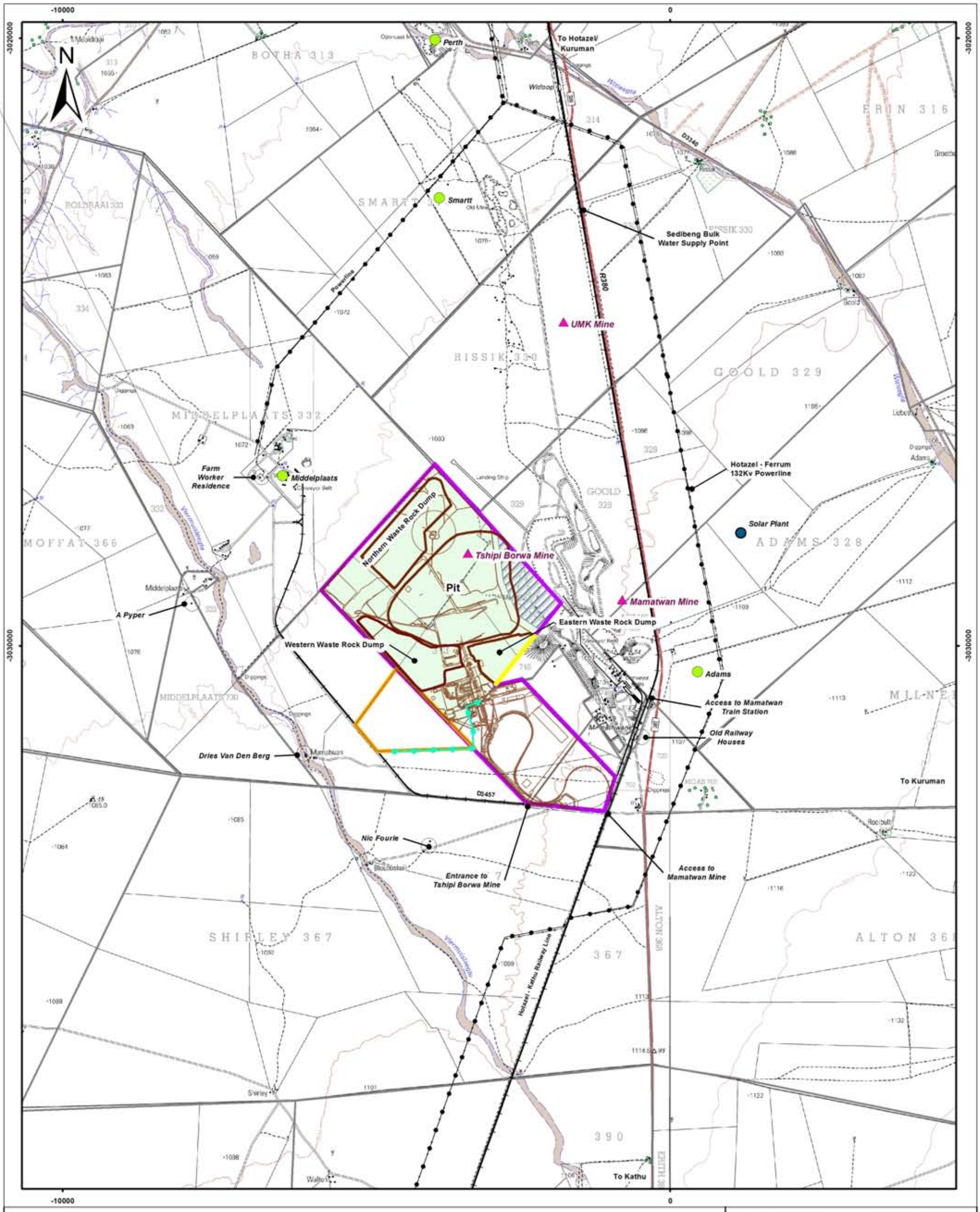
Tshipi é Ntle Manganese Mining (Pty) Ltd

Figure 6-7

Regional Land Use Map

SLR Consulting (Africa) (Pty) Ltd
P O Box 1596, Cramerview, 2060, South Africa
Tel: +27 (11) 467-0945 Fax: +27 (11) 467-0978

710.20008.00041 | 04/05/2018



Legend

- Operating Manganese Mines
- Closed/Dormant Mines
- Main Roads
- Secondary Roads
- Power Line
- Rivers and Streams
- Railway Lines
- Proposed 11kV Power Line
- Proposed West Waste Rock Dump Extension
- Proposed East Waste Rock Dump Extension
- Surface Use Area
- Approved Mining Right Area
- Barrier Pillar

0 1 000 2 000 Meters

Scale: 1:60 000 @ A3

Projection: Transverse Mercator

Datum: WGS1984, Lo23

Tshipi é Ntle Manganese Mining (Pty) Ltd

Figure 6-8

Local Land Use

SLR Consulting (Africa) (Pty) Ltd
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710.20008.00041 | 07/06/2018

6.5 ENVIRONMENTAL IMPACTS IDENTIFIED

6.5.1 Impacts identified for each alternative

This section provides a list of potential impacts on environmental and socio-economic aspects that have been identified in respect of each of the main project actions/activities and processes for each of the project phases. A discussion of each of the impacts identified is provided in Section 6.7. There are no WRD extension locations proposed.

TABLE 6-25: PRELIMINARY LIST OF POTENTIAL IMPACTS IDENTIFIED FOR THE PROPOSED PROJECT

Note: The preliminary assessment ratings provided in this table are for the unmitigated scenario only which assumes that no consideration is given to the prevention or reduction of environmental and social impacts. Furthermore, a conservative approach has been applied to these ratings in the absence of site specific studies. Once all the site specific studies have been completed the assessment and related ratings may change. Moreover, once the mitigation/management measures have been incorporated into the assessment as part of the EIR a determination of residual impact will be provided. The final ratings will be included in the EIR.

