

INTRODUCTION

1.1 Background

The mining industry in South Africa plays an important role in the nation's Gross Domestic Product (GDP) and employment ratio. The discovery of Iron and Manganese ore deposits contributed significantly to the socio-economic status of the Northern Cape Province.

The proposed Mashwening Iron Ore Mine is situated approximately 20 km southeast from the town of Kathu on the remaining extent of the farm Mashwening 557 located in the Magisterial District of Kuruman in the Northern Cape Province.

Wide Investments 100 (Pty) Ltd, herein after referred to as Wide Investments, is the holder of the Prospecting Right for Iron and Manganese ore in terms of Section 17(1) of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act No. 28 of 2002). A total of 46 Diamond core boreholes were drilled by Orex Exploration CC to inform the Mine Work Programme (MWP) about the mineral deposition, quality, quantity, economic viability, and the life of mine. Prospecting samples were submitted to SGS for analysis. In addition, detrital iron ore trenching was also undertaken on the southern periphery of the farm.

The total estimated resource to be mined is 14 million tonnes of ore in the ground. However, the total recoverable and saleable ore for the resource is 6.5 million tones.

On August 2013, Wide Investments 100 (Pty) Ltd applied to the Department of Mineral Resources for a Mining Right in terms of Section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). The Department of Mineral Resources must first authorize the application before mining of Iron and Manganese ore can commence.

According to the MWP, Wide Investments will utilize open-cast mining method to extract the Iron and Manganese ore minerals deposit. In common with other mining operations, Mashwening Iron Ore Mine has activities that fall within the ambit of section 21 of the National Water Act, 1998 (Act No. 36 of 1998) ("NWA"). Wide Investments (Pty) Ltd is required to apply for a Water Use Licence in terms of provisions of Chapter 4 of the NWA.

Furthermore, Wide Investments is required to develop an Integrated Water and Waste Management Plan (IWWMP) which will support the Integrated Water Use Licence Application (IWULA) for the planned activities at Mashwening Iron Ore Mine.

Jomela Consulting (Pty) Ltd has been appointed by Wide Investments (Pty) Ltd to facilitate the implementation of the EIA-EMP for the proposed mining operation.

1.2 Prospecting and Mining Right Status

Prospecting Right

The Prospecting Right was granted on the 12th of April 2011 in terms of Section 17(1) of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act No. 28 of 2002).

Invasive Prospecting

Prospecting activities commenced on the 29th August 2011 whereby a total of 46 Diamond core boreholes were drilled.

Mining Right Application

The Mining Right application was lodged with the Department of Mineral Resources on 14 August 2013, and subsequently accepted on 18 September 2013.

Application for Environmental Authorisation

An application for environmental authorisation for Listed Activities was submitted on the 26 September 2013.

Water Use Licence Pre-application Meeting

Water Use Licence (WUL) pre-application meeting was held at the Department of Water Affairs Northern Cape region on the 26 September 2013.

1.3 Property Information

The details of the relevant property are described in Table 1.1 below.

Table 1.1: Properties of the land to which the application relates.

| FARM NAME | PORTION NO. | COORDINATES | SIZE (ha) | SURFACE RIGHT OWNER | TITLE DEEDS |
|----------------|------------------|--------------------------------------|-----------|--|-------------|
| Mashwening 557 | Remaining Extent | Longitude: 23.05 Latitude: -27.86 | 1679.5094 | Sishen Iron Ore Mining Company (Pty) Ltd | T3280/2001 |

1.4 Regional Setting and Location of the Project

The study area is situated in the north-eastern part of the Northern Cape Province. The proposed mining operation is located approximately 70 km south west from the town of Kuruman in the Gamagara Local Municipality of the John Taolo Gaetsewe District Municipality. The project is located approximately 20 km south east of the town of Kathu, to the east of the N14 National Road. Sishen Mine is located about 17 km northwest from the proposed project. The highest altitude is about 1247 above mean sea level (AMSL), while the lowest is in the range between 1225-1229 m AMSL. Moreover, the project lies at longitude 28.23685 and latitude -24.63827. The project area is represented in **Figure 1.1** and as A, B, C, and D in **Figure 1.2** below:

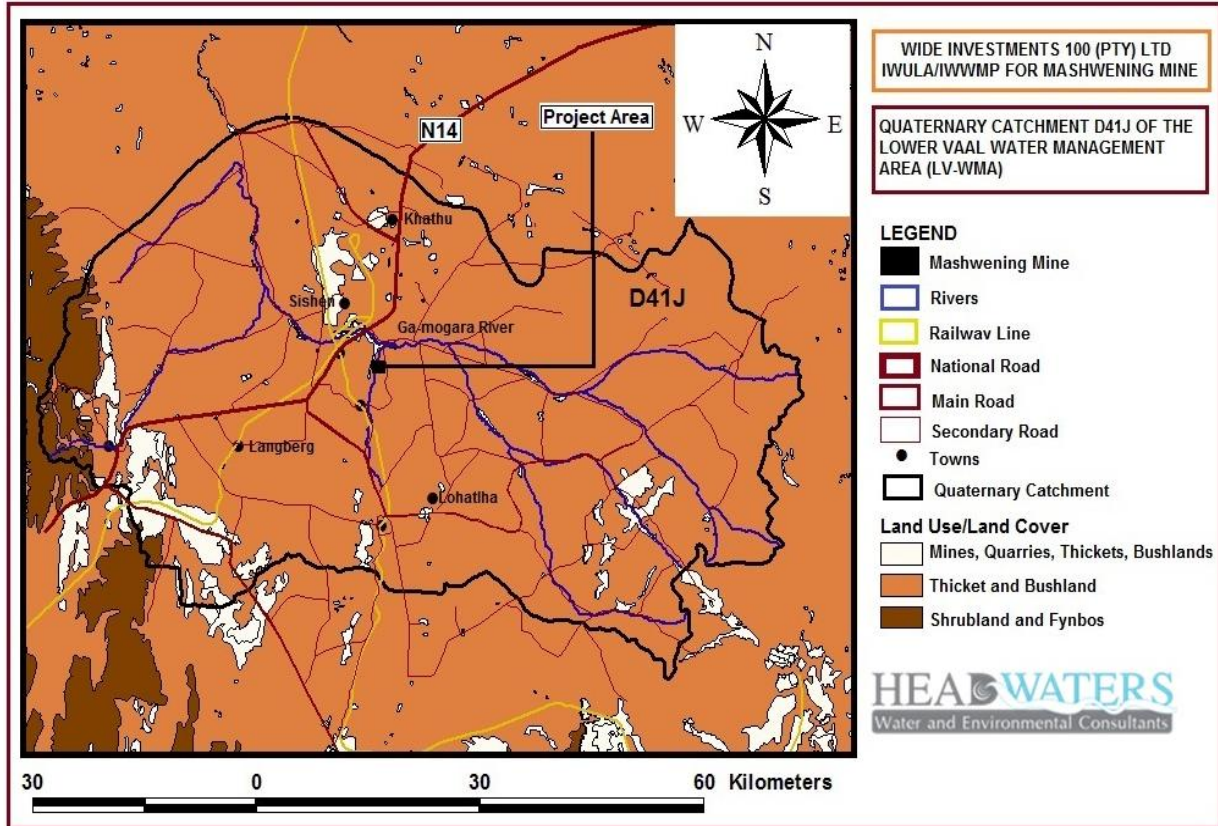


Figure 1.1: Location of the remaining extent of Mashwening 557 farm

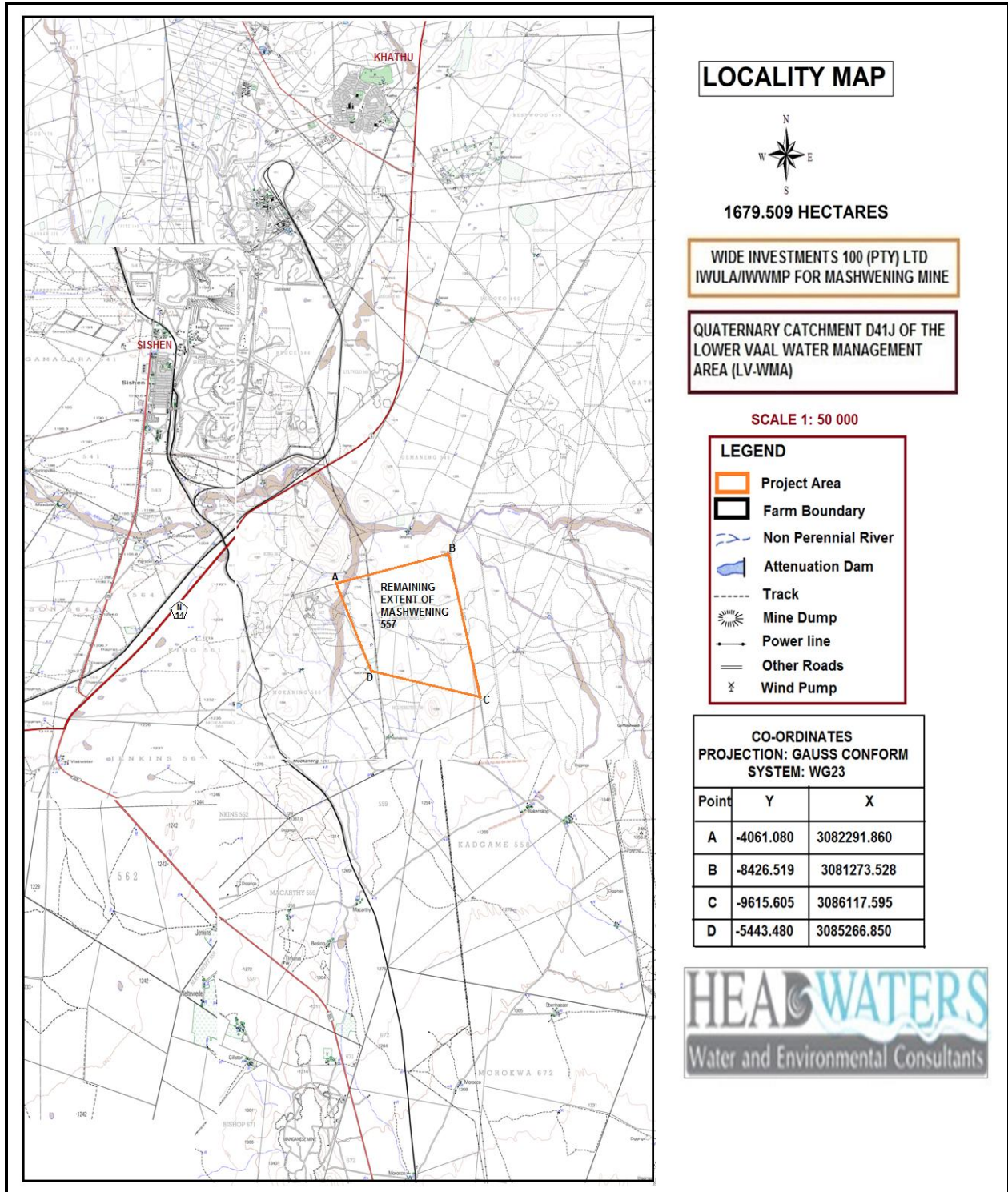


Figure 1.2: Locality of the project area (showing the whole Mashwening project area)

1.5 Legal Framework

1.5.1 The South African Constitution

The South African Constitution (Act 108 of 1996) constitute the supreme law of the country and guarantee the right of all people in South Africa. Furthermore, the Bill of Rights (Chapter 2-Section 24 (a) (b) under the South African Constitution (Act 108 of 1996) emphasize that *“Everyone has the right (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-*

- (i) Prevent pollution and ecological degradation;*
- (ii) Promote conservation; and*
- (iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”*

1.5.2 National Environmental Management Act

The NEMA (Act No.107 of 1998) is regarded as one of the important piece of general environmental legislation as it provide a framework for environmental law reform. The main objectives of this act is to ensure that ecosystem services and biodiversity are protected and maintained for sustainable development. Futhermore, Section 28 (1) of the NEMA requires that *“every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”*.

The National Environmental Management Waste Act (Act No. 59 of 2008) under the NEMA (Act No.107 of 1998) is the statutory regulator of all hazardous wastes generated by any form of development. This act further provides the identification of activities which will cause environmental degradation through the promulgation of GNR 343, GNR 544, and GNR 546 Listed Activities published on 18 June 2010, in terms of Section 24(2) and 24D of the NEMA.

