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# Exxaro Leeuwpan Coal EIA and EMP Consolidation Project

## Scoping Report

in terms of National Environmental Management Act, 1998

(Act No. 107 of 1998)

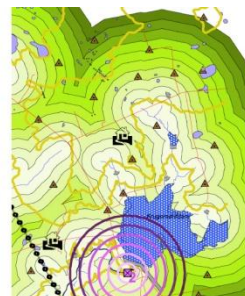
Version - Draft for I&AP Comments

January 2013

Exxaro Leeuwpan Coal

GCS Project Number: 11-447

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EIA and EMP Consolidation Project**

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## EXECUTIVE SUMMARY

### Introduction

Exxaro Leeuwpán Coal Mine (Leeuwpán) is located between 3- and 6km south east of Delmas, in the Victor Khanye Local Municipality. It further falls under the Nkangala District Municipality in the Mpumalanga Province.

Leeuwpán is an operational mine, and operates according to the previous approved Environmental Management Programme (EMP) that were submitted to the then Department of Minerals and Energy (DME), now the Department of Mineral Resources (DMR), thus making Leeuwpán a lawful mining operation as stated under the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA).

The proposed Leeuwpán Project has been initiated to fulfill the request of the DMR and will entail the consolidation of the current EMP and EMP Addendums into one consolidated Environmental Impact Assessment and Environmental Management Programme (EIA/EMP) in terms of the MPRDA. Leeuwpán will further utilize this opportunity to include a proposed opencast block (referred to as Block OI). The result of this consolidated EIA/EMP will be to have all information in one document for easy reference and effective environmental management.

### Background

Leeuwpán mine began as Iscor, doing extensive exploration, and the first box-cut was opened in 1992. In 1995 the original EMP for the Kenbar and Witklip sections at Leeuwpán was conducted. The reserves for the Kenbar and Witklip sections were 15.97 Mt Raw Coal Product (RCP) and 5.29 Mt RCP respectively.

The original EMPR was updated in May 1996, in the form of Addendum 1. In 1997 Leeuwpán Management proposed mining a small additional area (Block OE) of approximately 3ha, on section 4 of Witklip 229 IR, which was not part of the original EMP investigation or the updated document (Addendum 1). A number of changes with regards to environmental management, particularly with respect to water management, also came about at Leeuwpán Colliery during 1997, and was to be addressed in Addendum 2.

Addendum 3 was compiled in 2003 for the mining of blocks OD, OFPAD (the road reserve area associated with the provincial R548 road to Devon), OH and OM, of which the Mineral rights were all owned by Kumba Resources. Addendum 4 was later compiled for the extension of Block OJ and OL on the Farm Moabsvelden 248 IR. This property was then owned by Exxaro Coal.

In 2007 an EIA / EMP (Addendum 5) was compiled for Exxaro Coal for the mining of Block OWM on the farms Weltevreden 227 IR (Portion 7) and Moabsvelden 248 IR (Portions 1, 4, 5 and 6); an extension of the existing Block OD on the farm Wolvenfontein 244 IR (Portion 8); and Block UI to be mined on the farm Rietkuil 249 IR (Portions 1 and 2). However, only that part of Block OWM that was to be mined on the farm Moabsvelden 248 IR (Portion 4) formed part of the existing Leeuwpán Mining Rights area. Thus, Leeuwpán submitted applications for a mining authorisation in terms of Section 22 of the MPRDA to the then DME for the remaining farm portions, in October 2004. It was planned that bord-and-pillar underground mining of Block UI would commence during 2011 and continue until 2041. This has not happened and the mining method for the resource was reconsidered.

Currently Leeuwpán is evaluating the potential open cast mining of the coal reserves on the farms Rietkuil 249 IR and Moabsvelden 248 IR (Block OI) within its mining right area. The purpose of the proposed open cast development will expand the current mining operations.

### **Environmental process**

The project environmental process will be undertaken in three (3) parallel processes namely the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) process for all the associated listed activities, the MPRDA process to develop an EIA/EMP for the DMR, and the National Water Act, 1998 (Act No. 36 of 1998) (NWA) process regarding the water uses that will be associated with the proposed development.

As part of the process, an Integrated Water Use License Application (IWULA) and Integrated Water and Waste Management Plan (IWWMP) will have to be submitted in terms of the NWA, an Environmental Scoping Report (ESR) and EIA/EMP Report are to be compiled and submitted in terms of the NEMA and MPRDA.

This ESR provides an overview of the project and details the potential environmental issues and alternatives identified to date. The report also provides information regarding the environmental application process that has been followed to date and the processes that will be followed during the remainder of the project.

A brief description of the environmental setting including the geology, climate, topography, soils, land use, vegetation, animal life, surface water, groundwater, wetlands, air quality, noise, sites of archaeological and cultural interest, landscapes and the socio-economic status associated with the Leeuwpan operation are detailed in this ESR.

### **Proposed Infrastructure**

New infrastructure and activities that will be associated with the Proposed Block OI development, and that needs to be approved under the NEMA includes, but are not only limited to, are:

- Water pipelines (from OI) and Pipelines between PCDs
- Stormwater Drains, Trenches and Cut-off trenches
- Clean and Dirty water systems
- Evaporation dam
- Crushing and Screening plant
- Weirs
- Plant buildings
- Pollution control dams
- Silt dams
- Explosive magazine
- Mining of OI
- Construction of new and extension of existing haul roads (From OI to existing roads)
- ROM en Product Stockpiles
- Backfilling of discard material,
- Existing return water dams will be put back in use - combined capacity of 80000 Cubic metres

- Diesel Storage of 1000 cubic metres - Fuel Depot.