Potential impact	Activity	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact can:		
				Severity	Duration	Spatial scale			be reversed	cause irreplaceable loss of resources	be avoided/ Managed/ Mitigated
Loss and sterilization of mineral resources	Mineralised waste management	All	Operation Decommissioning	Insignificant							
Altering topography	Mineralised waste management Maintenance and aftercare	All	Construction Operation Decommissioning Closure	M	H	L	M	M	Partially	Unlikely	Can be managed/mitigated to acceptable levels
Pollution from emissions to air	Site preparation Earthworks Transport systems Mineralised waste Support services	All	Construction Operation Decommissioning	H	H	M	M	M	Fully	Possible	Can be managed/mitigated to acceptable levels

Potential impact	Activity	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact can:		
				Severity	Duration	Spatial scale			be reversed	cause irreplaceable loss of resources	be avoided/ Managed/ Mitigated
	General site management Rehabilitation Maintenance and aftercare										
Alteration of natural drainage patterns	Site preparation Earthworks Transport systems Mineralised waste management Support services Rehabilitation Maintenance and aftercare	All	Construction Operation Decommissioning Closure	L	H	M	M	M	Partially	Possible	Can be managed/mitigated to acceptable levels
Contamination of surface water resources	Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	All	Construction Operation Decommissioning Closure	M/H	H	M	M	M/H	Partially	Possible	Can be managed/mitigated to acceptable levels
Contamination of groundwater resources	Site preparation Earthworks Transport systems	All	Construction Operation Decommissioning	M/H	H	M	M	M/H	Partially	Possible	Can be managed/mitigated to

Potential impact	Activity	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact can:		
				Severity	Duration	Spatial scale			be reversed	cause irreplaceable loss of resources	be avoided/ Managed/ Mitigated
	Mineralised waste Support services General site management Rehabilitation Maintenance and aftercare		Closure								acceptable levels
Loss of soil resources and land capability through physical disturbance and pollution	Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	All	Construction Operation Decommissioning	L	H	L	M	M	Partially	Possible	Can be managed/mitigated to acceptable levels
Change in land use	Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and	All	Construction Operation Decommissioning Closure	M	H	M	H	H	Partially	Possible	Can be managed/mitigated to acceptable levels

Potential impact	Activity	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact can:		
				Severity	Duration	Spatial scale			be reversed	cause irreplaceable loss of resources	be avoided/ Managed/ Mitigated
	aftercare										
Physical destruction and general disturbance of biodiversity	Site preparation Earthworks Transport systems Mineralised waste management Non-mineralised waste management (general and hazardous) Support services General site management Rehabilitation Maintenance and aftercare	All	Construction Operation Decommissioning	L	H	M	M	M	Partially	Possible	Can be managed/mitigated to acceptable levels
Negative visual impacts	Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	All	Construction Operation Decommissioning Closure	M	H	M	M	M	Partially	Possible	Can be managed/mitigated to acceptable levels
Disturbance of roads by	Transport systems	All	Construction Operation	Insignificant							

Potential impact	Activity	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact can:		
				Severity	Duration	Spatial scale			be reversed	cause irreplaceable loss of resources	be avoided/ Managed/ Mitigated
project related traffic			Decommissioning								
Increase in disturbing noise levels	Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	All	Construction Operation Decommissioning	L	H	M	M	M	Fully	Unlikely	Can be managed/mitigated to acceptable levels
Loss of or damage to heritage and/or palaeontological resources	Site preparation Earthworks Transport systems Support services	All	Construction	M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and	All	Construction Operation Decommissioning	M^+	H	H	M	M^+	Partially	N/A	Can be managed to enhance positive impact

Potential impact	Activity	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact can:		
				Severity	Duration	Spatial scale			be reversed	cause irreplaceable loss of resources	be avoided/ Managed/ Mitigated
	aftercare										
Negative socio – economic impacts (Inward migration)	Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	All	Construction Operation Decommissioning	Insignificant							

6.6 METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

The proposed method for the assessment of environmental issues is set out in Table 6-26. This assessment methodology enables the assessment of environmental issues including: cumulative impacts, the severity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

TABLE 6-26: IMPACT ASSESSMENT METHODOLOGY APPLIED IN SCOPING

Note: Part A provides the definition for determining impact consequence (combining intensity, spatial scale and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D.

PART A: DEFINITION AND CRITERIA*		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of severity, spatial extent and duration**
Criteria for ranking of the SEVERITY of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national

PART B: DETERMINING CONSEQUENCE

SEVERITY = L

DURATION	Long term	**H**	**Medium**	**Medium**	**Medium**
	Medium term	**M**	**Low**	**Low**	**Medium**
	Short term	**L**	**Low**	**Low**	**Medium**

SEVERITY = M

DURATION	Long term	**H**	**Medium**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Low**	**Medium**	**Medium**

SEVERITY = H

DURATION	Long term	**H**	**High**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Medium**	**Medium**	**High**
			L	**M**	**H**
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/ national
			SPATIAL SCALE		
PART C: DETERMINING SIGNIFICANCE					
PROBABILITY (of exposure to impacts)	Definite/ Continuous	**H**	**Medium**	**Medium**	**High**
	Possible/ frequent	**M**	**Medium**	**Medium**	**High**
	Unlikely/ seldom	**L**	**Low**	**Low**	**Medium**
			L	**M**	**H**
			CONSEQUENCE		

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

***H = high, M= medium and L= low and + denotes a positive impact.**

6.7 POSITIVE AND NEGATIVE IMPACTS OF THE PROPOSED ACTIVITY AND ALTERNATIVES

Potential impacts that were identified during the scoping process, in consultation with IAPs, are discussed under environmental component headings in this section. These discussions should be read with the corresponding descriptions of the baseline environment in Section 6.4.1 of the scoping report.