The proposed mine will comprise of processing plant, main mine offices, pit offices, warehouses, change house facilities, workshops, electricity sub-station, explosives storage area, fuel depot, laboratory, sewage conservancy tank, and emergency care facilities. The establishment of these infrastructures on site will trigger NEMA listed Activities (**See Appendix A**).

An application for Environmental Authorisation was launched on the 26 September 2013 to the Department of Environment and Nature Conservation, Northern Cape Region. The project was assigned the following reference numbers **NC/EIA/12/JTG/GAE/KAT2/2013** and **NCP/EIA/0000242/2013**.

1.5.3 Mineral and Petroleum Resources Development Act

Wide Investment 100 (Pty) Ltd is the holder of a Prospecting Right (**NC 30/5/1/1/2/ (1440) PR**) for Iron and Manganese Ores granted by the Department of Mineral Resources (DMR) on the 12th of April 2011 in terms of Section 17(1) of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act No. 28 of 2002).

The bulk of the known ore body is situated on Pit 1 (north) and Pit 2 (south) within the Mashwening 557 project area. The extent of an area requiring mining is estimated to be 320 hectares.

The Department of Mineral and Petroleum Resources (DMR) must however first approve an Application for a Mining Right, before mining of the ore can commence. The Mining Right Application was launched on August 2013.

An EIA process is required for the Mining Right Application in terms of Section 39(1) of the MPRDA. In addition, two separate Scoping processes and one combined Environmental Impact Assessment process will be conducted for the NEMA and MPRDA.

1.5.4 National Environmental Biodiversity Act

The National Environmental Management Biodiversity Act (NEM:BA), 2004 (Act No.10 of 2004), provides for:

- (i) the management and conservation of South Africa`s biodiversity within the framework of the National Environmental Management Act, 1998;
- (ii) the protection of species and ecosystems that warrant national protection;
- (iii) the sustainable use of indigenous biological resources;
- (iv) the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources;
- (v) the establishment and functions of a South African National Biodiversity Institute;
- (vi) and for matters connected therewith.

An ecological impact assessment will be undertaken within the proposed mining areas to inform the MPRDA and NEMA-EIA reports.

1.5.5 National Heritage Resources Act

The National Heritage Resources Act (NHRA), 1999 (Act No. 25 of 1999) provides for the management of national heritage resources to set norms and maintain national standards for the management of heritage resources in South Africa, and to protect heritage resources of national significance, so that heritage resources may be bequeathed to future generations.

Section 35(4) of the NHRA related to archaeology, palaeontology, and meteorites, and states that: no person may, without a permit:

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate or remove from its original position, collect or own any archaeological material or palaeontological material or object or meteorite;*
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object;*
- (d) bring onto or use any equipment which assists in the detection or recovery of metals or archaeological and palaeontological material or objects.*

Section 38(1) of the NHRA, requires that any person who intends to undertake certain categories of development (see below) must notify the South African Heritage Resources Agency (SAHRA) at the very earliest stage of initiating such development and must furnish details of the location, nature and extent of the proposed development.

- (a) The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- (b) The construction of a bridge or similar structure exceeding 50 m in length;
- (c) Any development or other activity which will change the character of a site:
 - (i) Exceeding 5 000 m² in extent;
 - (ii) Involving three or more existing erven or subdivisions thereof; or
 - (iii) Involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - (iv) The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- (d) The re-zoning of a site exceeding 10 000 m² in extent; or
- (e) Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

The proposed mining project will cover an area of about 1679.5094 hectares (16 795 094 m²), of which 372 ha is required for mining and related infrastructure. A Phase 1 Archaeological and Heritage Impact Assessment (**See Appendix B**) was undertaken before the prospecting phase commenced.

1.5.6 National Water Act

The NWA (Act No. 36 of 1998) objectively ensures that water or water resources are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all people. Water use refers to all activities that have direct or indirect impact on the source, environment, quality, and quantity of water. Authorisation of water use for any designated activities above Schedule 1 of the NWA (Act No. 36 of 1998), is subjected Water Use Licence Application (WULA). The conditions of WULA are based in terms of Section 21 principles of the NWA (Act No. 36 of 1998), which includes:

- (a) Taking water from a water resource;*
- (b) Storing water;*
- (c) Impeding or diverting the flow of water in a watercourse;*
- (d) Engaging in a stream flow reduction activity contemplated in section 36;*
- (e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);*
- (f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;*
- (g) Disposing of waste in a manner which may detrimentally impact on a water resource;*

- (h) *Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;*
- (i) *Altering the bed, banks, course or characteristics of a watercourse;*
- (j) *Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and*
- (k) *Using water for recreational purposes.*

Section 3 of the NWA: Public trusteeship of nation's water resources

(1) As the public trustee of the nation's water resources the National Government, acting through the Minister, must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons and in accordance with its constitutional mandate.

(2) Without limiting subsection (1), the Minister is ultimately responsible to ensure that water is allocated equitably and used beneficially in the public interest, while promoting environmental values.

(3) The National Government, acting through the Minister, has the power to regulate the use, flow and control of all water in the Republic.

Section 19 of the NWA: Prevention and remedying effects of pollution

(1) An owner of land, a person in control of land or a person who occupies or uses the land on which -

- (a) any activity or process is or was performed or undertaken; or*
- (b) any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.*

(2) The measures referred to in subsection (1) may include measures to -

- (a) cease, modify or control any act or process causing the pollution;*
- (b) comply with any prescribed waste standard or management practice;*
- (c) contain or prevent the movement of pollutants;*
- (d) eliminate any source of the pollution;*
- (e) remedy the effects of the pollution; and*
- (f) remedy the effects of any disturbance to the bed and banks of a watercourse.*

(3) A catchment management agency may direct any person who fails to take the measures required under subsection (1) to -

- (a) commence taking specific measures before a given date;*
- (b) diligently continue with those measures; and*
- (c) complete them before a given date.*

(4) Should a person fail to comply, or comply inadequately with a directive given under subsection (3), the catchment management agency may take the measures it considers necessary to remedy the situation.

(5) Subject to subsection (6), a catchment management agency may recover all costs incurred as a result of it acting under subsection (4) jointly and severally from the following persons:

- (a) Any person who is or was responsible for, or who directly or indirectly contributed to, the pollution or the potential pollution;*

- (b) the owner of the land at the time when the pollution or the potential for pollution occurred, or that owner's successor-in-title;
- (c) the person in control of the land or any person who has a right to use the land at the time when -
- (i) the activity or the process is or was performed or undertaken; or
 - (ii) the situation came about; or
- (d) any person who negligently failed to prevent -
- (i) the activity or the process being performed or undertaken; or
 - (ii) the situation from coming about.
- (6) The catchment management agency may in respect of the recovery of costs under subsection (5), claim from any other person who, in the opinion of the catchment management agency, benefitted from the measures undertaken under subsection (4), to the extent of such benefit.
- (7) The costs claimed under subsection (5) must be reasonable and may include, without being limited to, labour, administrative and overhead costs.
- (8) If more than one person is liable in terms of subsection (5), the catchment management agency must, at the request of any of those persons, and after giving the others an opportunity to be heard, apportion the liability, but such apportionment does not relieve any of them of their joint and several liability for the full amount of the costs.

Section 35 of the NWA: Verification of existing water uses

- (1) The responsible authority may, in order to verify the lawfulness or extent of an existing water use, by written notice require any person claiming an entitlement to that water use to apply for a verification of that use.
- (2) A notice under subsection (1) must -
- (a) have a suitable application form annexed to it;
 - (b) specify a date before which the application must be submitted;
 - (c) inform the person concerned that any entitlement to continue with the water use may lapse if an application is not made on or before the specified date; and
 - (d) be delivered personally or sent by registered mail to the person concerned.
- (3) A responsible authority -
- (a) may require the applicant, at the applicant's expense, to obtain and provide it with other information, in addition to the information contained in the application;
 - (b) may conduct its own investigation into the veracity and the lawfulness of the water use in question;
 - (c) may invite written comments from any person who has an interest in the matter; and
 - (d) must afford the applicant an opportunity to make representations on any aspect of the application.
- (4) A responsible authority may determine the extent and lawfulness of a water use pursuant to an application under this section, and such determination limits the extent of any existing lawful water use contemplated in section 32(1).
- (5) No person who has been required to apply for verification under subsection (1) in respect of an existing lawful water use may exercise that water use -
- (a) after the closing date specified in the notice, if that person has not applied for verification; or

- (b) after the verification application has been refused, if that person applied for verification.*
- (6) A responsible authority may, for good reason, condone a late application and charge a reasonable additional fee for processing the late application.*

Section 39 of the NWA: General authorisation to a water use

- (1) A responsible authority may, subject to Schedule 1, by notice in the Gazette -*
- (a) generally;*
 - (b) in relation to a specific water resource; or*
 - (c) within an area specified in the notice, authorise all or any category of persons to use water, subject to any regulation made under section 26 and any conditions imposed under section 29.*
- (2) The notice must state the geographical area in respect of which the general authorisation will apply, and the date upon which the general authorisation will come into force, and may state the date on which the general authorisation will lapse.*
- (3) A water use may be authorised under subsection (1) on condition that the user obtains any permission or authority required by any other specified law.*
- (4) Before issuing a general authorisation, the responsible authority must -*
- (a) publish a notice in the Gazette -*
 - (i) setting out the proposed general authorisation; and*
 - (ii) inviting written comments to be submitted on the proposed general authorisation, specifying an address to which and a date before which comments are to be submitted, which date may not be earlier than 60 days after publication of the notice;*
 - (b) consider what further steps, if any, are appropriate to bring the contents of the notice to the attention of interested persons, and take those steps which the responsible authority considers to be appropriate; and*
 - (c) consider all comments received on or before the date specified in paragraph (a)(ii).*
- (5) An authorisation to use water under this section does not replace or limit any entitlement to use water which a person may otherwise have under this Act.*

Section 40 of the NWA: Application for licence

- (1) A person who is required or wishes to obtain a licence to use water must apply to the relevant responsible authority for a licence.*
- (2) Where a person has made an application for an authorisation to use water under another Act, and that application has not been finalised when this Act takes effect, the application must be regarded as being an application for a water use under this Act.*
- (3) A responsible authority may charge a reasonable fee for processing a licence application, which may be waived in deserving cases.*
- (4) A responsible authority may decline to consider a licence application for the use of water to which the applicant is already entitled by way of an existing lawful water use or under a general authorisation.*

Section 41 of the NWA: Procedure for licence applications

- (1) An application for a licence for water use must -*
- (a) be made in the form;*
 - (b) contain the information; and*

- (c) be accompanied by the processing fee, determined by the responsible authority.
- (2) A responsible authority -
- (a) may, to the extent that it is reasonable to do so, require the applicant, at the applicant's expense, to obtain and provide it by a given date with -
- (i) other information, in addition to the information contained in the application;
- (ii) an assessment by a competent person of the likely effect of the proposed licence on the resource quality; and
- (iii) an independent review of the assessment furnished in terms of subparagraph (ii), by a person acceptable to the responsible authority;
- (b) may conduct its own investigation on the likely effect of the proposed licence on the protection, use, development, conservation, management and control of the water resource;
- (c) may invite written comments from any organ of state which or person who has an interest in the matter; and
- (d) must afford the applicant an opportunity to make representations on any aspect of the licence application.
- (3) A responsible authority may direct that any assessment under subsection (2)(a)(ii) must comply with the requirements contained in regulations made under section 26 of the Environment Conservation Act, 1989 (Act No. 73 of 1989).
- (4) A responsible authority may, at any stage of the application process, require the applicant -
- (a) to give suitable notice in newspapers and other media -
- (i) describing the licence applied for;
- (ii) stating that written objections may be lodged against the application before a specified date, which must be not less than 60 days after the last publication of the notice;
- (iii) giving an address where written objections must be lodged; and
- (iv) containing such other particulars as the responsible authority may require;
- (b) to take such other steps as it may direct to bring the application to the attention of relevant organs of state, interested persons and the general public; and
- (c) to satisfy the responsible authority that the interests of any other person having an interest in the land will not be adversely affected.