The proposed block OI will be situated on the following farm portions:

SG Number	Farm	Portion	Owner detail
TOIR00000000024800002	MOABVELDEN 248	Portion 02	Exxaro Coal Pty Ltd
TOIR00000000024800003	MOABVELDEN 248	Portion 03	Exxaro Coal Pty Ltd
TOIR00000000024800010	MOABVELDEN 248	Portion 10	Exxaro Coal Pty Ltd
TOIR00000000024800016	MOABVELDEN 248	Portion 16	Exxaro Coal Pty Ltd
TOIR00000000024900001	RIETKUIL 249	Portion 01	Hannes Potgieter Trustfonds
TOIR00000000024900002	RIETKUIL 249	Portion 02	Hannes Potgieter Trustfonds

### Public Participation

The Public Participation Process (PPP) has been initiated as part of the requirements of the NEMA; MPRDA; and NWA. A Background Information Document (BID) has been sent to all stakeholders and Interested and Affected Parties (IAPs) on the existing Leeuwpán database and the identified stakeholders as per the requirements of the NEMA and MPRDA. The database is being updated continuously as new stakeholders and/or IAPs register for the project.

Advertisements regarding the project background and the assessment process being followed were placed in the following newspapers:

- The Citizen on 9th of November 2012; and
- Streeknuus on 16th of November 2012.

Site notices regarding the project background and the assessment process being followed were also put up around the project site.

### Possible impacts

As mentioned before the proposed infrastructure and mining activities will be located on portions of which the mineral rights belong to Exxaro, and certain portions of these farms are privately owned and utilised for agricultural practices.

The EIA/EMP report which will follow the ESR will assess the current state of the environment in terms of where approved infrastructure is situated. The detailed specialist assessments will then be undertaken within the area of the proposed infrastructure to establish the additional impacts and also the cumulative impacts in terms of a holistic EMP.

Possible impacts are as follows:

- Loss of geological strata due to the removal of coal resources;
- A potential impact from the proposed mining and additional infrastructure on topography;
- Soil erosion;
- Disturbance to the functionality and productivity of the soil;
- Chemical soil pollution;
- Soil compaction;
- Land capability may be reduced to wilderness;
- Possible impacts on threatened and protected flora;
- Possible habitat destruction and modifications;
- Possible disruption of ecosystem service on primary grassland patches;
- Increased fragmentation and loss of ecological connectivity;
- Dewatering of the groundwater;
- Potential contamination of the groundwater resources;
- Loss of wetlands;
- Potential increase in dust dispersion due to mining activities;
- Noise from the earthmoving equipment, and operations might impact on the surrounding environment;
- Decrease in property values of the site;
- Increase in Economic Output/production due to Project Activities - positive;
- Loss of Productive Agricultural Assets and loss of Agricultural Production;
- Presence of temporary workers disrupting communities;



- Possible increased traffic demand; and
- Safety of the local communities (in terms of pedestrian movement).

All impacts and remedial measures will be presented to the registered stakeholders on completion of the environmental investigations during the EIA/EMP Phase.

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## 1 BACKGROUND AND INTRODUCTION

### 1.1 Introduction

Exxaro Leeuwpán Coal Mine (Leeuwpán) is located between 3- and 6 km south east of Delmas, in the Victor Khanye Local Municipality. It further falls under the Nkangala District Municipality in the Mpumalanga Province. In 1991, the mine began as an Iscor mine, doing extensive exploration and the first box-cut was opened in 1992.

The district forms part of the Highveld maize production area of Mpumalanga, and is mainly used as cultivated farm land except for those areas not suitable, which are utilized for grazing.

Leeuwpán is an operational mine, and operates according to the previous approved Environmental Management Plans (EMP's) that were submitted to the Department of Minerals and Energy (DME), now the Department of Mineral Resources (DMR), thus making Leeuwpán a lawful mining operation as stated under the Mineral and Petroleum Resources Development Act, 2002 (Act no. 28 of 2002) (MPRDA).

The mine is situated in the upper reaches of the Bronkhorstspuit catchment. A section of the Bronkhorstspuit on the farm Kenbar 257 IR was diverted to keep water out of the open pit. A section of a tributary to the Bronkhorstspuit on the farm Witklip 229 IR was also diverted to prevent water from flowing into the open pit. In addition and in order to prevent the tributary of the Bronkhorstspuit from flowing into the proposed Block OWM pit, the construction of a river diversion was also deemed necessary on the farms Weltevreden 227 IR and Moabsvelden 248 IR.

The proposed Leeuwpán Project has been initiated to fulfill the request of the DMR and will entail the consolidation of the current EMP and EMP Addendums into one consolidated Environmental Impact Assessment and Environmental Management Programme (EIA/EMP) in terms of the MPRDA. Leeuwpán will further utilize this opportunity to include a proposed opencast block (referred to as Block OI). The result of this consolidated EIA/EMP will be to have all information in one document for easy reference and effective environmental management.

The DMR previously approved the Block OI mining as underground, however further studies have indicated the feasibility for open cast mining methods in this area, due to the shallow coal seams. The property is however not owned by Exxaro (Exxaro only owns the Mineral Rights) and is currently used for cultivation.