The potential impacts associated with all the phases (construction, operations, decommissioning and closure) have been identified and described and reference has been made to the studies/investigations that are required to provide the necessary additional information. In the absence of site specific studies the assessment conclusions are conservative. It follows that the assessment provided below is a preliminary assessment which will be refined/changed in the EIR with specialist input, as appropriate.

The assessment below provides a preliminary assessment of the identified impacts.

6.7.1 Geology

ISSUE: LOSS AND STERILIZATION OF MINERAL RESOURCES

Phase/s in which impact could occur

The table below shows which project phases the impact could occur and is used in the sections below.

Construction	Operational	Decommissioning	Closure

Discussion

By the nature of mining projects the mineral resources within the natural geology is exploited for the target minerals therefore the impact on the local geology. It is also possible that mineral resources can become sterilised through the placement of surface infrastructure. These activities already take place on site as the mine is in operation; however the proposed WRD extensions present the potential for sterilisation of mineral resources. The proposed powerline and conveyor infrastructure will not sterilise mineral resources and could be moved if needed and are therefore not discussed further.

It is understood from Tshipi that the sub-outcrop of the currently economically mineralised resource is located beyond the areas where the East and West WRD extensions are planned. The prospecting programme conducted by Tshipi before construction of the mine and various geological reports confirms this. This impact has therefore been rated as insignificant.

The mine will continue to implement management measures for the overall operations as per the approved EMPr.

6.7.2 Topography

ISSUE: ALTERING TOPOGRAPHY

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

The establishment of the proposed WRD extensions will alter the natural topography of the project area. This in turn may impact on surface water drainage (discussed in section 6.4.1.6), visual aspects (discussed in section 6.4.1.10).

The majority of the natural topography at the Tshipi Borwa Mine has been disturbed as a result of the existing mining infrastructure and activities. The establishment of the proposed WRD extensions will further alter natural topography and this will be permanent as waste rock residue will likely remain on surface after closure. The proposed powerline and conveyor infrastructure will not change the topography.

The overall severity in the unmitigated scenario is expected to be moderate. The spatial scale will be limited to the project area. The significance of this impact is moderate and cannot be mitigated.

The additional work required to address this issue is described in Section 7.2 of this scoping report.

6.7.3 Air Quality

ISSUE: POLLUTION FROM EMISSIONS TO AIR

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Mining projects present a number of air pollution sources that can have a negative impact on ambient air quality and surrounding land uses in all phases. Pollution sources include land clearing activities, materials handling, wind erosion from stockpiles, wind erosion of disturbed areas, vehicle movement along unpaved roads and gas emissions mainly from vehicles and generators. These activities already

take place on site as the mine is in operation, however the establishment of the proposed WRD extensions could present additional dust generation sources. The construction of the proposed powerline and conveyor infrastructure could also generate dust.

Dust generated at these sources could have a negative impact on ambient air quality and could result in nuisance impacts as well as health impacts for nearby sensitive receptors, if unmanaged. This is a high severity in the unmitigated scenario and can be reduced with measures to control dust. Without mitigation the duration of the impact could extend beyond closure however if the WRD extensions are properly rehabilitated and re-vegetated, dust should no longer be generated at these sites. With mitigation, the duration of impact will therefore be limited to the operational phase. The spatial scale of the potential impact could extend off site in both the mitigated and unmitigated scenarios. The overall significance of this impact is expected to be moderate in the unmitigated scenario and can be reduced with mitigation.

The additional work required to address this issue is described in Section 7.4.1 of this scoping report.

6.7.4 Surface water

ISSUE: ALTERING DRAINAGE PATTERNS

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Pre-mining natural drainage across the project area is via sheet flow and the nearest watercourse is approximately 2 km away. Rainfall and surface water run-off is already collected in all areas of the mine that have been designed with water containment infrastructure as required by legislation. The proposed WRD extension will require the collection of additional stormwater. The collected run-off will therefore be lost to the catchment and can result in the alteration of drainage patterns. The proposed WRD extensions will remain in perpetuity, along with the existing WRDs and therefore this impact will be permanent. The proposed powerline and conveyor infrastructure will not impact on natural drainage.

When considering the loss of run-off to the catchment as a result of proposed WRD extensions containment infrastructure, the severity of the impact is expected to be low due to the limited size of the WRD extension footprints. The WRDs and their extensions are likely to remain in perpetuity and without proper rehabilitation of the WRDs, drainage patterns would continue to be impacted upon post-closure. With mitigation however, sheet flow run-off patterns should be largely re-established in the project area reducing the duration to medium. In the mitigated and unmitigated scenario the physical alteration of drainage patterns will extend beyond the site boundary as flow reduction impacts could extend further downstream. The significance is moderate in the unmitigated scenario as the probability of the alteration of drainage patterns is definite without mitigation. With mitigation, the re-establishment of run-off patterns as far as practically possible is expected to reduce the significance of this impact to low.

The additional work required to address this issue is described in Section 7.4.2 of this scoping report.

ISSUE: CONTAMINATION OF SURFACE WATER RESOURCES

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Mining projects generally present a number of pollution sources that can have a negative impact on surface water quality if unmanaged in all project phases. Various pollution sources exist on site as the mine is operational: fuel and lubricants, sewage, mine residue (WRDs), dirty water circuit, chemicals, non-mineralised waste (hazardous, general), and erosion of particles from exposed soils in the form of suspended solids. The proposed WRD extensions present additional potential pollution sources as runoff from the WRD extensions could contain contaminants. The construction of the proposed powerline and conveyor infrastructure could present temporary pollution sources through accidental spills and leaks.