1.5.6 Other Legal Requirements

Other Acts, legally binding documents and guidelines may also be applicable the proposed mining project, including;

- (a) Environment Conservation Act, 1989 (Act No. 73 of 1989);
- (b) National Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004);
- (c) Mine Health and Safety Act, 1996 (Act No. 29 of 1996);
- (d) Hazardous Substances Act, 1973 (Act No. 15 of 1973);
- (e) Roads Ordinance Amendment Act, 1998 (Act No. 17 of 1998);
- (f) South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998);
- (g) Government Notice R.77 National Water Act, 1998 (Act 36 of 1998), Regulations on use of water for mining and related activities aimed at the protection of water resources, 2010;
- (h) The Department of Water Affairs: Best Practice Guidelines (BPG)

- A2: Water Management for Mine Residue Deposits (July 2008);
 - A5: Water Management for Surface Mines (July 2008);
 - G1: Storm Water Management (August 2006);
 - G2: Water and Salt Balances (August 2006);
 - G3: Water Monitoring Systems (July 2007);
 - G4: Impact Prediction (December 2008);
 - H1: Integrated Mine Water Management (December 2008);
- (i) Occupational Health and Safety Act (OHSA), 1993 (Act No. 85 of 1993).

2. Details of the Applicant

Company Name: Wide Investments 100 (Pty) Ltd

Company Reg. No.: 2007/022620/07

Property: Remaining Extent of Mashwening 557

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3. Environmental Assessment Practitioner

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Jomela Consulting (Pty) Ltd was company established in 2013. The company was established with a view to joint efforts of various associate specialists to provide a one-stop environmental management service. The associates bring collectively to the company a wealth of experience and skills obtained through qualifications, work experience and also interactions over the years with different stakeholders such as industry, government and civil society. This experience and skill in environmental management ranges from policy analysis and development, regulatory compliance and enforcement, environmental impact assessment, development and/or review of environmental management plans.

The associates constituting Jomela Consulting have previously worked for the government both in the mining and environmental sectors and still maintain a close liaison with these departments to ensure that they are kept abreast of any policy shifts and developments, including amendments to legislation.

4. Geological Setting and Potential of the Mashwening Iron and Manganese Deposits

The rock stratigraphy, within the Griqualand West depository, forms part of the early, Proterozoic-Transvaal Supergroup sequence. The Postmasburg Manganese Field is located along the western margin of the Kaapvaal Craton and on the eastern limb of the Maremane Dome.

In Griqualand West the succession can be broadly subdivided into a basal, chemical sedimentary unit, referred to as the Ghaap Group, which is overlain by a mixed volcanic clastic-chemical sequence, known as the Postmasburg Group. The Ghaap and Postmasburg Groups represent two separate, major unconformity-bounded sequences.

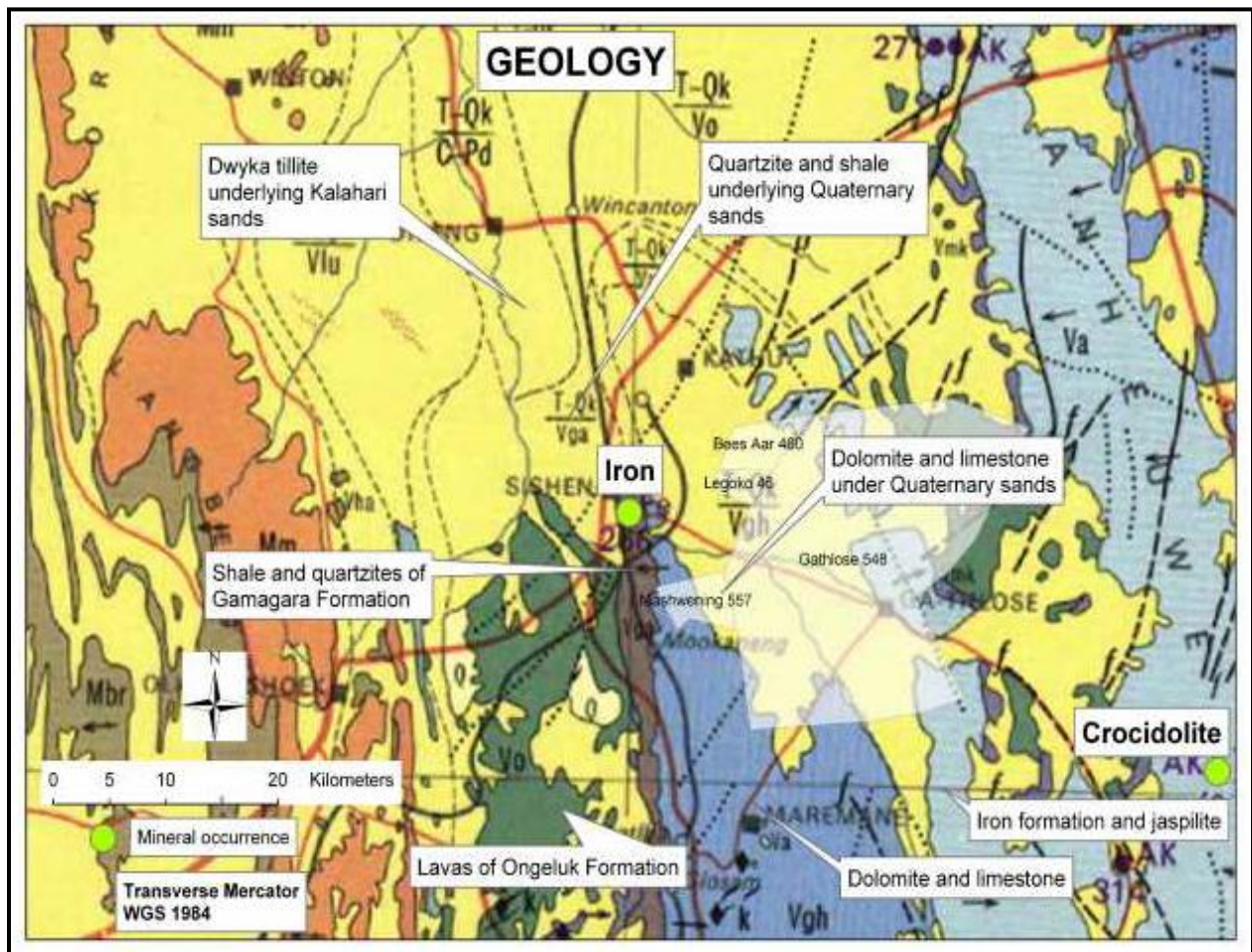


Figure 4.1: Local geological Setting

Deposition of the Transvaal sequence in Griqualand West took place on a continental margin or trailing edge and was controlled by three tectonic-sedimentary elements:

- A shallow water platform on the Kaapvaal Craton.
- A platform edge (shelf margin) located parallel to the Griquatown fault zone (A growth fault across which there are a number of facies changes).

- A deep basin along the western margin of the Kaapvaal Craton.

The Postmasburg Mineral Field is located on a structurally related dome, referred to as the Maremane dome. The Maremane dome extends from Sishen in the north to Beeshoek mine in the south, near Postmasburg.

The floor rocks on the Maremane dome comprise dolomites and limestones of the Campbell Rand Sub-Group. Mineralization is confined to two belts, known as the western and eastern belts. Paleosinkhole development and supergene enrichment, which took place during the erosional period, preceding the deposition of the Gamagara Formation, played an important part in the development of the deposits.

4.1 Hematite Iron Ore Mineralisation

Hematite iron ore is developed within the Manganore Iron Formation. The Manganore Iron Formation represents a lateral equivalent of the Kuruman Iron Formation that slumped into sinkhole structures during the period of erosion that preceded the deposition of the overlying Gamagara Formation.

The Kuruman Iron Formation represents the basal part of the Asbesheuwel-Sub Group, resting directly on Campbell Rand dolomite.

Rain-water is enriched in carbon which results in the formation of carbonic acid which reacts with the carbonate-rich dolomite to produce soluble bicarbonate. Removal of the bicarbonate eventually results in the collapse of the overlying rock sequence into the underlying caves. The result of sinkhole formation is folding, brecciation and structural thickening of the sequence.

Hematization of the Manganore Iron Formation took place prior to the deposition of the Gamagara Formation as suggested by the presence of a hematite conglomerate at the base of the Gamagara Formation. During the period of erosion and slumping, silica was leached from the Kuruman Iron Formation by alkaline ground water solutions and ferrous minerals were oxidized to hematite ore (Manganore Iron Formation) present along the eastern belt on the Maremane Dome and at the junction of the two belts at Postmasburg and Sishen.

Iron ore is also present within the western belt toward the north and south as one move from the central part of the dome.

Based on the structural and stratigraphic grounds, the iron ore found on Mashwening is classified as the Massive Gamagara type, which consists of sand-to silt-sized grains of haematite and represents ferruginised, haematitic sandstone and shale.

Iron ore is present as follows:

- Detrital ore present within debris fans along hill slopes and within topographic lows. The detrital ore comprises rounded to sub-rounded iron ore pebbles and boulders.
- In situ ore preserved within karst structures and along the fringes of the sinkhole.

In situ iron ore mineralization is restricted to two isolated hills, located towards the northern farm boundary with Demaneng 546 where it is developed in the Manganore Iron Formation, preserved within a karst structures within the underlying dolomite.

A second in situ iron ore resource is present toward the south, where it is preserved in a small sinkhole structure.

The iron ore (Fe) in the area is graded as follows:

- High-grade - 69.9 - 66.0% Fe, with SiO₂ + insolubles of 0.8 – 4.5%
- Medium-grade - 69.9 - 66.0% Fe, with SiO₂ + insolubles of 0.8 – 4.5%
- Low-grade- 69.9 - 66.0% Fe, with SiO₂ + insolubles of 0.8 – 4.5%

The eastern belt hills are circular in shape displaying steep bedding plane dips along the circumference varying between 20-60 degrees toward the center of the hills. Brecciation is a common feature.

4.2 Manganese Ore Mineralisation

The Manganore Iron Formation grades downward into the Wolhaarkop Breccia.

The source of manganese is considered to be from the Campbellrand dolomite, which in places contain up to 5%Mn. The manganese present within the western belt was sourced from the Ulco Member of the Reivilo Formation whilst the manganese within the eastern belt came from the Fairfield Formation. Chemical weathering (leaching) extracted manganese from the dolomites and was carried in ground water to sites of precipitation. Paleo-sinkhole development and supergene enrichment, which took place during the period of erosion, that preceded the deposition of the Olifantshoek Group, played an important part in the development and preservation of the deposits.

Along the eastern belt, manganese mineralization occurs within a slumped chert breccia, known as the Wolhaarkop Breccia, which consists of chert fragments set in a ferruginous and manganiferous matrix. The Wolhaarkop Breccia is thought to represent accumulations of the insoluble residue of the dolomite in sink holes.

The eastern belt is marked by an arc of detached breccia hills, the so-called Klipfontein Hills, which links with the western belt at Beeshoek in the south and at Sishen in the north. Braunite is the dominant ore mineral but since it forms the matrix within the chert breccia, the primary mining product contains much silica.

The western belt trends north-south extending from Beeshoek in the south to Sishen in the north. The manganese deposits represent replacement deposits within the basal part of the Sishen shales. The deposits are extremely irregular in shape, occurring as slump features on a floor of dolomite between closely spaced dolomite pinnacles and within solution cavities. The

dominant ore mineral is iron-rich bixbyite. Bixbyite contains iron as an essential part of the molecule causing the ore to be ferruginous.

Manganese mineralization is confined to the basal part of the Wolhaarkop breccia, near the top of the Campbell Rand dolomite.

Field observations indicate the presence of two main ore types:

- Siliceous ore containing visible quartz and displaying a speckled appearance.
- Dark black, massively bedded braunite ore with no visible quartz present.