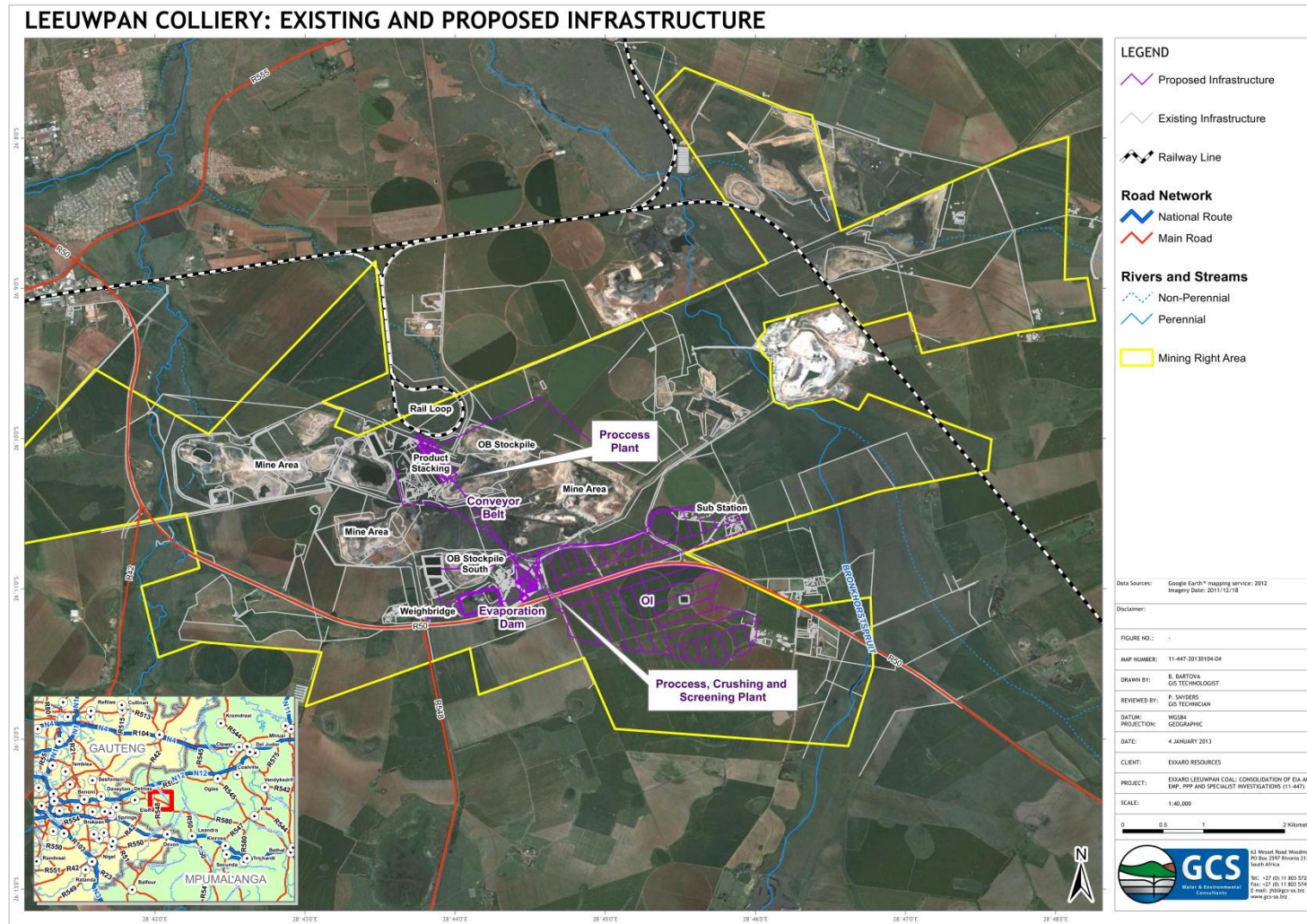


Figure 1.1 Leeupan Mine Layout: Current and Proposed Infrastructure (See Appendix A for full size figure)

## **1.2 Background**

### **1.2.1 Original EIA / EMP**

ISCOR, in 1995 conducted the original EMP for the Kenbar and Witklip sections at Leeuwan. The reserves for the Kenbar and Witklip sections were 15.97Mt Raw Coal Product (RCP) and 5.29Mt RCP respectively.

The top layer material of the Witklip reserve mainly consisted of clay of which a large portion is suitable for the manufacturing of bricks. The stockpiles are still in existence and a portion of the clay is provided to a contractor that produces bricks on the Witklip terrain. The total plastic clay reserve was about 1.6Mt.

The mining method used was opencast mining. The expected life of mine was 10 Years, and if underground mining continues this would add another 9 years to the life of mine. The underground mining method would have involved building chambers supported by pillars to hold the roof and then removing the coal seams.

Two areas, that were suitable options for the mine infrastructure, namely Kenbar and Witklip, were investigated, seeing that Iscor already possessed the surface rights to those areas. The Kenbar terrain was found to be the most suitable. It was later decided that the 4 X 106 m<sup>3</sup> topsoil heaps at Kenbar would not be reused.

The original EIA / EMP were approved in 1993.

### **1.2.2 EIA / EMP Update - 1996**

As an accompaniment to the mine's application for mining authorisation as required in terms of the Minerals Act, 1991 (Act No 50 of 1991) and as amended by Minerals Amendment Act, 1993 (Act No. 103 of 1993), the original EMPR was updated in May 1996, in the form of Addendum 1. The update in the form of Addendum 1 included Monitoring that would be conducted at Leeuwan.

### **1.2.3 Addendum 2 - 1998**

During 1998 the original EMP and Addendum 1 EMP was still awaiting final approval by authorities. In 1997 Leeuwan Management proposed mining a small additional area (Block OE) of approximately 3ha, on section 4 of Witklip 229 IR, which was not part of the original EMP investigation or the updated document (Addendum 1). The investigation concerned the impact of the proposed additional opencast mining area (phase 1) with a coal reserve of approximately 300,000tons. Approximately 4m depth of the overburden constitutes clay suitable for brick manufacture and was being stockpiled as excavation proceeded. This will amount to approximately 2.6Mt of clay to be used by the interested contractor. The Block OE reserves were expected to extend the life of the opencast mining by 3 months.

A number of changes with regards to environmental management, particularly with respect to water management, were investigated and implemented at Leeuwan Colliery during 1997, these were to be addressed in Addendum 2. A revised water management programme, which includes a proposal to discharge excess water into an unnamed tributary of the Bronkhorstspuit, had also been developed. The available assimilative capacity of the receiving water body warrants a discharge of mine water during high flow periods and provides opportunity for the mine to continue its operation without the terminal expenses of sulphate treatment.

The changes at Leeuwan during 1998 included:

- The old plant (interim phase plant) were taken apart;
- The new plant (final phase plant) were constructed;
- The new mining area (Block OE) became operational; and
- A comprehensive water monitoring programme was commissioned during 1998.

Addendum 2 was approved in 2003 by the then DME.

#### **1.2.4 Addendum 3 - July 2003**

Addendum 3 EMP was compiled for the mining of blocks OD, OFPAD (the road reserve area associated with the provincial R548 road to Devon), OH and OM, of which the Mineral rights were all owned by Kumba Resources. The mining of Block OM, Block OH, Block OFPAD and Block OD involved the extension of existing mining operation at that time. The mining of Block OH would affect Samquarz in terms of mineral rights since they owned the rights to silica in that area.