In the unmitigated scenario the severity is expected to be moderate/high, depending on the water quality of the run-off water. This could be reduced to low with mitigation measures focussed on diverting clean water away from the proposed WRD extensions and containing contaminated water. In the unmitigated scenario pollution events can extend beyond the LOM. With mitigation, pollution events can be prevented or mitigated within the LOM. It should be noted that the nearest watercourse is 2 km away. The overall significance in the unmitigated scenario could be moderate/high and reduced to moderate/low with mitigation.

The additional work required to address this issue is described in Section 7.4.2 of this scoping report.

6.7.5 Groundwater

ISSUE: CONTAMINATION OF GROUNDWATER RESOURCES

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Mining projects generally present a number of pollution sources that can have a negative impact on groundwater quality if unmanaged in all project phases. Various pollution sources exist on site as the mine is operational: fuel and lubricants, sewage, mine residue (WRDs), dirty water circuit, chemicals, non-mineralised waste (hazardous, general). The proposed WRD extensions present additional potential pollution sources. The proposed powerline and conveyor infrastructure will not impact on groundwater.

Seepage from the WRD extensions could contain contaminants. In the unmitigated scenario the severity is expected to be moderate/high, depending on the seepage water quality. This could be reduced to low with mitigation measures focussed on managing seepage and containing contaminated run-off water. In the unmitigated scenario pollution events can extend beyond the LOM. With mitigation, pollution events can be prevented or mitigated within the LOM. Groundwater pollution could extend beyond the site boundary and affect third party water users in the unmitigated scenario. The overall significance in the unmitigated scenario could be moderate/high and reduced to moderate/low with mitigation.

The additional work required to address this issue is described in Section 7.4.3 of this scoping report.

6.7.6 Soils and Land Capability

ISSUE: LOSS OF SOIL AND LAND CAPABILITY THROUGH PHYSICAL DISTURBANCE AND POLLUTION

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Soil is the key to re-establishing post closure land capability. Soil resources can be disturbed through removal, erosion and compaction, as well as pollution during accidental spills and leaks which can result in a loss of soil functionality as an ecological driver. Existing mining activities have already disturbed soils and related land capability through the establishment of related surface infrastructure and mining activities. The proposed WRD extensions, proposed powerline and conveyor infrastructure will require the disturbance of additional soils and associated activities could present additional pollution risks.

In the unmitigated scenario the severity is low as although soils will be lost to the area of disturbance, this would be localised to the proposed infrastructure footprints and immediate surrounds. Accidental spills and leaks could result in the contamination of soils in all project phases. The loss of soil and related land capability is long term and will continue after the life of the mine. The duration of this impact can be reduced to medium with mitigation as most of the soil can be conserved and used for rehabilitation. The significance of this impact is expected to be moderate in the unmitigated scenario and can be reduced to low with mitigation.

The additional work required to address this issue is described in Section 7.4.4 of this scoping report.

6.7.7 Land Use

ISSUE: CHANGE IN LAND USE

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Current land uses within the project area include mining, and farming as the proposed West WRD extension will be established on grazing land. Surrounding land use includes existing mining operations, agriculture, infrastructure (road, rail network, powerlines, water pipeline, sewage works), solar plant and isolated farmsteads. Activities and infrastructure related to the proposed WRD extensions, powerline and conveyor infrastructure may have an impact on land uses within and surrounding the project area in all phases.

Land uses within and surrounding the project area may be affected by one or more of the following environmental and social aspects during the operational phase:

- hazardous infrastructure and excavations;
- land clearing (vegetation and soil);
- surface and groundwater quality;
- dust;
- traffic related safety impacts;
- inward migration;
- noise; and
- visual impacts.

In the unmitigated scenario the severity is moderate and can be reduced to low with mitigation that is focussed on prevention and/or controls for each environmental and social impact type. The WRDs will remain in perpetuity and therefore land use impacts will extend beyond closure. The spatial scale extends beyond the project area in both the unmitigated and mitigated scenario. The unmitigated overall significance is expected to be moderate where environmental and social impacts are uncontrolled. With mitigation this impact may be reduced to low.

The additional work required to address this issue is described in 7.4.4 of this scoping report.

6.7.8 Biodiversity

ISSUE: PHYSICAL DESTRUCTION AND GENERAL DISTURBANCE OF BIODIVERSITY

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

The placement of mining infrastructure and activities in all phases has the potential to destroy biodiversity through the physical destruction of specific biodiversity areas, of linkages between biodiversity areas and related species which are considered to be significant because of their status, and/or the role that they play in the ecosystem. Current and past mining activities have already disturbed biodiversity through the establishment of surface infrastructure and mining activities. In addition, biodiversity can be disturbed by other activities e.g. illegal removal or harming of fauna and flora species, settlement of dust on vegetation, generation of noise that may scare off vertebrates and invertebrates, road kills, general litter and starting of fires.

The existing mining activities pose these risks but the proposed WRD extensions, powerline and conveyor infrastructure pose additional disturbance risk in the project area and require the disturbance of an additional surface area.

In the unmitigated and mitigated scenarios, the severity is expected to be low because the proposed infrastructure areas have very little natural biodiversity. In the mitigated scenario, biodiversity may be partially restored during the decommissioning and closure phases with removal of linear infrastructure and proper rehabilitation of the WRDs. Biodiversity processes are not confined to the project area and as such the spatial scale will extend beyond this boundary with and without mitigation. The overall significance is expected to be moderate without mitigation and reduced to low with correct management measures, and rehabilitation as appropriate.

The additional work required to address this issue is described in Section 7.4.5 of this scoping report.