The siliceous ore generally contains Mn values ranging between 20-38 % Mn and 10-40 % SiO₂. The massive ore grades vary between 38-55 % Mn and 0-10 % SiO₂. The manganese (Mn) ore grade is classified as follows:

High Grade ore- ore with greater than 44% Mn content

Medium Grade ore- ore with greater than 30% but less than 43% Mn content

Low Grade- ore with less than 30% Mn content

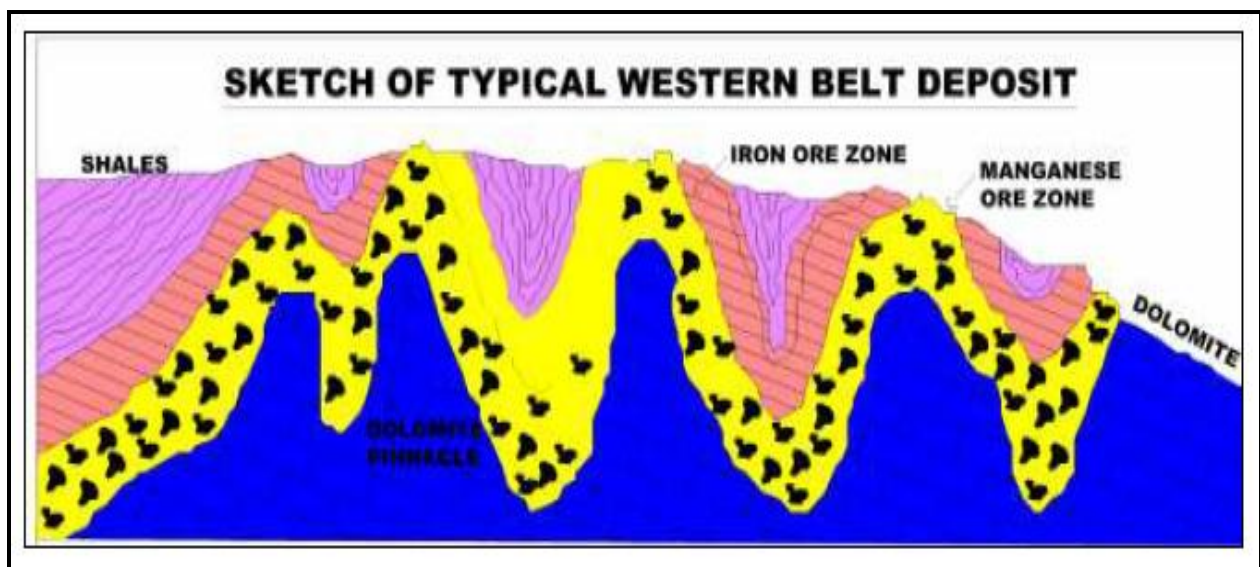


Figure 4.2: Western belt mineralisation

4.3 Mineral Resources Estimation

The estimation of the mineral resource was based on the methodology as stipulated by the South African Code for Reporting Mineral Resources and Mineral Reserves ("the SAMREC CODE). The total estimated mineral resource includes in-situ tonnages for both manganese and iron ore obtained from the sampling and drilling results.

A total of 46 boreholes were drilled at a spacing of 25 m and 50 m centre to centre, with a total of 718 m drilled at an average depth of 17 m. The boreholes were surveyed and plotted on the plan and sections drawn to show the stratigraphy; mineralization and related geological feature present in the area. The section was used to determine the volume of ore contained in the area

covered by the boreholes. The total tonnage was calculated using the volume and the particular specific gravity of the in-situ and detrital ore, and grade values assigned to boreholes which formed a cluster.

The manganese tonnage was based on the average depth of the sampling pits, with 42 samples taken at different positions at an average depth of 2 m, the area covered by the mineralized zone was used to calculate the tonnage of the manganese resource.

4.4 Products and their proportionate quantities

The mine is planned to produce two categories of product, namely lump ore and fine ore for both iron ore and manganese. Tailings will comprise mainly of small size materials and considered as waste product as this will have a low commercial potential and there is no market to sell the product.

This classification is based on the customer requirements and the processing plant will be designed and operated to generate a final product within the size ranges. The list of products and annualized production quantities based on the different sizes are listed in the **Table 3.1** below:

Table 4.1: List of products and their proportionate quantities

| Product | Grade Estimated | Size Distribution | Quantity |
|----------------------------------|-----------------|-----------------------|---------------------|
| Lump Mn Ore | 36 - 38%Mn | -75 mm + 6 mm for Mn | 80 000 tons |
| | 54 - 64% | -25 mm +8 mm Fe for | 300 000 tons |
| Fines | > 35% Mn | -6 mm + 1.5 mm for Mn | 30 000 tons |
| | 54 - 64% Fe | -8 mm + 1 mm for Fe | 40 000 tons |
| Tailings | 20-25% Mn | -1.5 mm for Mn | 10 000 tons |
| | < 54% Fe | -1 mm for Fe | 20 000 tons |
| TOTAL ANNUAL PRODUCT TONS | | | 480 000 tons |

5. Proposed Mashwening Open-Cast Mine

The Mashwening Iron Ore Mine planned to utilize the open cast mining method for the whole life span of the mine. This type of mining involves considerable depth and will reach a maximum depth of about 49 m below the earth surface. The method involves pre-stripping of vegetation to clear the pit area, followed by the removal of topsoil and overburden to expose the ore.

Topsoil will be stockpiled separately to prevent mixing of the soil layers. Overburden material will be stockpiled separately from any topsoil. The iron and manganese ore will be removed, the overburden will be returned to the pit and the topsoil replaced.

The initial phase of mining will be to first exploit the detrital ore using excavators and latter the hard ore which will require blasting. In addition, the detrital ore will be loaded into a truck and transported to a crusher and in-field screening facilities for processing.

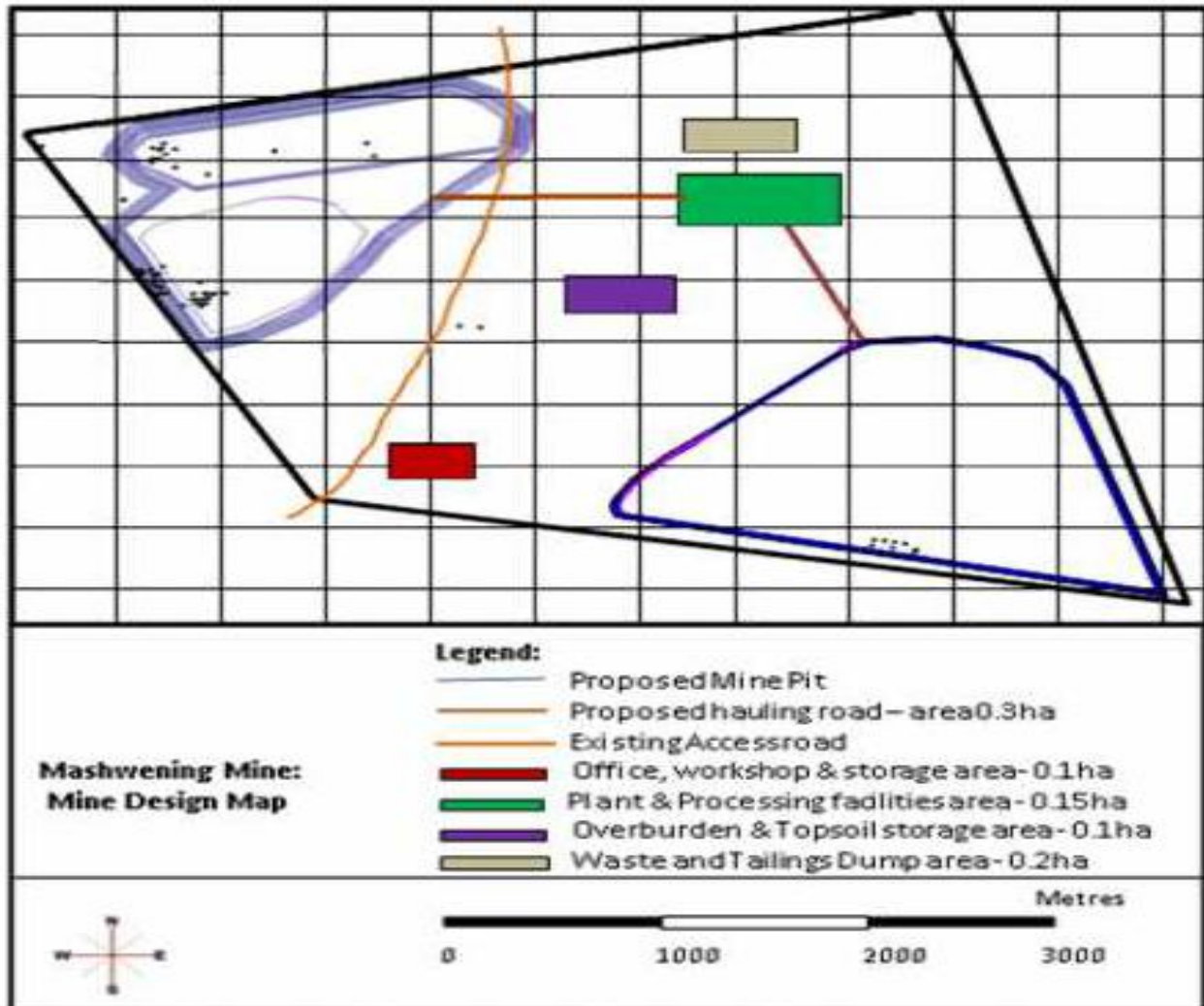


Figure 5.1: Conceptual Mine layout plan

After the depletion of detrital ore, and loose overburden having been removed to expose the hard ore and waste, mining benches will be created by drilling blast holes of between 150 and 160 mm in diameter to a depth of 6 m. These blast holes will be charged with explosives and blasted to fragment the ore and waste which will be loaded using excavators onto haul trucks for transportation to the crusher and in-field screening units. The blasting operations will be done on 6 m high benches, whilst loading operations will be done on 3 m high benches as a cycle. These bench heights will allow minimum contamination and maximum recovery of ore during the blasting and cleaning mining cycles. The cycle of blasting and loading activities being

carried out on the specified bench heights will be achieved by separating the blasted rock into two platforms.

6. The Proposed Ore Processing Plant

6.1 Plant Layout

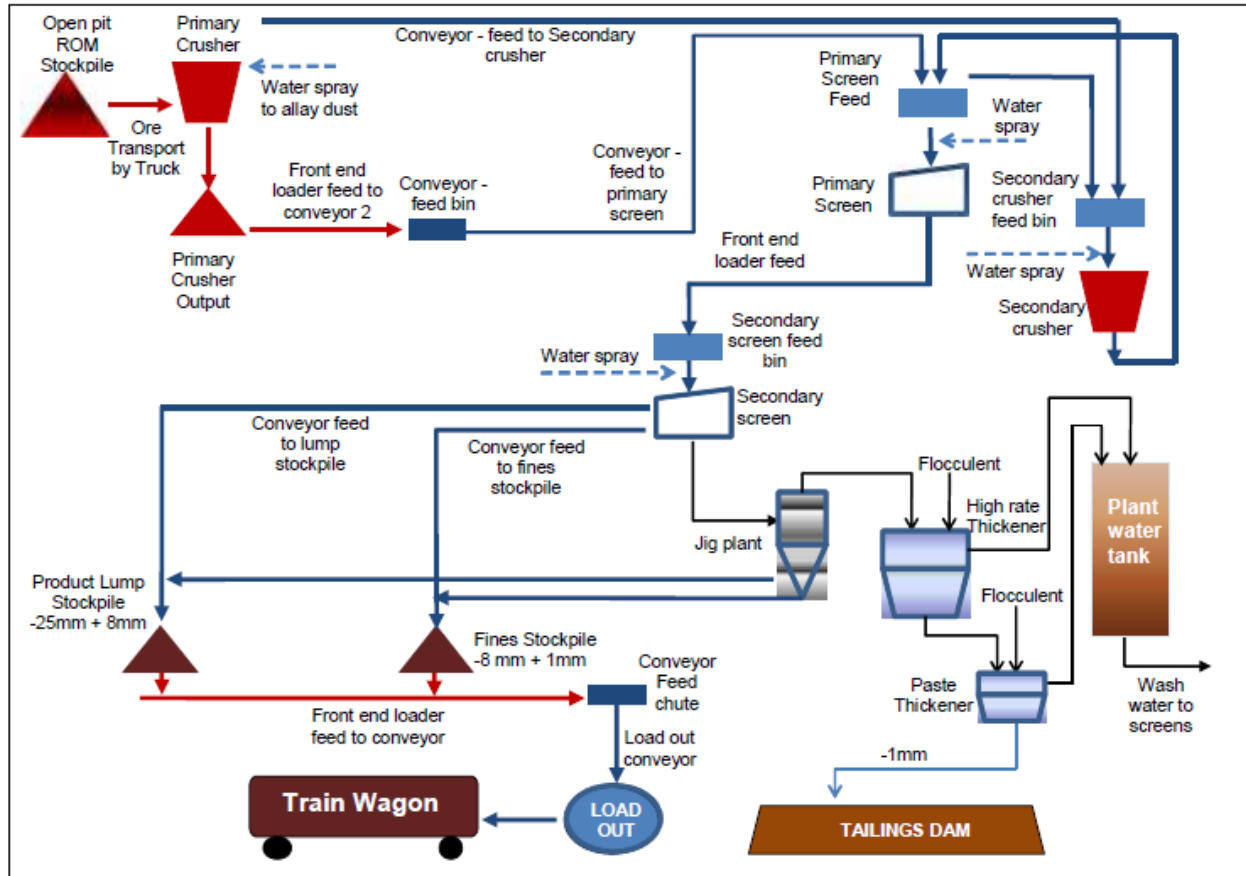


Figure 6.1: Processing plant flow process

6.2 Process

The plant and processing facilities will cover an area of about 0.15 hectares. The plant design will consist of two crusher units (primary and secondary crusher); two skid-mounted scalping screen units and a jigging plant to treat 100 tons/hour of -25+8mm feed material. Ore will be conveyed from the tipping point to the crusher units with a 1.5 m conveyor belt equipped with a variable speed drive, tipping the ROM material onto a 6.5 m³ feed bin. A sloped grizzly with 800 mm square apertures will be constructed above the feed bin for the protection of the jaw crusher. The crusher breakdowns the ROM into smaller size and in the process separate waste rock from ore.