Two mine plans were investigated during Addendum 3 EMP. **Mine plan 1** would have involved the mining of Block OM, Block OH and Block OD without mining through the provincial R50 and R548 roads. The mining of Block OM would have been a continuation of the current mining of Block OF (in an easterly direction) until the provincial R50 road was reached. In order to facilitate the haulage of coal from the pit to the existing washing plant, a bridge would have been built over the provincial R50 road. A new boxcut would have been constructed on the northern side of the provincial R50 road in order to continue with the mining of Block OH.

In terms of the mining of Block OD, a new boxcut would have been constructed adjacent to the provincial R548 road. The subsequent cuts would have been in a westerly direction and the existing haulage roads used to transport coal from the pit to the existing washing plant.

**Mine plan 2** would have involved the mining of Block OM, Block OH, Block OFPAD and Block OD by mining through the provincial R50 and R548 roads. A diversion of the R50 and R548 provincial roads would have been required. The mining of Block OM would be a continuation of the current mining of Block OF (in an easterly direction). The direction of mining would then change to an approximately northeasterly direction as the provincial R50 road and Block OH is mined.

The mining of Block OD would involve the extension of Block OF in a westerly direction, followed by the mining of Block OFPAD and Block OD. The mining of Block OFPAD would involve the mining of the provincial R548 road for which a diversion would be constructed. The subsequent cuts would be in a westerly direction and the existing haulage roads would be used to transport coal from the pit to the existing washing plant.

It was decided to go with mine plan 2. With Mine plan 2, approximately 215 persons would have been employed for a further 7 years. Between 300 and 350 persons would then be employed at full production.

It was also indicated that land claims had been lodged against the farms Leeuwan 246 IR Moabsvelden 248 IR and Wolvenfontein 244 IR. The exact portions of the farms against which the land claims were lodged were however not known at the stage of the Addendum 3 Process.

Addendum 3 was finally approved in 2007.

#### **1.2.5 Addendum 4 EMP - 2007**

The Addendum 4 EMP was compiled for the extension of Block OJ and OL on the Farm Moabsvelden 248 IR. The property is owned by Exxaro Coal. The mine initially proposed to mine the Reserves on the farm Weltevreden, However, the Weltevreden area falls outside of the current mining authorisation area and Leeuwan had to apply for the mining rights for that area. Due to delays in the mining right application process, the proposed mine plan had been amended to first mine portions of Block OJ and Block OL (Referred to as Phase 1). Mining were proposed to be carried out by opencast method over a period of 18 months and giving rise to a pit of approximately 36.5ha in extent.

The proximity of the Bronkhorstspuit to the operations was of concern and measures were to be taken in order to ensure that the river was protected. No discard material was to be used as backfill in the Phase 1 Pit. In addition, clayey material was to be placed on the downgradient side of the pit to act as a barrier for groundwater seepage towards the pit.

During the application period the mine had 537 employees, of which 203 were contractors and the remaining 334 were permanent staff. Personnel involved in current mining operations at OH, OM and OG were to be utilised on the extension area.

Addendum 4 was approved in 2009.

### **1.2.6 Addendum 5 - OD, UI and OWM - 2007**

In 2006 an EIA / EMP was compiled for Kumba Coal (later Exxaro Resources Limited) for the mining of Block OWM on the farms Weltevreden 227 IR (Portion 7) and Moabsvelden 248 IR (Portions 1, 4, 5 and 6); an extension of the existing Block OD on the farm Wolvenfontein 244 IR (Portion 8); and Block UI to be mined underground on the farm Rietkuil 249 IR (Portions 1 and 2). However, only the part of Block OWM that was to be mined on the farm Moabsvelden 248 IR (Portion 4) formed part of the existing Leeuwan Coal Mine Mining Rights area. Thus, Leeuwan submitted applications for a mining authorisation in terms of Section 22 of the MPRDA, to the DME for the remaining farm portions, in October 2004. Subsequently, the DME accepted the application in writing, however, the said letter indicated that the mentioned applications overlapped with other applications lodged prior to the mine's applications and would therefore be dealt with in accordance with Section 9(1)(b) of the MPRDA, 2002. The DME therefore required the submission of a Scoping Report, an EIA and EMP to be able to assess the project completely.

It was planned that bord-and-pillar underground mining of Block UI would commence during 2011 and continue until 2041. It was also planned that mining of the extension of the existing Block OD at Leeuwan Coal Mine would commence during 2012 and continue until 2015 using opencast mining. Mining of Block OWM was planned to commence during 2007, also using opencast mining, and would continue until 2031.

The underground mining of Block UI never commenced in 2011 and the mining method for the resource was reconsidered, hence the application to mine the area opencast in future as Block OI.

Addendum 5 was approved in 2010.

## 1.3 Brief Project Description

### 1.3.1 *Approved Infrastructure*

Infrastructure approved under the MPRDA at Leeuwpán are detailed below for each of the mining areas discussed in the project background, each table will indicate what infrastructure still exists and what has been removed. Figure 1.2 shows the existing infrastructure of Leeuwpán colliery.

Listed activities under the National Environmental Management Act (NEMA, No. 107 of 1998) (NEMA) didn't come into effect before 2006 and therefore didn't need approval under the NEMA. For Addendums 4 and 5 conducted in 2006 - 2007, mining applications were excluded until further notice from the EIA process legislated under the NEMA. Several activities associated with the mining operations that were proposed in Addendums 4 and 5 have however been listed under the NEMA EIA Regulations (No. R 385, 386 and 387 of 2006). As was agreed then in consultation with Mpumalanga Department of Land Administration (MDALA), since all activities are directly related to mining, it was not be necessary to obtain authorisation in terms of the EIA Regulations.