6.7.9 Visual

ISSUE: NEGATIVE VISUAL IMPACTS

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Mining infrastructure and activities have already altered the visual resource of the project area and surrounds. The proposed WRD extensions, powerline and conveyor infrastructure will result in further impact on the visual resource. The severity in the unmitigated scenario is moderate when considered in

the context of existing mining operations located north and east of the project area. The severity is unlikely to reduce with mitigation. The duration will be long term. The spatial scale will extend beyond the mine boundary in both the unmitigated and mitigated scenarios. The significance of this impact is expected to be medium in the unmitigated scenario. In the mitigated scenario the significance of the impact remains medium after closure, due to the presence of the WRDs which will remain in perpetuity.

The additional work required to address this issue is described in Section 7.2 of this scoping report.

6.7.10 Traffic

ISSUE: DISTURBANCE OF ROADS BY PROJECT RELATED TRAFFIC

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure
			N/A

Discussion

The proposed WRD extensions, powerline and conveyor infrastructure is not expected to generate additional traffic. The mine implements measures to manage traffic and road safety. Consequently the potential for increased traffic and road safety risks due to project activities is expected to be negligible.

The mine will however continue to implement traffic management measures as per the approved EMPr.

6.7.11 Noise

ISSUE: INCREASE IN DISTURBING NOISE LEVELS

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure
			N/A

Discussion

Although the current noise environment in the wider area is already compromised by the active mining operations, the proposed WRD extensions, powerline and conveyor infrastructure could present additional noise emission sources which may result in cumulative noise impacts on the closest third party receptors. The severity in the unmitigated scenario is expected to be low given that the mine already generates noise. In both the unmitigated and mitigated scenarios noise impacts will occur until the closure phase of the mine when the noise generating activities are stopped. This is a medium duration. In the unmitigated and mitigated scenarios the noise impacts could extend beyond the site boundary. The significance is medium in the unmitigated scenario and can be reduced to low with mitigation.

The additional work required to address this issue is described in Section 7.2 of this scoping report.

6.7.12 Heritage/Cultural Resources

ISSUE: LOSS OF OR DAMAGE TO HERITAGE AND/OR PALEONTOLOGICAL RESOURCES

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure
			N/A

Discussion

The establishment of the proposed WRD extensions, powerline and conveyor infrastructure has the potential to damage or destroy heritage/cultural resources, either directly or indirectly, and result in the loss of the resource for future generations, if such resources are present, particularly within the proposed West WRD extension footprint. In the unmitigated scenario the severity is medium. With mitigation measures in place that aim to minimise the disturbance of heritage/cultural sites, the severity is reduced to low. If the heritage/cultural resources are removed, damaged or destroyed the impact duration is long term. In the mitigated scenario the duration reduces to less than the project life. The spatial scale will be localised to the site boundary in both the unmitigated and mitigated scenario. The significance of the impact is medium and can be reduced to low with mitigation with a reduction on probability.

The additional work required to address this issue is described in Section 7.4.6 of this scoping report.

6.7.13 Socio-Economic Issues

ISSUE: ECONOMIC IMPACT (POSITIVE SOCIO-ECONOMIC)

The promise of further development and the very presence of the mine will result in both positive and negative socio-economic impacts.

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

The existing mine as a whole has a positive economic impact on the local, regional and national economies. Direct benefits of the mine are derived from wages and salaries, procurement and purchases of goods and services, taxes and distribution of profits. Indirect benefits through the downstream procurement of goods and services, and the increased spending power of employees. The proposed project will allow the mine to continue operating optimally and thereby continue to realize the associated positive impacts. Tshipi is already committed to measures to enhance the positive economic impact such as preferential local employment, procurement and promoting the development of small and medium enterprises. As a result the potential for increased economic benefits due to proposed project activities is expected to be negligible.

The additional work required to address this issue is described in 7.2 of this scoping report.

ISSUE: INWARD MIGRATION (NEGATIVE SOCIO-ECONOMIC)

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

The proposed project forms part of an existing approved mine and the proposed Project will not generate any significant additional employment opportunities as Tshipi will make use of existing contractors and workers on site. Mitigating factors such as the monitoring of workers' living conditions, recruitment disciplines and HIV/Aids awareness and management already exist. As a result the potential for increased social risks due to project activities is expected to be negligible.

The additional work required to address this issue is described in 7.2 of this scoping report.

6.8 THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RISK

The table below provides a list of the preliminary impacts identified by the EAP or raised by interested and affected parties, as well as the possible management and mitigation measures. The preliminary level of residual risk after management or mitigation is also estimated. This will be refined during the EIA phase with specialist input as appropriate.

TABLE 6-27: POSSIBLE MITIGATION MEASURES AND ANTICIPATED LEVEL OF RESIDUAL RISK

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Mineralised waste management	Loss and sterilization of mineral resources	• Incorporate cross discipline planning to avoid mineral sterilisation. A key component of the cross cutting function is the Mine Resource Manager.	Insignificant
Mineralised waste management Maintenance and aftercare	Altering topography	• Limit disturbed areas. • Effective rehabilitation of residue facilities and the overall site.	Low
Site preparation Earthworks Transport systems Mineralised waste Support services General site management Rehabilitation Maintenance and aftercare	Air pollution	• Limit disturbed areas. • Supress dust effectively on unpaved roads as required. • Monitor pollutants of concern and implement additional mitigation as required. • Maintain haul, access and service roads in a good state of repair • Maintain vehicles and equipment in good working order.	Low
Site preparation Earthworks Transport systems Mineralised waste management Support services Rehabilitation Maintenance and aftercare	Alteration of natural drainage patterns	• Obtain the necessary authorisations in terms of the NWA and exemptions in terms of Regulation 704 (4 June 1999) • Develop and implement a stormwater management plan to minimise containment areas and divert clean water away from the site. • Effective rehabilitation of the general site, and WRDs to as close to pre-mining conditions as practically possible.	Low