After the crushing process is completed the ore will be passed through scalping screens to remove other waste and silica material as well as to produce the required product sizes. The first scalping screen will have a 50 mm top deck and a 25 mm bottom deck, whilst the second

screen a 25 mm top deck and 8mm bottom deck. The second screen will also utilize water to wet the product. The undersize materials from the two screens will be a saleable product of either -25 +8 mm or -8 +1mm. A jig plant will also be installed and will utilize water for a gravity separation process to upgrade the product for the two category sizes. Any material from the screens and the jig plant with a size of -1mm will be tailings and a cyclone will be installed for dewatering of fines prior to disposal at the slimes disposal site.

6.3 General Wastes Streams

The waste streams generated will be as follows:

Table 6.1: Waste streams identification

| Infrastructures | Waste Streams Identification |
|------------------------|---|
| Mine offices | (i) General wastes generated by the offices |
| Stockpiles | (i) Overburden stockpiles |
| | (ii) Ore stockpiles |
| | (iii) Waste rock stockpiles |
| Workshops | Hydrocarbon wastes generated by: (i) spillages (ii) operations of vehicles (iii) Diesel generators |
| Processing Plant | (i) Processing wastewater from thickener dam |
| | (ii) Tailings dam |
| | (iii) Sedimentation basin |

6.4 Project Alternatives

The EIA process, supported by the results of specialist studies will consider alternatives for the proposed developments under the following elements:

Alternatives for mining

The proposed mining method is open-cast. This method is depended on the nature of the ore body derived from the exploration results. Underground mining for this ore body is not feasible at this stage.

Alternatives for mineral processing

Processing option include processing and beneficiation technologies to achieve the required grade. Technologies for crushing, screening, selection, blending, dense medium separation and jigging of ore will be considered.

Alternatives for transport, power and water supply systems & services

Water Supply

- Options for mine water supply include Vaal-Gamagara Scheme (water pipeline), borehole water, mine water from the pit, surface run-off. All these option are considered with the understanding of the scarcity of water in the area.

Power Supply

- Power will be tapped from the existing powerline traversing the farm by establishing a sub-station specifically for the mine.
- Diesel powered generators will also be used.
- Solar panels will be considered as an alternate green energy source.

Transport

- Ore will be transported by trucks from the pit to the processing area.
- The use of conveyor belts will be considered.
- Transport of product from the mine to the market is by road and rail. The best cost-effective and environmentally friendly method must be evaluated.

No-go Option

This option means the project may not proceed, and this may have serious implications on the part of the proponent, seeing that a lot of resources were invested to bring the project to its current state. The area has been widely prospected and the results thereof are compatible with the other existing mining operations in the area. He no-go option implies that the mineral resources proven to be on the ground will be sterilized if not mined. This can be regarded as an economic opportunity loss.

7. BASELINE ENVIRONMENTAL SITUATION

7.1 Climate

The proposed mining operational area comprises of summer and autumn rainfall with very dry winters. The actual Mean Annual Precipitation (MAP) is about 358 mm. However, the maximum MAP can reach about 450 mm. The wet season occurs between the months of October to March. In addition, the mean monthly maximum and minimum temperatures is about 35.9°C and -3.3°C for January and June respectively. Frost is frequent usually occurs in winter seasons. The Mean Annual Evaporation (MAE) is in the range between 2200-2600 mm (Bassom and Rossouw, 2003).

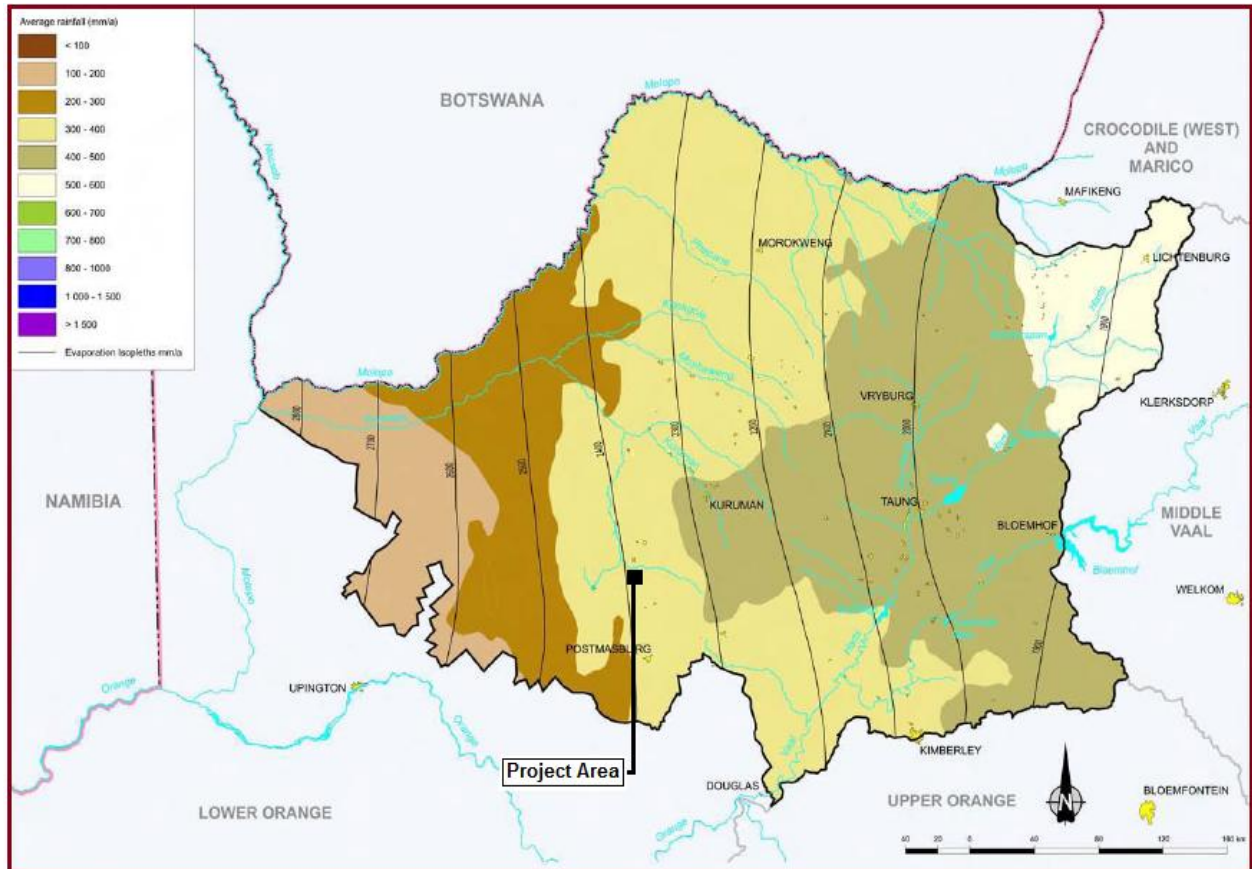


Figure 7.1: Climate of the study area (Bassom and Rossouw, 2003)

7.2 Wind

The most commonly occurring wind direction for Kathu region is SSE where the wind velocity is 3,0 m/s. Commonly the wind speed fluctuates between 1,6 m/s and 3,5 m/s although speeds in the range 3,6 m/s to 5,5 m/s are regularly recorded.

7.3 Soil and Land Capability

The project area is characterised by red wind-blown (0.3-1.2 m deep) sand (See Figure 7.2 below) and Hutton soil form mixed with manganese and iron ore rock deposits. The red wind-blown soil is mixed with the Hematite iron ore mineral deposits. Erosion is low due to the insufficient MAP and runoff volumes within the D41J catchment.



Figure 7.2: Example of the soil profile within the proposed mining area

7.4 Water Management Area

Significant spatial variations in climate, water availability, level and nature of economic development and growth are typical in South Africa. To enable improved representation of the water resources situation in the Water Management Area (WMA) under such varied conditions, and to facilitate the applicability and better use of information for strategic management purposes, the WMA was divided into sub-areas. Delineation of the sub-areas was based on practical considerations such as size and location of Sub-catchment, homogeneity of natural characteristics, location of pertinent water infrastructure, and economic developments (Basson and Rossouw, 2003).

The proposed mining project falls within the Lower Vaal Water Management Area (LV-WMA). This Water Management Area is one of the five WMA's in the Orange River Basin. In addition, major rivers within the LV-WMA include the Vaal River, Harts River, and the Molopa River. The Vaal River and the Harts River are located about 134.1 km and 136.45 km (Straight line) southeast of the study area.

The Vaal River System supplies the water resources needs of 60% of the national economy and serves 20 million people.

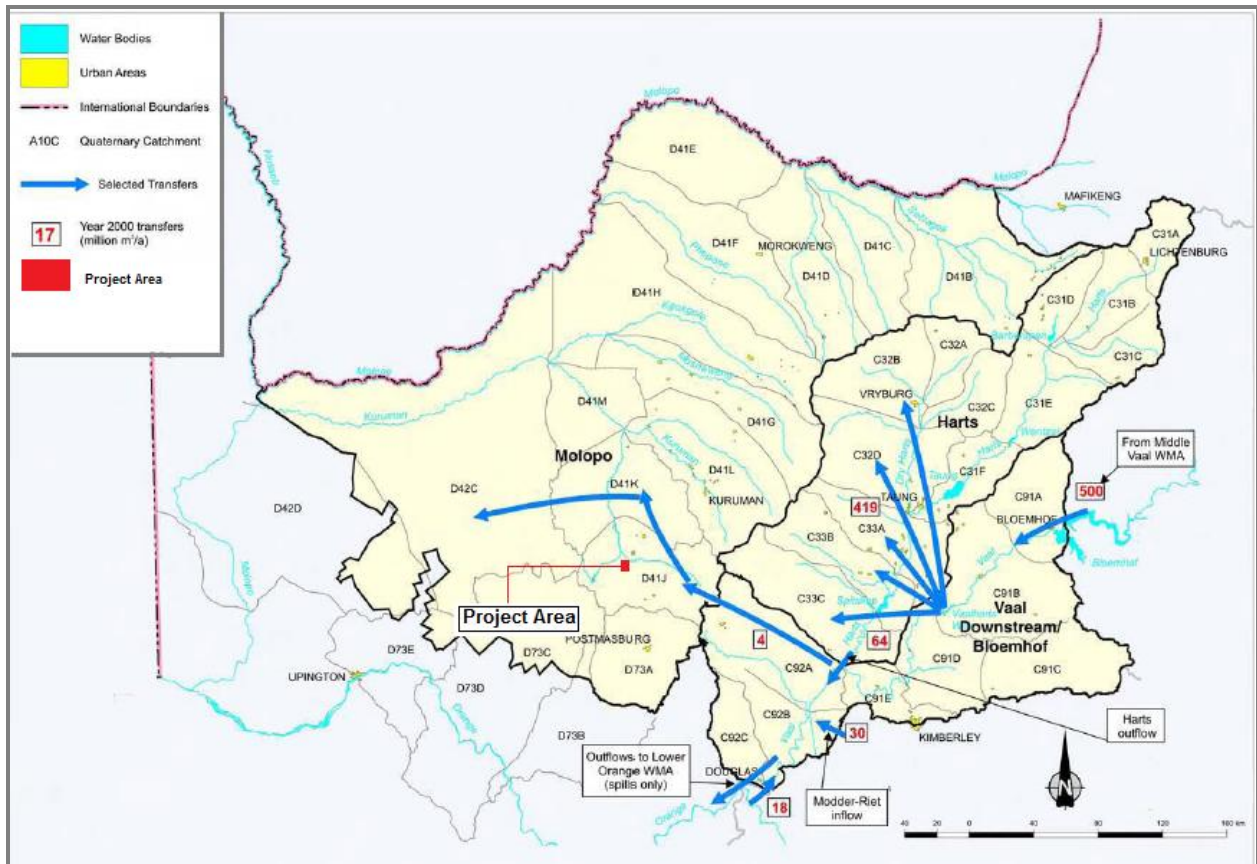


Figure 7.3: Lower Vaal Water Management Area (LV-WMA)

7.5 Hydrology

The proposed mining project falls within Quaternary Catchment D41J, with an area of about 3873.500 km². The farm comprises of drainage lines that experience ephemeral flow after significant rainfall events. Furthermore, the Olifantsloop River and the Ga-mogara River are the most important watercourse within the catchment. These non-perennial streams are not sufficient enough to be utilised as water sources.