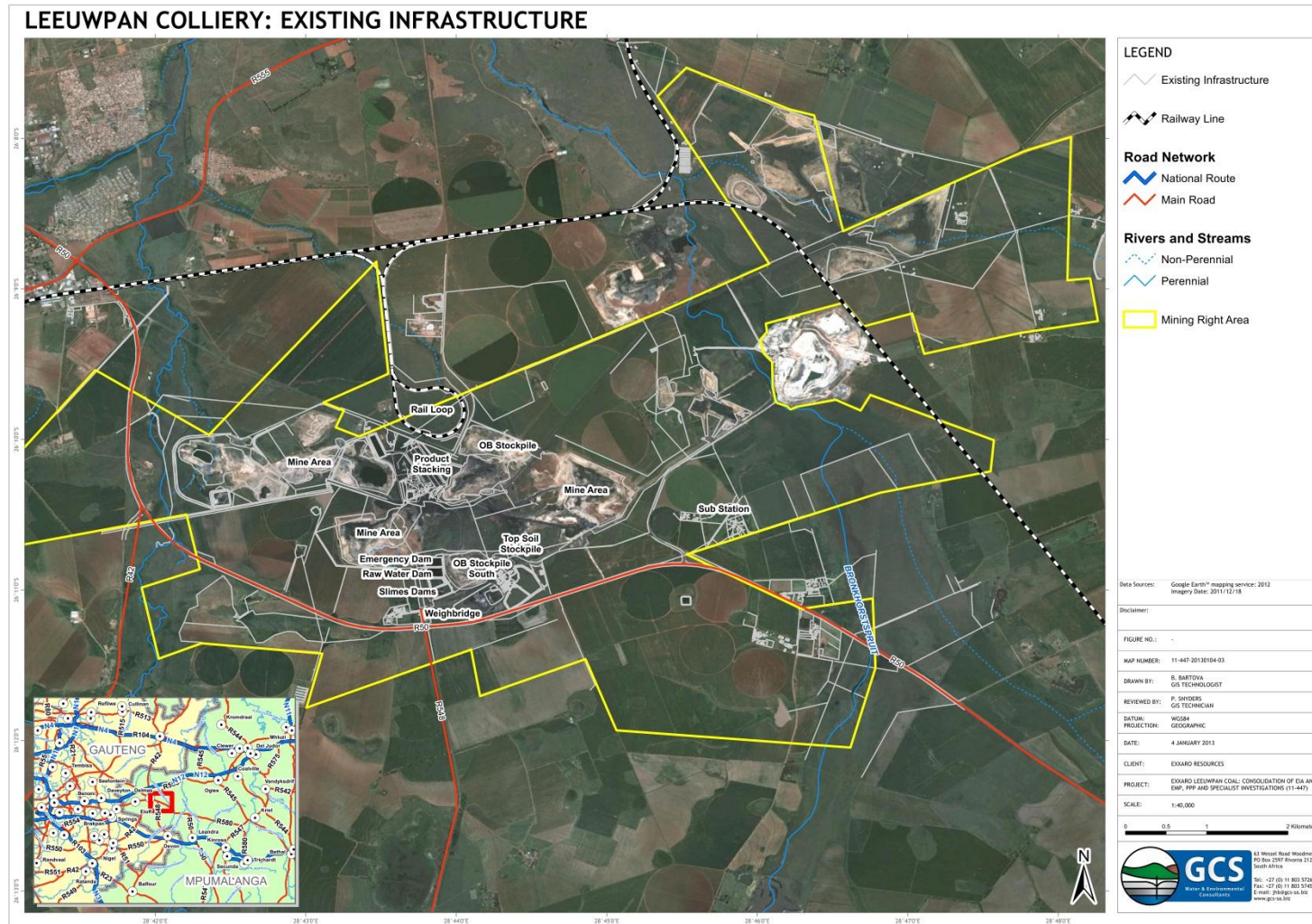


Figure 1.2 Existing infrastructure at Leeuwan (please refer to Appendix A for full size figure)



### 1.3.1.1 Kenbar and Witklip

Table 1.1 indicates infrastructure and facilities approved under the MPRDA associated with the original EMP for Kenbar and Witklip.

**Table 1-1 Kenbar / Witklip approved infrastructure from Original EMP**

Activity / structure	Still existing
Discharge silo and conveyor band across the Delmas - Leandra road	No
Equipment workshop	Yes
Coal mixing bed and off-load facilities	Yes
Railroad of $\pm$ 3 km for the transport of coal from Leeuwan	Yes
Weighbridge for the road transport	Yes
Ablution block and administration offices	Yes
A linking road with the R 50 route (between Delmas and Leandra) including security buildings	No
A linking road with the P 36-2 route between Delmas and Devon	No
Pit water dam and silt dams	No
Evaporation ponds	Yes
Additional storm water control measures (berms)	Yes
Electricity supply network	Yes
Closed water network for process water	Yes
Potable water supply via pipeline	Yes
Sewerage infrastructure	Yes
River diversion	Yes
Mining of Kenbar and Witklip sections	Yes - not operational

### 1.3.1.2 Block OE

A number of changes with regards to environmental management, particularly with respect to water management, came about at Leeuwan Colliery during 1997. Approved activities and infrastructure under the MPRDA are indicated in Table 1.2.

**Table 1-2 Block OE Activity / Infrastructure approved under the MPRDA**

Activity / structure	Still existing
Discharge of excess water into an unnamed tributary of the Bronkhorstspruit	No
Demolition of old plant (interim phase plant)	No
New plant (final phase plant)	Yes
Opencast block (Block OE)	Yes - not operational
River diversion	Yes

### 1.3.1.3 Blocks OD, OFPAD, OH and OM

The mining of Block OM, Block OH, Block OFPAD and Block OD involved the extension of existing mining operation and Table 1.3 indicates the activities / infrastructure approved under the MPRDA that were added during the process.

**Table 1-3 OM, OH, OFPAD and OD approved Infrastructure / Activities under the MPRDA**

<b>Activity / structure</b>	<b>Still existing</b>
Extension of existing haul roads to Block OM, Block OH as well as Block OFPAD and Block OD	Yes
Relocation of the 11 kV powerlines and associated mini substations	Yes
Clean and dirty water systems around the mining area of Block OM, Block OH, Block OFPAD and Block OD	Yes
Road diversions and associated infrastructure	Yes
Mining activities	Yes

#### 1.3.1.4 Block OJ and OL

The Addendum 4 EMP was compiled for the extension of Block OJ and OL on the Farm Moabsvelden 248 IR. Infrastructure and activities that was approved under the MPRDA in the proposed extension are shown in Table 1-4. As mentioned previously it was agreed in consultation with Mpumalanga Department of Land Administration (MDALA), since all activities are directly related to mining, that it was not be necessary to obtain authorisation in terms of the EIA Regulations.