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	Contamination of surface water resources	• Mine infrastructure will be constructed and operated so as to comply with the National Water Act No. 36 of 1998 and GNR 704 of 4 June 1999. In this regard to the mine's stormwater management system will be revised to address the proposed WRD extensions. • Conduct surface water monitoring when water is present in the nearest watercourse and implement remedial actions as required. • Effective equipment and vehicle maintenance. • Quick reaction to and effective clean-up of spills. • Effective waste management. • Education and training of workers. • Effective rehabilitation of residue facilities and the overall site.	M/L
Site preparation Earthworks Transport systems Mineralised waste Support services General site management Rehabilitation Maintenance and aftercare	Contamination of groundwater	• Mine infrastructure will be constructed and operated so as to comply with the National Water Act No. 36 of 1998 and Regulation 704 (4 June 1999). • Infrastructure that has the potential to pollute groundwater will be identified and included into a groundwater pollution management plan which will be implemented as part of the operational phase through post-closure as required. This will include the proposed WRD extensions. • Conduct groundwater monitoring and implement remedial actions as required. This includes compensation for mine related loss of third party water supply. • Effective equipment and vehicle maintenance. • Fast and effective clean-up of spills. • Effective waste management.	M/L

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
		• Education and training of workers. • Effective rehabilitation of residue facilities and the overall site.	
Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	Loss of soil resources through physical destruction and pollution	• Limit site clearance to what is absolutely necessary. • Develop and implement a soil management plan that addresses soil stripping, stockpiling and use for rehabilitation. • Mine environmental management system and compliance. • Basic infrastructure design that is adequate to contain polluting substances. • Training of workers to prevent pollution. • Equipment and vehicle maintenance. • Fast and effective clean-up of spills. • Effective waste management. • In case of major spillage incidents an emergency response procedure must be implemented.	Low
Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	Land use	• Effectively manage noise, dust, surface and groundwater quality, blasting hazards, social impacts and visual impacts. • Effective rehabilitation of the overall site for post closure land use.	Low
Site preparation	Physical destruction and general	• Limit site clearance to what is absolutely necessary.	Low

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	disturbance of biodiversity	• Pre-construction surveys of the development footprints for species suitable for search and rescue operations. • Avoid sensitive areas as far as practically possible. • Obtain relevant permits prior to removal of protected species. • Implementation of an alien invasive species programme. • Limit dust emissions and soiling of vegetation. • Training of employees on the value of biodiversity. • Zero tolerance for harming and harvesting fauna and flora. • Limit light and noise disturbance as far as practically possible. • Effective waste management and pollution prevention. • Effective rehabilitation to as close to pre-mining conditions as practically possible. • Prevention and combatting veld fires though establishment and maintaining of fire breaks and through the education of employees in order to comply with the National Veld and Forest Fire Act No. 101 of 1998. • Implementation of a biodiversity action plan to ensure that the undeveloped/disturbed areas within the property are properly conserved and maintained. • Effective rehabilitation to as close to pre-mining conditions as practically possible.	
Site preparation Earthworks Transport systems Mineralised waste management	Noise pollution	• Maintain vehicles and equipment in good working order. • Conduct noise monitoring in the unlikely event that Tshipi receives noise related complaints. • Adhering to working schedule i.e. no blasting at night	Low

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Support services General site management Rehabilitation Maintenance and aftercare			
Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	Visual impact	• Limit disturbed areas. • Supress dust to prevent a visual dust cloud. • Effective waste management. • Implement effective use of lighting which reduces light spill. • Effective rehabilitation of the overall site.	Medium
Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	Road disturbance and traffic safety	• Construct/maintain safe access point/intersection. • Educate employees (temporary and permanent) about road safety. • Enforce strict vehicle speeds. • If a person or animal is injured by transport activities an emergency response procedure must be implemented.	Insignificant
Site preparation	Loss of heritage resources	• Limit the area of disturbance as far as practically possible.	Low

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Earthworks Transport systems Support services		• Training of workers about the heritage and cultural sites that may be encountered and about the need to conserve these. • These resources are protected by the National Heritage Resources Act (No 25 of 1999) and may not be affected (demolished, altered, renovated, removed) without approval. In the event that resources are identified, a chance find emergency procedure should be implemented.	
Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation Maintenance and aftercare	Economic impact (positive impact)	• Employ local people and procure goods and services locally as far as practically possible. • Ensure that closure planning considerations address the re-skilling of employees for the downscaling, early closure and long-term closure scenarios.	Moderate +
Site preparation Earthworks Transport systems Mineralised waste management Support services General site management Rehabilitation	Inward migration	• Effective communication with local communities to manage expectations with regard to employment and other opportunities. • Worker training on health and safety related issues. • Work together with landowners and land users to prevent the establishment of informal settlements and to manage issues such as security.	Insignificant

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Maintenance and aftercare			

6.9 OUTCOME OF THE SITE SELECTION MATRIX

With reference to Section 6.1, the location of the proposed West WRD extension relied on the availability of a property large enough to accommodate the required volume of waste rock and this property additionally should have no economically minable resource to prevent sterilization. It also needed to be located in close proximity to the open pit to reduce the haulage distance. It follows that no locality alternatives, other than Portion 8 of the farm Mamatwan 331, measured up to these criteria. Furthermore, there is no commercial activity i.e. farming being undertaken on this property and Tshipi already own the surface rights.

The void between the Tshipi East WRD and the Mamatwan WRD has already been impacted by the waste rock dumping activities and the associated access roads, and therefore no other site alternatives were considered. In terms of surface environmental features an effort was made to avoid locating the East WRD and West WRD extensions within close proximity to the Vlermuisleegte River, approximately two kilometers west of Tshipi Borwa and away from the nearest local farm residents.