In addition, the Ga-mogara River (88.037 km in length) straddles the Mashwening farm on the northern west periphery. The Olifantsloop River (42.492 km in length) is situated approximately 26.51 km west of the study area.

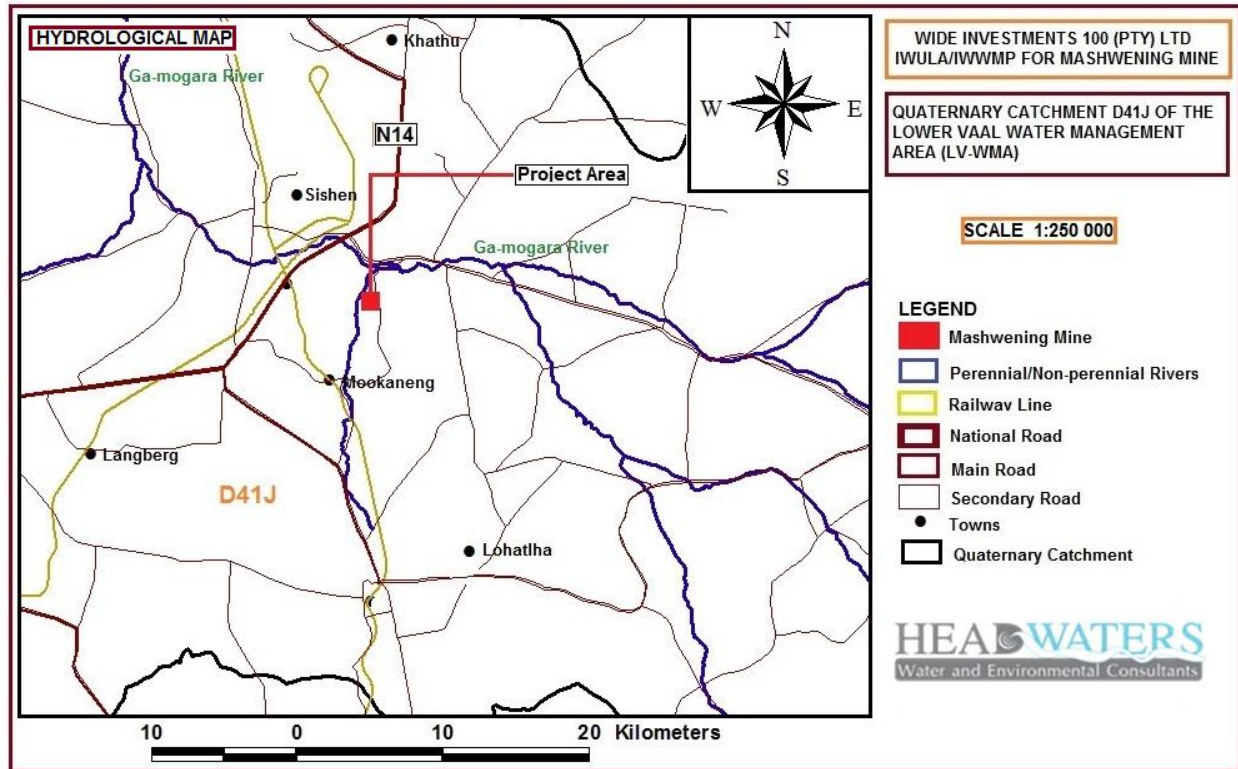


Figure 7.4: Hydrology of the Study Area

7.6 Surface Water Quality

South Africa is located in a predominantly semi-arid part of the world. The climate varies from desert and semi-desert in the west to sub-humid along the eastern coastal area, with an average rainfall for the country of about 450 mm per year, well below the world average of about 860 mm per year, while evaporation is comparatively high. As a result, South Africa's water resources are, in global terms, scarce and extremely limited in extent.

The Ga-mogara River as mentioned above is an intermittent water resource. There is a limitation in determining the water quality of this river as a result of insufficient baseflow, low MAP, low runoff potential, and the depth of occurrence of the piezometric surface that is confined aquifers.

7.7 Mean Annual Run-off (MAR)

As a result of the low rainfall, flat topography and sandy soils over much of the water management area, little usable surface runoff is generated in the water management area. The runoff which does occur, is highly variable and intermittent

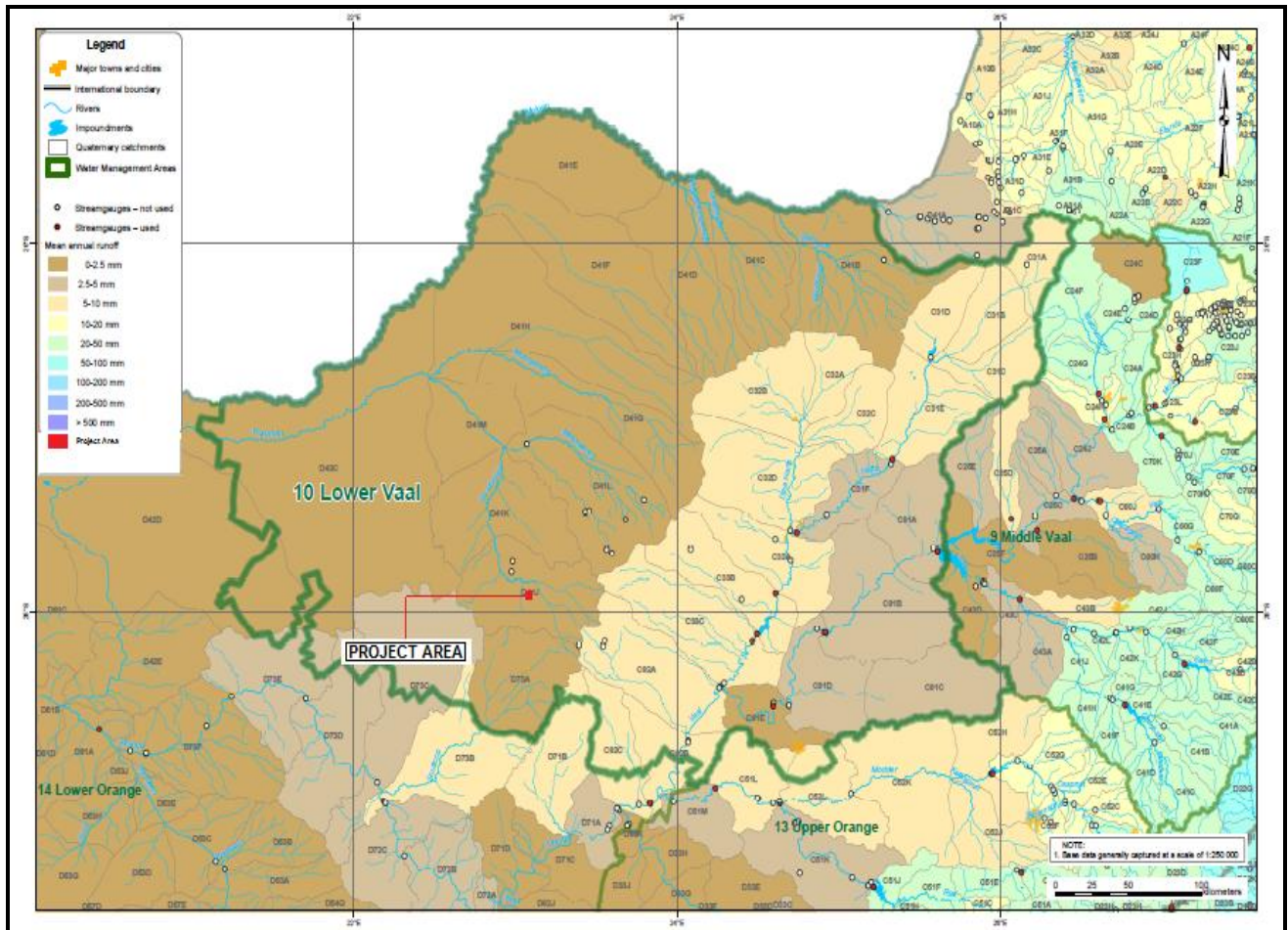


Figure 7.5: Runoff volume of the study area

The D41J Quaternary Catchment experiences a Mean Annual Runoff of about 1 mm (ArcView GIS 3.2a, 2000). Low runoff potential results due to high soil infiltration/percolation rates and vegetation cover. Rainfall infiltration into the soil depend upon soil moisture content, that is, if previously rainfall storm was sufficient, soil moisture content will be high given low evaporation rates.

7.8 Surface Water User Survey

Many mining operations, industries, and agricultural activities depend upon groundwater sources for water supply due to the lack of perennial surface water resources within the vicinity of the Khathu region including Sishen. The Vaal Gamagara Water Supply Scheme, abstracting water from the Vaal River just below the Harts River confluence. Furthermore, the scheme is situated approximately 80 km west of town of Kimberley, just outside Delportshoop. It consists of a raw water pump station, purification works, 6 booster pump station, several reservoir facilities, and a pipeline network of about 1700 km.

This scheme is of great importance to the Northern Cape Province, supplying water for domestic, industrial, and mining use. The water is abstracted, then purified and pumped by means of a high lift pump station to Kneukel some 20km away. From the Kneukel pump station

the water flow is boosted to the Tredwill pump station and Clifton reservoirs, which is situated near Lime Acres about 117 km from the purification plant. Clifton, the main storage facility, consists of 4 reservoirs with a combined capacity of 27 000m³. From Clifton water gravitates past Postmasburg and Kathu to reservoirs at Blackrock.

The scheme runs through six Water Service Authorities, that is, four Local Municipalities (Dikgatlong, Kgatelopele, Tsantsabane and Gamagara) and two District Municipalities (Kgalagadi and Frances Baard).

7.9 Water User Association

The proposed project falls under the Tshiping Water User Association (TWUA). The TWUA aims to promote sustainable use of water resources for the benefit of the ecology and all water users within the LV-WMA in Quaternary Catchment D41J and D73A of the Northern Cape Province. The association objectively aims to:

- Monitor and control the use of water from and on all water sources in the area of operation by way of privately owned waterworks;
- To make sure persons or organisations use and abstract water in accordance with water use authorizations as provided for in Sections 22(1) and 32 (1) (a) of the NWA.
- To exercise cost accounting from the user and user groups

7.10 Sensitive Areas Survey

There are no existing wetlands, dams, national parks, and archeological artifacts within the proposed mining area

7.11 Vegetation

The study falls within the Kuruman Thornveld (also known as Kalahari Thornveld and Shrub Bushveld and Kalahari Plains Thorn Bushveld) vegetation of the Savanna biome within the Eastern Kalahari Bushveld bioregion. The Savanna biome constitutes about 32% of South Africa`s biomes. Moreover, it is distributed (**See Figure 7.7 below**) in most parts of North-West Province and Northern Cape Province usually on the flats plains.

This type of vegetation has been largely disturbed by mining activities (Iron and Manganese Ore) and most disturbed areas are characterised by *Aristida adscensions*, *A. congesta*, *Enneapogon scoparius*, *Geigeria ornativa*, *Melhania rehmanii*, *Rhigozum trichotomum*, and *Sericorema remotiflora* and the absence of *Acacia erioloba*, *A. haematoxylon* and *Grewia flava* (Mucina and Rutherford, 2006).