**Table 1-4 OJ, OL Extension Infrastructure / Activity approved under the MPRDA**

Activity / structure	Still existing
Infrastructure in the one in ten year flood line of a river or stream, or within 32 meters of the bank of a river or stream	Yes
The construction of a road that is wider than 4m	Yes
Development activity, including associated structure or infrastructure.	Yes
Mining of mining blocks	Yes

#### 1.3.1.5 OD, UI and OWM

In 2006 an EIA/EMP was compiled for Kumba Coal for the mining of an extension of the existing Block OD on the farm Wolvenfontein 244 IR; and Block UI to be mined underground on the farm Rietkuil 249 IR. Block UI was however never mined and thus no infrastructure was put in place for that section. Table 1-5 shows the infrastructure and activities approved under the MPRDA for the OD mining area. As mentioned previously it was agreed in consultation with Mpumalanga Department of Land Administration (MDALA), since all activities are directly related to mining, that it was not be necessary to obtain authorisation in terms of the EIA Regulations.

**Table 1-5 OD Infrastructure / Activities**

Activity / structure	Still existing
Topsoil and overburden stockpiles	Yes
RoM stockpile	Yes
Storm water diversion channels	Yes
Expansion of existing haul roads	Yes
Pollution water management system	Yes
Water supply system	Yes
Ablution facilities	Yes
Diesel fuel tank	Yes
Workshop	Yes
Site offices	Yes
Explosives magazine	Yes
Mining of OD	Yes

In 2006 an EIA/EMP was also compiled for the mining of Block OWM on the farms Weltevreden 227 IR and Moabsvelden 248 IR. Table 1-6 shows the approved infrastructure (under the MPRDA) associated with the proposed mining of Block OWM.

**Table 1-6 OWM Infrastructure / Activities**

Activity / structure	Still existing
Topsoil and overburden stockpiles	Yes
ROM stockpile	Yes
Water pollution management system	Yes
Storm water diversion measures, including the proposed stream alteration	Yes
Water supply system	Yes
Haul road and access roads	Yes
Portable ablution facilities	Yes
Diesel fuel tank	Yes
Temporary workshop	Yes
Portable site office	Yes
Explosives magazine	Yes
Mining of OWM	Yes

### **1.3.2 Proposed project infrastructure and activities**

Leeuwan is planning the development of an additional opencast pit (Block OI) which will be located on portions of the farm Moabsvelden and Rietkuil. The mineral rights belong to Exxaro, however the certain portions of these farms are privately owned and utilised for agricultural practices.

New infrastructure and activities that will be associated with the Proposed Block OI development, and that needs to be approved under the NEMA includes, but are not only limited to:

- Water pipelines (from OI) and Pipelines between PCDs
- Stormwater Drains, Trenches and Cut-off trenches
- Clean and Dirty water systems
- Evaporation dam
- Crushing and Screening plant
- Weirs
- Plant buildings
- Pollution control dams

- Silt dams
- Explosive magazine
- Mining of OI
- Construction of new and extension of existing haul roads (From OI to existing roads)
- ROM en Product Stockpiles
- Backfilling of discard material,
- Existing return water dams will be put back in use - combined capacity of 80000 Cubic metres
- Diesel Storage of 1000 cubic metres - Fuel Depot.

Figure 1.3 shows the proposed infrastructure associated with the Block OI project.