The routing of the 11kV powerline is determined by the approved Eskom sub-station to be constructed and will follow the West WRD property boundary. The conveyor infrastructure will be located within the mining area and is determined by the location of the secondary crushing and screening plant and the stockpiles.

6.10 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

With reference to Section 6.1, no site alternatives were considered for the proposed infrastructure.

6.11 THE PREFERRED ALTERNATIVES

The “No-Go” alternative will be assessed in the EIR.

7 PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT

The main objectives of the EIA phase will be to:-

- Assess the potential cultural, heritage, socio-economic and biophysical impacts of the project;
- Identify and describe procedures and measures that will mitigate potential negative impacts and enhance potential positive impacts;
- Liaise with I&APs including relevant government departments on issues relating to the proposed development to ensure compliance with existing guidelines and regulations;
- Undertake consultation with I&APs and provide them with an opportunity to review and comment on the outcomes of the EIA process and acceptability of mitigation measures;
- Develop an EMPr and a conceptual closure/decommissioning plan; and
- Provide measures for ongoing monitoring (including environmental audits) to ensure that the project plan and proposed mitigation measures are implemented as outlined in the detailed EIR.

This chapter describes the nature and extent of further investigations to be conducted by SLR in the EIA, and sets out the proposed approach to the EIA phase.

7.1 ALTERNATIVES TO BE CONSIDERED

Refer to Section 34.

7.2 ASPECTS TO BE ASSESSED

This section lists the environmental aspects that will be considered and qualitatively assessed by SLR in the Environmental Impact Assessment phase. These are as follows:

- Topography;
- Visual resource;
- Noise;
- Traffic; and
- Socio-economic.

The assessment and detailed management measures will be provided in the EIR by SLR.

In addition, waste type assessment conducted by Golder Associates Africa (February 2016) for Tshipi will be used to inform the EIA.

7.3 ASPECTS TO BE ASSESSED BY SPECIALISTS

This section lists the aspects to be subject to specialist investigation in the Environmental Impact Assessment phase.

- Air quality;
- Surface water;
- Groundwater;
- Soil, land use and land capability;
- Ecology and biodiversity; and
- Heritage (includes cultural and paleontological resources).

The EIA will also be supported by a Closure Plan in terms of the Financial Provision Regulations GNR 1147 of 20 November 2015, as amended and conceptual East and West WRD designs.

7.4 METHOD OF ASSESSING THE ENVIRONMENTAL ASPECTS

This section describes the nature and extent of the investigations required in the EIA phase. In particular it describes the scope of work for the specialist investigations.

7.4.1 Air Quality

A specialist study is required and will include the followings tasks:

- Characterise the baseline air quality;
- Development of a comprehensive atmospheric emissions inventory key;
- Identify potential air pollution receptors;
- Assessment of the significance of air quality impacts; and
- Provide input, together with SLR and the technical project team into air quality management measures going forward.

The assessment and detailed management measures will be provided in the EIR report by SLR. A copy of the specialist report will be provided in the EIR.

7.4.2 Surface Water

A specialist study is required and will include the followings tasks:

- Describe baseline hydrology of the site;
- Assess the significance of surface water impacts;
- Update the Tshipi water balance relevant stormwater management plan; and
- Provide input, together with SLR and the technical project team into surface water management measures going forward.

The assessment and detailed management measures will be provided in the EIR by SLR. A copy of the specialist report will be provided in the EIR.

7.4.3 Groundwater

A specialist study is required and will include the followings tasks:

- Characterise the baseline groundwater environment
- Model the pollution dispersion impacts from the proposed WRD extensions on surrounding groundwater users;
- Assess the significance of potential groundwater impacts; and
- Provide input, together with SLR and the technical project team into groundwater management measures going forward.

The assessment and detailed management measures will be provided in the EIR by SLR. A copy of the specialist report will be provided in the EIR.

7.4.4 Soil, Land Use and Land Capability

A specialist study is required and will include the followings tasks:

- Map the soils in the proposed WRD extension footprints;
- Determine the physical and chemical soil properties;
- Determine the current land capabilities on site following the classification system stipulated by the South African Chamber of Mines to determine pre-mining baseline land capabilities;
- Assist with the identification of current land uses;
- Assess the impact of the proposed WRD extensions on soil, land use and land capability; and
- Provide input together with SLR and the technical project team into soil resource management measures going forward.

The assessment and detailed management measures will be provided in the EIR by SLR. A copy of the specialist report will be provided in the EIR.

7.4.5 Biodiversity

A specialist study is required and will include the followings tasks:

- Identify and describe the terrestrial habitats within the project area;
- Identify key floral species associated with each habitat;
- Conduct field work to identify the occurrence of fauna, including Red Data Listed species;
- Map sensitive areas where detail will be given of the ecological aspect of concern in each sensitivity zone;

- Assess biodiversity impacts; and
- Provide input together with SLR and the technical project team into biodiversity management measures going forward.

7.4.6 Heritage/Cultural Resources

A specialist study is required and will include the followings tasks:

- Identify and map heritage resources;
- Assess the impact on heritage resources; and
- Provide input together with SLR and the technical project team into heritage management measures going forward.

The assessment and detailed management measures will be provided in the EIR report by SLR. A copy of the specialist report will be provided in the EIR.

7.5 METHOD OF ASSESSING IMPACT SIGNIFICANCE

Refer to Section 6.6.

7.6 CONSULTATION WITH THE COMPETENT AUTHORITY

The EIR will be provided to all identified commenting authorities and the DMR for a 30 day review period. A site visit and EIA feedback meeting shall be held, if requested.