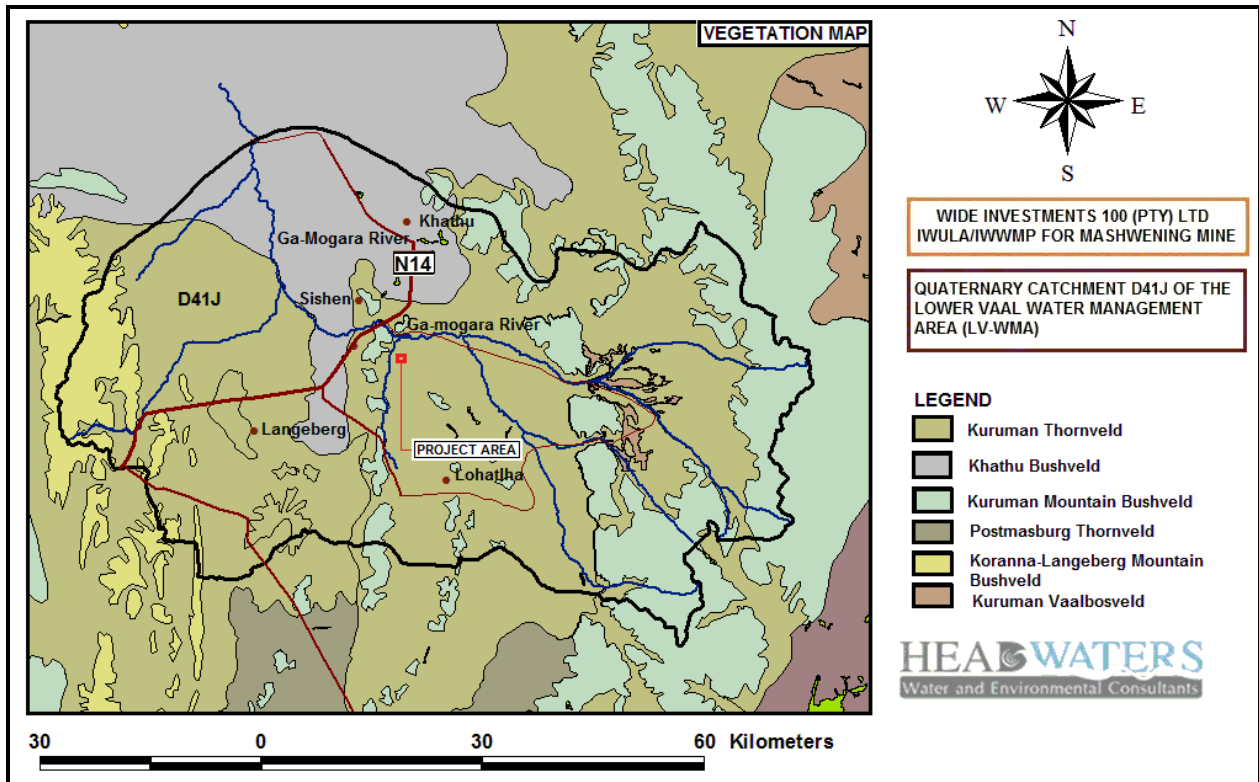


Figure 7.6: Vegetation distribution within the vicinity of the study area



Figure 7.7: The Kuruman Thornveld Vegetation

7.11.1 Flora

Tall Trees: *Acacia erioloba*

Small Trees: *Acacia mellifera* Subsp. *Detinens*, *Boscia albutrunca*

Tall Shrubs: *Grewia flava*, *Lycium hirsutum*, *Tarchonanthus camphorates*, *Gymnosporia buxifolia*

Low Shrubs: *Acacia hebeclada* subsp. *Hebeclada*, *Monechma divaricatum*, *Gnidia polycephala*, *Helichrysum zeyheri*, *Hermannia comosa*, *Pentzia calcare*, *Plinthus sericeus*

Geoxylic Suffrutex: *Elephantorrhiza elephantine*

Graminoids: *Aristida meridionalis*, *A. stipitata* subsp. *Stipitata*, *Eragrostis lehmanniana*, *E. echinochloidea*, *Melinis repens*

Herbs: *Dicoma schinzii*, *Gisekia Africana*, *Harpagophytum procumbens* subsp. *Procumbens*, *Indigofera daleoides*, *Limeum fenestratum*, *Nolletia ciliaris*, *Seddera capensis*, *Tripteris aghillana*, *Vahlia capensis* subsp. *vulgaris*

7.11.2 Other important Flora Species

Small Trees: *Acacia luederitzi* var. *luederitzii*, *Terminalia sericea*;

Tall Shrub: *Acacia haematoxylon*

Low Shrubs: *Blespharis marginata*

Graminoid: *Digitaria polyphylla*

Herb: *Corchorus pinnatipartitus*

7.11.3 Conservation Importance

The Kuruman Thornveld is a least threatened type of vegetation. Only about 2% of this vegetation is transformed. Soil erosion in the area is very low, due to the rocky environment providing soil stability during rainfall events. The 2 % which is transformed is largely due to the mining of Manganese and Iron ore minerals.

7.12 Topography

The vicinity of the proposed project is characterised by flat rocky plains and sloping hills with well developed, closed shrub layer and well-developed open tree stratum consisting of *Acacia erioloba*. There are more 8 manganese and iron ore mining operations located within the sides of the N14 national road following the mountainous terrains.

The Mashwening farm is rich in Manganese and Iron Ore minerals. The proposed mining operation lies between longitude 23.05 and latitude -27.86 at an altitude range of 1226-1247 above mean sea level (AMSL).

7.13 Groundwater

Many towns in the Northern Cape Province rely on dolomitic groundwater as their main source of water. Mining expansion programmes in the Northern Cape Province are dependent on water being available both for mining and domestic water supply. Current water supplies consists of local groundwater resources (boreholes and mine de-watering), and bulk water supplies from the Vaal Gamagara Water Supply Scheme pipeline. The groundwater exploitability potential within the D41J Quaternary catchment is in the range of 15 000- 25 000 m³/km²/a.

Major de-watering of groundwater aquifers for mining purposes occurs at Sishen, where up to 28 million m³ per year is abstracted from groundwater.

7.14 Groundwater Quality

The quality of groundwater in the water management area is generally good, although brackish (mineralised) water is found in the drier areas (Basson and Rossouw, 2003).

7.15 Socio-economic Status

The discovery of Iron and Manganese Ore minerals in the Northern Cape Province has instigated economic growth of the province and the country as well, that is, increase in the GDP. The single largest factor that has guided the development of the Gamagara area is the iron ore mine at Sishen. Not only does the mine provide jobs to thousands of people, but it was also the reason for the establishment of the town of Kathu. Kathu is the largest town within the municipality and not just an administrative centre for the municipality but is also serves as an economic centre for Gamagara Local Municipality.

7.16 Population

The population of the Gamagara municipal area has increased from 23 202 in year 2001 to 41 617 in 2011. According to the Gamagara 2013/2014 Integrated Development Plan (IDP) the population has increased by 5.84% per annum from 2001 to 2011. Furthermore, the Gamagara population consists mainly of black African, colored, white, and Indian or Asian people.

7.17 Employment

Majority of the population within the vicinity of the Gamagara region are employed and followed by those that are not economically active. Approximately 2% of the population falls under the discouraged workers category, while 8% of the population are unemployed.

8. Plan of Study for EIA and EMP

The Environmental Impact Assessment component will aim at:

- Addressing any issues that have been highlighted during the Scoping Phase;
- Assessing all identified impacts to determine the potential significance of the impacts; and
- Recommending mitigation measures for minimizing the significance of each impact.

The EIA phase will comprise of the following activities;

- Stakeholder Engagement;
- Assessing of Alternatives;
- Baseline and Specialist Studies;
- Identification of potential impacts
- Impact Assessment;
- Identification and Description of mitigation measures; and
- Reporting and decision-making.

8.1 Tasks to be undertaken as part of the EIA process

The authorisation process to be followed for Mashwening Iron Ore Mine has been designed to meet the requirements of both the Mineral Petroleum Resource Development Act (Act 28 of 2002) and National Environmental Management Act (Act 107 of 1998; amended 2006). The authorisation process will include:

- Scoping Phase:
 - Stakeholder Notification;
 - Authority Consultation;
 - Capturing of Issues and Concerns;
 - Compilation of a Stakeholder Database;
 - Identification of Potentially Significant Impacts;
 - Identification of Potentially Sensitive Environmental Aspects;
 - Identification of Required Specialist Studies;
 - Compilation of a Scoping Report (this document), including:
 - ❖ Plan of Study for EIA/EMP Amendment.
 - ❖ Issues Report; and
 - Stakeholder Review of Documentation;
 - Submission and approval of Scoping Report by relevant authorities.
- Impact Assessment Phase:
 - Undertake necessary specialist studies;
 - Assessment of environmental impacts;
 - Compilation of management plans;

- Compilation of an EMP Amendment Report;
- Stakeholder document review and comment;
- Submission of final report for decision-making.

The EMP Amendment Report will include a description of the proposed project, a list of identified environmental aspects that will potentially be impacted upon by the excavation of the expansion projects, an Impact Assessment for these aspects, and an Environmental Management Programme for the mitigation and management of the identified impacts.

8.2 Specialist Studies

In order to assess the environmental, social and cultural impacts of the proposed Mashwening Iron Ore Mine, a number of specialist studies will be commissioned. The findings of these studies will be incorporated into the Environmental Impact Assessment Report (EIR). The specialist studies consider the proposed structure and activities of the operations, as well as the associated risks to the receiving physical and socio-cultural environment.

The following aspects of the biophysical environment will be considered in the baseline studies:

- Surface Water;
- Groundwater;
- Noise;
- Air Quality;
- Vegetation and Fauna;
- Heritage and Archaeology;
- Traffic;
- Soil;
- Land Use;
- Visual Aspects.

The following environmental specialists were appointed to undertake these studies:

Table 8.1: Specialist studies and objectives

| Specialists studies | Consultant | Objectives of the study |
|--|---------------|---|
| Surface Water Baseline and Impact Assessment | Headwaters CC | <ul style="list-style-type: none"> • Determining which quaternary sub-catchment the site falls into using the “Surface Water Resources of South Africa – 1990” Vol 3 (Midgley, Pitman & Middleton, 1995) (WR90); • Assessing the rainfall stations in the area and selecting one based on distance from site, reliability and length of record; |

| | | |
|--|---------------|--|
| | | <ul style="list-style-type: none"> • Determining the Mean Annual Run-off (MAR) using the Soil Conservation Service Curve Number (SCS-CN) Model; • Delineating the site into areas with different runoff characteristics in order to determine the volume of run-off that could be expected for the area; • Determination of the 1:50 and 1:100 year floodlines. |
| Groundwater Baseline and Impact Assessment | Headwaters CC | <ul style="list-style-type: none"> • Review of mining project information; • Review of available Hydrocensus; • Groundwater conceptual model; • Topographical analysis and surface drainage patterns; • Groundwater levels and contour mapping; • Steady State Groundwater Flow Model; • Groundwater quality data analysis; • Groundwater balance; • Geohydrological Report Compilation. |
| Integrated Water Use Licence Application/ Integrated Water and Waste Management Plan (IWWMP) | Headwaters CC | <ul style="list-style-type: none"> • Department of Water Affairs: Water Use Licencing forms DW 758, DW 773, DW 774, DW 767, DW 805, DW 784, DW 905, DW 790, DW 901, DW 902, DW 788; • 1:50 000 topographic Map; • Section 27 motivation; • Geohydrological Report; • Stormwater Management Plan (SMP); • Public Participation Process (PPP); • Water and Salt Balance Model; • Civil designs; • Application fee R114.00; • Title Deeds. • A pre-application meeting took place with the Department of Water Affairs at Kimberley in the Northern Cape Province on the 26 September 2013. At the meeting, discussions were held regarding the Integrated Water Use License Application (IWULA) and Integrated Water and Waste Management Plan (IWWMP) that are required by |

| | | Mashwening Iron Ore Mine. |
|---|-------------------------------------|--|
| Archaeological Assessment | Vhubvo Archaeo-Heritage Consultants | <p>Desktop Study:</p> <ul style="list-style-type: none"> • Consult heritage databases; • Undertaking of brief study (prehistory); • Analyzing previous work undertaken in the project area; <p>Fieldwork:</p> <ul style="list-style-type: none"> • Foot Survey of the project area; • Vehicle survey of the project area; • GPS logging • Mapping; • Photographing; • Description of the heritage resources, grave sites, and cultural landscapes |
| Ecological Assessment | Zen Environmental Consultants | <ul style="list-style-type: none"> • Description of the habitat integrity; • Identification of the presence or likelihood of occurrence of Red Data floral and faunal species; • Identification of “no-go” areas and ecologically valuable habitats on a sensitivity map. |
| Soil and Land Capability Assessment | Zen Environmental Consultants | <ul style="list-style-type: none"> • Assess the erodability and misuse of soils, mapping land use and land capability, • Formulation of a soil stripping plan, determination of chemical, mineralogical and physical properties of soil forms, assess the suitability of soils for rehabilitation • Recommendation to mitigate impacts. |
| Air Quality Study | | <ul style="list-style-type: none"> • Assess the expected impacts during construction and operation and identify emission reduction opportunities and cost effective emission abatement strategies |
| Air Quality Monitoring Baseline Study and Impact Assessment | Zen Environmental Consultants | <ul style="list-style-type: none"> • Identification of potential routine sources of emission; • Quantifying potential routine sources of emission; • Location of dust fallout buckets; • Evaluation of potential for human health and environmental impacts. |
| Social Impact | | |

| | | |
|---------------------------|-----------------------------|--|
| Assessment | | <ul style="list-style-type: none"> • To identify relevant social aspects and predict the anticipated future social developments and/or changes in the receiving human environment; • Provide a baseline study describing the socio-economic factors of the affected population; • Assess negative and positive impacts associated with the project; • Identify feasible mitigation measures and benefits related with the project. |
| Traffic Impact Assessment | Jomela Consulting (Pty) Ltd | <ul style="list-style-type: none"> • Collection of traffic information to determine the status quo; • Determination of the trip generation due to the mine establishment; • Assessing the impacts of the trip generated by the mine; • Public transport provision for mine employees. |

8.3 Methodology for Assessing Environmental Issues and Alternatives

According to NEMA, 1998 (Act No.107 of 1998), the *environment is described as the surrounding within which human exist and that are made up of:*

- (i) *the land, water and atmosphere of the earth;*
- (ii) *micro-organisms, plant and animal life;*
- (iii) *any part or combination of (i) and (ii) and the interrelationships among and between them; and*
- (iv) *the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.*

This means that impact analysis will focus on the biophysical, cultural, and socio-economic environment. Mashwening mining activities will alter the status of the environment.