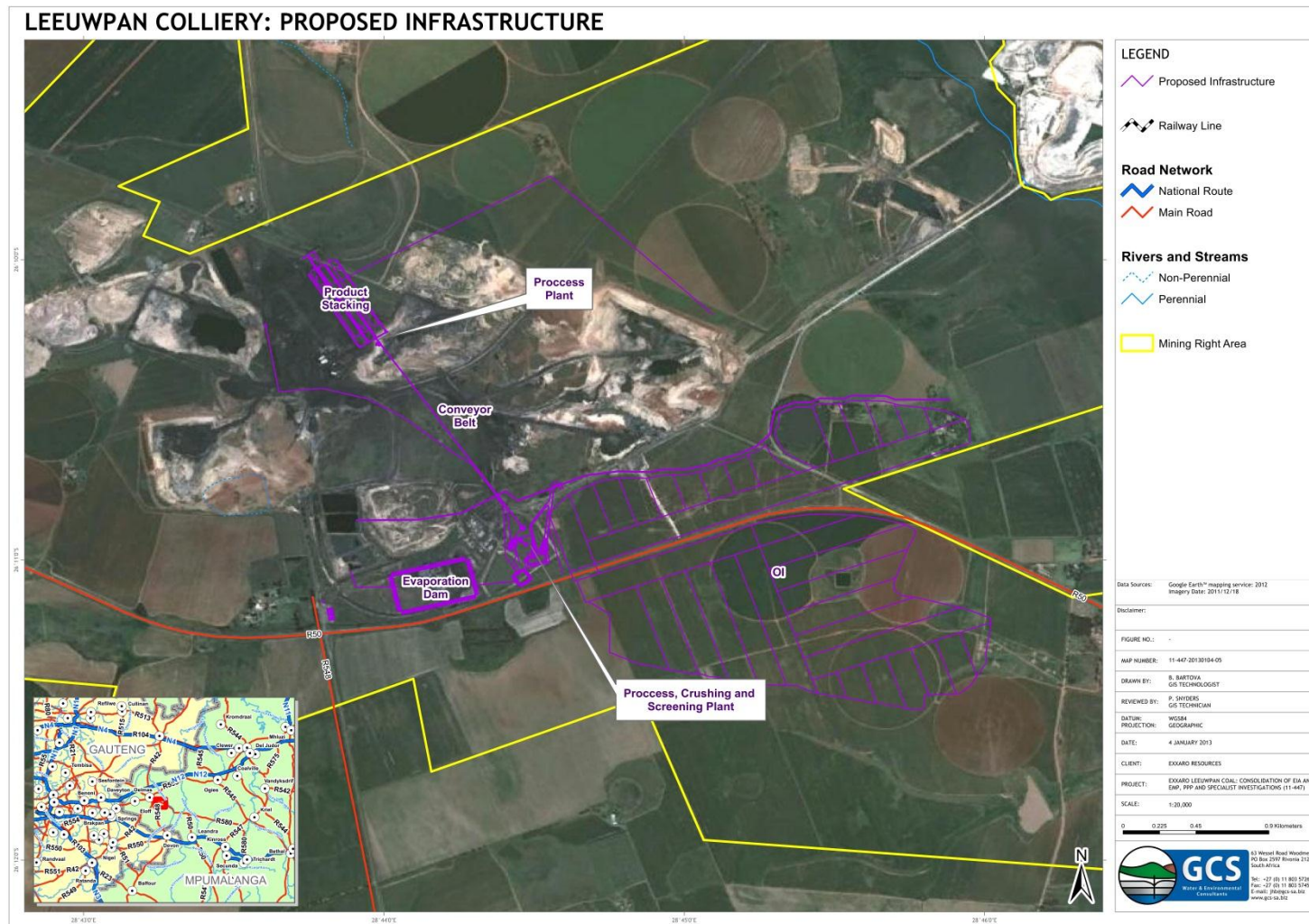


Figure 1.3 Proposed infrastructure associated with the Block OI project (Refer to Appendix A for full size figure)

## 1.4 Contact Details

**Table 1-7 Name and Address of Mine**

<b>Name of Mine</b>	Exxaro Leeuwpn Coal
<b>Telephone</b>	(013) 665 7670
<b>Facsimile</b>	(013) 665 7630
<b>Contact Person</b>	Stephen Badenhorst
<b>Environmental Co-Coordinator</b>	Igna Dougal

**Table 1-8 Name and Address of Mineral Rights Holder**

<b>Name of Mine</b>	Exxaro Leeuwpn Coal
<b>Telephone</b>	(013) 665 7670
<b>Facsimile</b>	(013) 665 7630
<b>Contact Person</b>	Stephen Badenhorst
<b>Environmental Co-Coordinator</b>	Igna Dougal

## 1.5 Description of Land

The Leeuwpn Mining Right Area (MRA) is located approximately 3- and 6 km south east of Delmas, in the Victor Khanye Local Municipality. It further falls under the Nkangala District Municipality in the Mpumalanga province. The MRA is adjacent to SamQuarz Silica Mine and Stuart Coal.

The MRA comprises eight (8) farms, namely, Kenbar 257, Leeuwpn 246, Moabsvelden 248, Weltevreden 227, Witklip 229, Witklip 232, Wolvenfontein 244 and Rietkuil 249. Nine mineral resource blocks have been mined or are in the process of being mined. Three Mineral resource blocks, located on Rietkuil 249, Moabsvelden 248 and Wolvenfontein 244, will be or is proposed to be (Rietkuil 249) mined in the future. The property details for the MRA were obtained from the government deeds website ([www.deeds.gov.za](http://www.deeds.gov.za)). The majority of the surface rights are privately owned. Current infrastructure is located on the following farm portions (Table 1-9):

**Table 1-9 Farm portions related to existing infrastructure**

SG Number	Farm	Portion	Owner detail
TOIR00000000025700000	KENBAR 257	Portion 0	Exxaro Coal Pty Ltd
TOIR00000000024600003	LEEUPAN 246	Portion 3	Exxaro Coal Pty Ltd
TOIR00000000024800001	MOABVELDEN 248	Portion 01	Gouws Louis
TOIR00000000024800002	MOABVELDEN 248	Portion 02	Exxaro Coal Pty Ltd
TOIR00000000024800003	MOABVELDEN 248	Portion 03	Exxaro Coal Pty Ltd
TOIR00000000024800004	MOABVELDEN 248	Portion 04	Phillem Beleggings Pty Ltd
TOIR00000000024800005	MOABVELDEN 248	Portion 05	Exxaro Coal Pty Ltd
TOIR00000000024800006	MOABVELDEN 248	Portion 06	Exxaro Coal Pty Ltd
TOIR00000000024800010	MOABVELDEN 248	Portion 10	Exxaro Coal Pty Ltd
TOIR00000000024800012	MOABVELDEN 248	Portion 12	Exxaro Coal Pty Ltd
TOIR00000000024800013	MOABVELDEN 248	Portion 13	Exxaro Coal Pty Ltd
TOIR00000000024800016	MOABVELDEN 248	Portion 16	Exxaro Coal Pty Ltd
TOIR00000000024800027	MOABVELDEN 248	Portion 27	Transnet Ltd
TOIR00000000024800030	MOABVELDEN 248	Portion 30	Transnet Ltd
TOIR00000000024800032	MOABVELDEN 248	Portion 32	Transnet Ltd
TOIR00000000022700007	WELTEVREDEN 227	Portion 07	Exxaro Coal Pty Ltd
TOIR00000000022700037	WELTEVREDEN 227	Portion 37	Transnet Ltd
TOIR00000000022900004	WITKLIP 229	Portion 04	Exxaro Coal Pty Ltd
TOIR00000000022900006	WITKLIP 229	Portion 06	Hendrik Schoeman & Seuns Pty Ltd
TOIR00000000023200113	WITKLIP 232	Portion 113	Eskom Holdings Ltd
TOIR00000000023200016	WITKLIP 232	Portion 16	Hendrik Schoeman & Seuns Pty Ltd
TOIR00000000024400003	WOLVENFONTEIN 244	Portion 03	Endorsement: Exxaro Coal Pty Ltd

The proposed OI Projects will be situated on the following farm portions (Table 1-9):

**Table 1-10 Farm portions associated with the proposed block OI**

SG Number	Farm	Portion	Owner detail
TOIR00000000024800002	MOABVELDEN 248	Portion 02	Exxaro Coal Pty Ltd
TOIR00000000024800003	MOABVELDEN 248	Portion 03	Exxaro Coal Pty Ltd
TOIR00000000024800010	MOABVELDEN 248	Portion 10	Exxaro Coal Pty Ltd
TOIR00000000024800016	MOABVELDEN 248	Portion 16	Exxaro Coal Pty Ltd
TOIR00000000024900001	RIETKUIL 249	Portion 01	Hannes Potgieter Trustfonds
TOIR00000000024900002	RIETKUIL 249	Portion 02	Hannes Potgieter Trustfonds

Please refer to Figure 1.4 for the location of the farm portions as it relates to the Leeuwan Mining Rights Boundary and proposed new infrastructure development.