7.7 THE PUBLIC PARTICIPATION PROCESS IN THE EIA

7.7.1 Notification of interested and affected parties

I&APs on the project database will be provided with information in the form of summary documents and will be notified when the EIR is available for public review via electronic mail, post and bulk SMS. I&APs will similarly be invited to attend a public feedback meeting during the EIA phase, if required.

7.7.2 Details of the engagement process to be followed

The stakeholder engagement process in the EIA & EMPr Phase will include the following:

- Public and/or stakeholder meeting/s to give feedback on the findings of the EIR (if required);
- Collation of issues and concerns into a report for submission to the commenting authorities and DMR;
- Circulation of the EIR for public and authority review and collation of comments; and
- Notification of I&APs on the database on the relevant DMR decisions.

7.7.3 Information to be provided to registered interested and affected parties

The following information will be included in the EIA which will be made available for public review:

- Detailed description of the proposed project;
- A site layout;
- Details of the activities to be authorised in terms of NEMA and NEM:WA;
- Scale and extent of activities to be authorised in terms of NEMA and NEM:WA;
- The duration of the activity;
- An assessment of the environmental and socio-economic impacts identified during the environmental assessment process, through input from IAPs, regulatory authorities and specialists;
- Detailed management measures to reduce and control environmental and socio-economic impact; and
- Copies of the specialist reports undertaken for the proposed project.

During the EIA Phase a summary of the findings of the EIA will be provided in English and Afrikaans. In addition, the EIR will be subjected to public review. Once the DMR has issued decisions on the applications, I&APs on the project database will be informed accordingly.

7.8 TASKS TO BE UNDERTAKEN DURING THE EIA

A description of the tasks that will be undertaken during the EIA phase is provided below in Table 7-1.

TABLE 7-1: EIA TASKS AND TIMING

Phase	EAP activity	Opportunities for Consultation and Participation		Schedule
		Competent Authorities	IAPs, State Departments and Organs of State	
Specialist Assessments and Input	EAP to manage specialist activities and receive inputs for EIR.			April to July 2018
EIA Phase	Assess environmental impacts. Compile EIR			August 2018
	Submit EIR to I&APs and authorities.	Review of EIR (30 days). Comments to EAP	Review of EIR (30 days). Comments to EAP	Sept to Oct 2018
	Arrange meetings and consultations	Meetings with authorities during EIA phase if required.	Public Feedback Meeting if required. Focused consultation with I&APs or commenting authorities if required.	
	Address public comment and finalise EIR			Oct 2018
Authority review and Authorisation Phase	EIR report to DMR (106 days from acceptance of scoping).	Authority Acknowledge Receipt of EIA report (10 days).	Review of EIR Comments to CA	February 2019
		Environmental Authorisation Granted / Refused (107 days).		
			Notifications to I&AP's regarding environmental authorisation (granted or refused).	
Appeal Phase	EAP to provide guidance regarding the appeal process as and when required.	Consultation during processing of appeal if relevant.	Submit appeal in terms of National Appeal Regulations	Variable

7.9 MEASURES TO AVOID, REVERSE, MITIGATE, OR MANAGE IDENTIFIED IMPACTS

See Table 6-27. It should be noted that this table has been compiled with the information currently in hand and will be refined during the EIA & EMPr phase.

7.10 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

No additional requests for information have been received to date.

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

The potential socio-economic impacts will be assessed qualitatively by SLR during the EIA & EMPr phase. This assessment will be based on previous studies completed for Tshipi.

7.10.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act, 25 of 1999.

A heritage study will be conducted to identify potential impacts on heritage resources. The results of this study will be provided in the EIA & EMPr.

8 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT

No other matters are required in terms of Section 24(4)(A) and (B) of the Act.

9 UNDERTAKINGS BY THE EAP

I, Linda Munro, the Environmental Assessment Practitioner responsible for compiling this report, undertake that:

- The information provided herein is correct;
- The comments and inputs from stakeholders and I&APs have been correctly recorded;
- Information and responses provided to stakeholders and I&APs by the EAP is correct; and
- The level of agreement with I&APs and stakeholders has been correctly recorded and reported.

Signature of the EAP

19 July 2018
Date

10 REFERENCES

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Tshipi é Ntle, Social and Labour Plan, December 2014.

APPENDIX 1: PROOF OF EAP REGISTRATION

APPENDIX 2: CURRICULUM VITAE

APPENDIX 3: LOCAL SETTING

APPENDIX 4: SITE LAYOUT

APPENDIX 5: STAKEHOLDER ENGAGEMENT DOCUMENTS

- I&AP database;
- Background information documents;
- Advertisements and site notices;
- Proof of advertisements;
- Photos and location of the site notices;
- Proof of background information document distribution;
- Minutes of public scoping meeting and attendance register;
- Minutes of DMR pre-application meetings;
- Land claims correspondence; and
- Correspondence to and from I&APs.

APPENDIX 6: TSHIPI ENVIRONMENTAL AUTHORISATIONS AND MINING RIGHT

APPENDIX 7: NEMA AND NEM:WA APPLICATION

RECORD OF REPORT DISTRIBUTION

Project Number:	710.20008.00041
Title:	Scoping Report for the Tshipi Borwa Waste Rock Dump Extension Project
Report Number:	1
Proponent:	Tshipi é Ntle Manganese Mining (Pty) Ltd

Name	Entity	Copy No.	Date issued	Issuer
James Manis	Tshipi é Ntle Manganese Mining (Pty) Ltd	Electronic	July 2018	L Munro
Takalani Khorombi	Department of Mineral Resources	1 (including electronic upload on SAMRAD)		
Carol Kenyon	SLR Consulting Library	Electronic		
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