The level of change determines the significance of a change, which is assessed in terms of spatial extent, magnitude, duration, probability, irreplaceable, and reversibility. This informs the assessment, whether the changes are significant impacts, or not.

Mitigation measures for the likely impacts will be described in the environmental management programme (EMP) to prevent and reduce environmental risks. Furthermore, recommendations from the studies undertaken by specialists will also reduce the significance of negative potential impacts identified.

The broad objective of the Environmental Impact Assessment is to determine whether or not the proposed mining operation is likely to cause significant environmental impacts. A detailed description of the assessment methodology is as follows:

Table 8.2: Assessment components, ranking scales and descriptions

| Assessment components | Ranking scales and description |
|--|---|
| <p>Magnitude of Negative Impacts (at the indicated spatial scale)</p> | <p>10 – Very high: Biophysical and/or social functions and/or processes might be severely altered. 8 – High: Biophysical and/or social functions and/or processes might be considerably altered. 6 – Medium: Biophysical and/or social functions and/or processes might be notably altered. 4 – Low: Biophysical and/or social functions and/or processes might be slightly altered. 2 – Very Low: Biophysical and/or social functions and/or processes might be negligibly altered. 0 – Zero: Biophysical and/or social functions and/or processes will remain unaltered.</p> |
| <p>Magnitude of Positive Impact (at the indicated spatial scale)</p> | <p>10 – Very High (positive): Biophysical and/or social functions and/or processes might be substantially enhanced. 8 – High (positive): Biophysical and/or social functions and/or processes might be considerably enhanced. 6 – Medium (positive): Biophysical and/or social functions and/or processes might be notably enhanced. 4 – Low (positive): Biophysical and/or social functions and/or processes might be slightly enhanced. 2 – Very Low (positive): Biophysical and/or social functions and/or processes might be negligibly enhanced. 0 – Zero (positive): Biophysical and/or social functions and/or processes will remain unaltered.</p> |
| <p>Duration</p> | <p>5 – Permanent 4 – Long Term: Impact ceases after Operational Phase/Life of the activity 3 – Medium Term: Impact might occur during the Operational Phase/life of the activity. 2 – Short Term: Impact might occur during the Construction Phase. 1 – Immediate</p> |
| <p>Extent (or spatial scale/influence at impact)</p> | <p>5 – International: Beyond National boundaries. 4 – National: Beyond Provincial boundaries and within National boundaries. 3 – Regional: Beyond 5 km of the proposed mine and within Provincial boundaries. 2 – Local: Within 5 km of the proposed mine. 1 – Site Specific: On site or within 100 m of the boundary of the mine lease area. 0 – None</p> |
| <p>Irreplaceable loss of resources</p> | <p>5 – Definite loss of irreplaceable resources. 4 – High potential for loss of irreplaceable resources. 3 – Moderate potential for loss of irreplaceable resources. 2 – Low potential for loss of irreplaceable resources. 1 – Very Low potential for loss of irreplaceable resources. 0 – None</p> |
| | |

| | |
|------------------------------------|---|
| Reversibility of impact | <p>5 – Impact cannot be reversed. 4 – Low potential that impact might be reversed. 3 – Moderate potential that impact might be reversed. 2 – High potential that impact might be reversed. 1 – Impact will be reversible. 0 – No impact.</p> |
| Probability (of occurrence) | <p>5 – Definite: >95 % chance of the potential impact occurring. 4 – High probability: 75 % - 95 % chance of the potential impact occurring. 3 – Medium probability: 25 % - 75 % chance of the potential impact occurring. 2 – Low probability: 5 % - 25 % chance of the potential impact occurring. 1 – Improbable: < 5 % chance of the potential impact occurring.</p> |
| Cumulative impacts | <p>High: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Medium: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional, or national concern.</p> <p>Low: The activity is localised and might have a negligible cumulative impact.</p> <p>None: No cumulative impact on the environment</p> |

Table 8.3: Calculation and definition of significance ratings (positive and negative)

| |
|---|
| <p>Once the evaluation components have been ranked for each impact, the significance of potential impact area assessed (or calculated) using the following formula:</p> |
| <p style="text-align: center;">Significance Points = (magnitude + duration + extent + irreplaceable + reversibility) × probability</p> |
| <p>The maximum value is 150 Significance Points. The unmitigated and mitigated scenarios for each environment impact should be rated as per the table below.</p> |

| Significance Points | Environmental Significance | Description |
|---------------------|----------------------------|--|
| 125 – 150 | Very High (VH) | An impact of very high significance will mean that the mining project cannot proceed, and that impacts are irreversible, regardless of available mitigation options. |
| 100 - 124 | High (H) | An impact of high significance which could influence a decision about whether or not to proceed with the proposed mine, regardless of available mitigation options. |

| | | |
|---------|---------------------|---|
| 75 - 99 | Medium – high (MH) | If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with the proposed mine. Mitigation options should be re-evaluated. |
| 40 – 74 | Medium (M) | If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with the proposed mine. |
| <40 | Low (L) | An impact of low significance is likely to contribute to positive decisions about whether or not to proceed with the proposed mine. It will have little real effect and is unlikely to have an influence on project design or alternative motivation. |
| + | Positive Impact (+) | A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the proposed mine. |

8.4 Public Participation Process

It is a legal requirement of the South African constitution that interested and affected parties are provided with sufficient information for any proposed project which will involve altering the status of the environment. In terms of regulation 55(6) of the NEMA, the applicant must notify interested and affected parties about the designated project.

Furthermore, regulation 2(4)f under the principles of NEMA further states that: *the participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantage persons must be ensured.*

The aim of the public participation process (PPP) is to provide interested and affected parties with an opportunity to :

- Inform interested and affected parties about the mining project
- To obtain stakeholder views and concerns;
- Promote integrity and human rights (Bill of Rights);

8.4.1 Interested and Affected Parties

An Interested and Affected Party is a juristic person or an association of persons with a direct interest in the proposed or existing operation or who may be affected by the proposed or existing operation.

The majority of the stakeholders on the database are comprised of individual, associations, companies, organisations, municipal representatives, and government departments. Refer to **Appendix A** for the Interested and Affected Party list.

8.4.2 Project Announcement and Invitation to Participate

Interested and Affected Parties were informed about the proposed mining operation by means of telephone conversations, email correspondences, faxes, and registered mail. Refer to **Appendix D** for record of communication with stakeholders.

Background Information Document

Interested and Affected Parties were provided with the project Background information Document (BID) describing the proposed mining activity, environment likely to be affected, the likely impacts envisaged, and the consultation process to be followed. Refer to **Appendix A** for the BID.

8.4.3 Advertisements and Site Notices

Newspaper Advert

Advertisements were placed in the following two newspapers in both English and Afrikaans languages to announce the project and to invite interested and affected parties to register:

- Diamonds Fields Advertiser (02 October 2013);
- Khathu Gazette (05 October 2013);

These newspapers covers the both the local communities and the whole of Northern Cape Province. Refer to **Appendix A**for copies of newspaper advertisements.

An A3 colour sized English notices were placed at the following sites on the 26 October 2013:

- Kuruman Post Office;
- Khathu Post Office;
- Dingleton Post Office;
- Kuruman Library;
- Gamagara Library;
- Kuruman Local Municipality;
- Gamagara Local Municipality;
- John Taolo Gaetsewe District Municipality;
- Mashwening 557 farm entrance point;
- Diro Mining entrance and offices;
- Helpebietjie Mine security gate office.

Refer to **Appendix G** for site notices.

8.4.4 Public Meeting

A public meeting will be held with interested and affected parties for the compilation of the Environmental Management Programme (EMP) amendment report.

Authorities pre-application meetings were held with the Department of Water affairs and the Department of Environment and Nature Conservation at the Northern Cape Region.

8.4.5 Public Review

Interested and Affected parties will be provided with a review period prior to the final compilation and submission of the report to authorities. This is to offer the public an opportunity to get acquainted with the Draft Scoping Report and to give comments. Communications lines will be drawn between the consultant (Jomela Consulting (Pty) Ltd) and I & APs through the use of electronic mail, telephone, postmail and fax mail. The report will be available for review at the following places:

Table 8.4: Draft Scoping Report distribution

| DISTRIBUTION PLAN | |
|-----------------------------|--|
| Objectives | Authorities |
| Draft Submission for Review | <ul style="list-style-type: none"> • Department of Environment and Nature Conservation (DENC); • Department of Mineral Resources (DMR); • Department of Water Affairs (DWA); • South African Heritage Resources Agency (SAHRA) website (SAHRIS); |
| | Public Review |
| | <ul style="list-style-type: none"> • Gamagara Library; • Consultant Website • All identified I&APs |

8.4.6 Further Opportunities to Participate

Throughout the process the consultant has communicated with registered stakeholders by means of telephone conversations, email correspondences, faxes, and registered mail. All comments received through the process have been documented in the Issues register. This method of communication will be continued throughout the process until a decision is reached by authorities.

9. Conclusions

The Scoping Report and Plan of Study for the EIA describe the activities that will be undertaken for the proposed mining project at Mashwening Iron Ore Mine. It provides a description of the biophysical, cultural and socio-economic environment to ensure that all risks and issues are taken into consideration in all phases of the planned development. Mashwening mining activities will have the potential to change the status of the environment.

This draft has also identified all baseline studies to be incorporated within the environmental impact process.

All the risks and issues identified with associated mitigation measures will be discussed in detail in the Environmental Impact Assessment Report and Environmental Management Programme.

Comments from the Interested and Affected Parties about this Draft Scoping Report will be forwarded to Jomela Consulting before the end of the public review period (30 days). All comments raised by stakeholder will be incorporated within the final Scoping Report.

Public Participation Process will be continuous through the overall environmental impact assessment. The plan of study has been described in full for the whole EIA process.

APPENDIX A

NEMA LIST ACTIVITIES

| GNR 544 Listing Notice 1: Activities requiring an environmental authorisation subject to a Basic Assessment | | |
|--|---|--|
| Notice | Activity No (s) (in terms of the relevant or notice) | Description of the Listed Activity |
| GNR 544 | Activity 9 | The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water- (i) with an internal diameter of 0.36 metres or more; or (ii) with a peak throughput of 120 litres per second or more, excluding where: a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve. |
| GNR 544 | Activity 10 | The construction of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more. |
| GNR 544 | Activity 12 | The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 19 of Notice 545 of 2010. |
| GNR 544 | Activity 13 | The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres; |
| GNR 544 | Activity 22 | The construction of a road, outside urban areas, (ii) where no reserve exists where the road is wider than 8 metres. |
| GNR 545 Listing Notice 2: Activities requiring an environmental authorisation subject to a Scoping and Environmental Impact Assessment. | | |
| GNR 545 | Activity 15 | Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; |
| GNR 545 | Activity 19 | The construction of a dam, where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more |
| GNR 545 | Activity 20 | Any activity which requires a mining right or renewal thereof as contemplated in sections 22 and 24 respectively of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). |

APPENDIX B

RECORD OF INTERESTED AND AFFECTED PARTIES CONSULTATION

APPENDIX C

PHASE 1 HERITAGE IMPACT STUDY