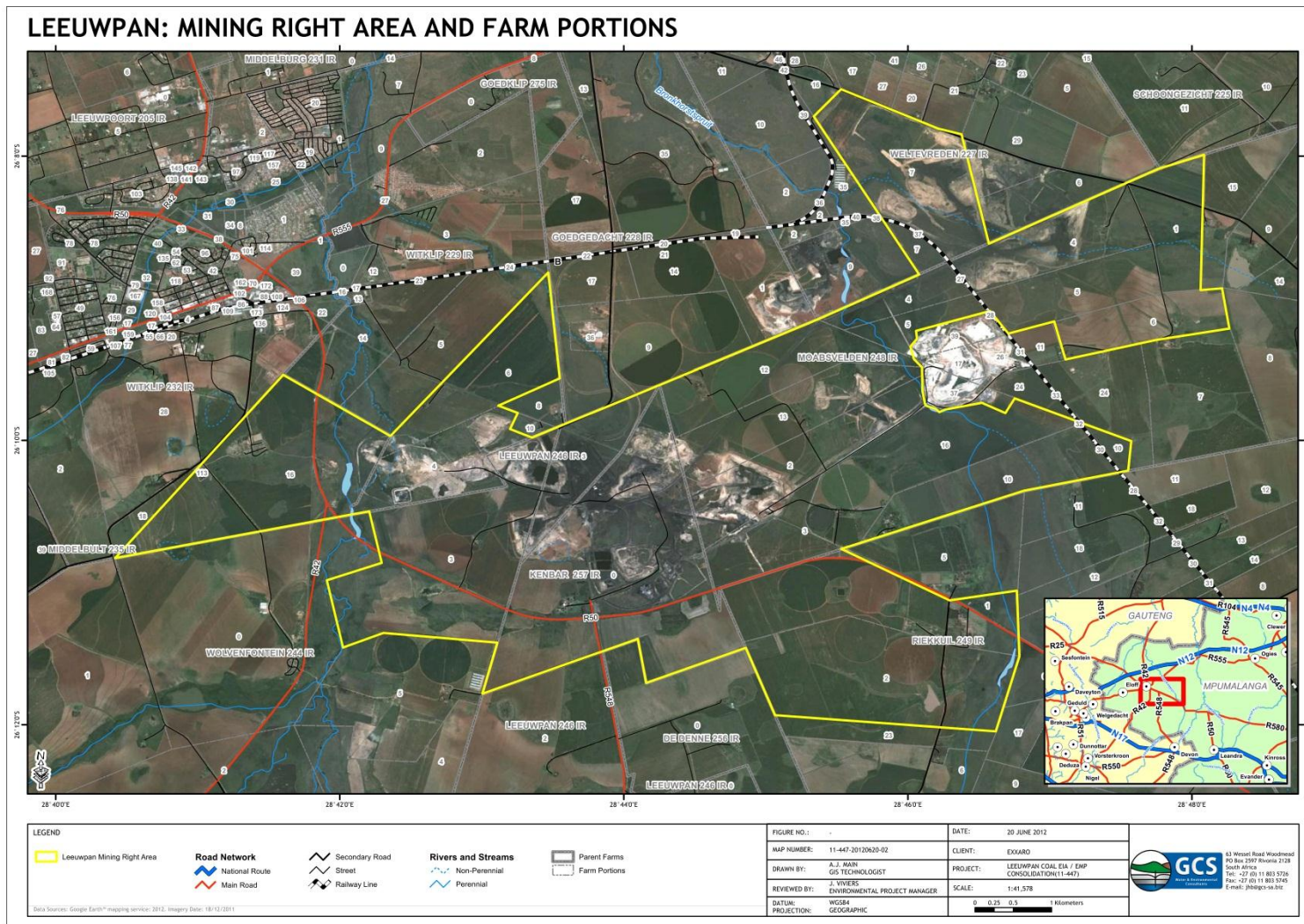


Figure 1.4 Leeuwan Location and Farm Portions (see also Appendix A)

## 1.6 Environmental Processes

The project environmental process will be undertaken in three (3) parallel processes namely the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) process for all the associated listed activities, the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) process to develop an EIA/EMP for the DMR, and the National Water Act, 1998 (Act No. 36 of 1998) (NWA) process regarding the water uses that will be associated with the proposed development.

### *1.6.1 Mineral and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA) process*

In terms of Section 102 of the MPRDA, when a change or addition of new activities occurs after an EIA/EMP has been approved, an amendment to the Environmental Impact Assessment and Environmental Management Plan (EIA/EMP) needs to be submitted to the DMR. Leeuwan is required to conduct a new environmental assessment for all new or changed activities and submit an Environmental Scoping Report (ESR) and updated EIA/EMP to the Department of Mineral Resources (DMR) in Mpumalanga for authorisation.

Leeuwan has an approved Mining Application under the MPRDA (reference number: MP 30/5/1/2/2/171 MR). The DMR has however requested the consolidation of all the previous EMP's along with the proposed mining of Block OI in order to have one document for the whole mine updating previous studies done. The MPRDA process will thus address the project as a whole including all activities regarding the new block OI mine.

### *1.6.2 National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) process*

Section 24 of the NEMA requires that activities (e.g. construction) which may impact on the environment must obtain an environmental authorization from a relevant authority before commencing with the activities. Such activities are listed under Regulations 544 and 545 (dated 2 August 2010) of NEMA.

The activities which are triggered by the proposed new mining operation are listed under Regulations R544 and R545, and as such requires an application for an Environmental Authorization in the form of an EIA process, all activities under R544 which requires a Basic Assessment will be included as part of the full EIA process to the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET):

The following listed activities will be applied for under NEMA for the development of the proposed mining activities at Block OI:

- GNR 544: List Activity Numbers: 9, 11, 12, 13, 18, 22, 24, 28, 37, 41 and 47; and
- GNR 545: List Activity Numbers: 3, 5, 15, and 20.

**Table 1-11 Listed Activities according to NEMA, GNR 544 and GNR 545, to be applied for for the new proposed project**

Relevant notice:	Activity No	Describe each listed activity:	Triggered by
Listing Notice 1 (R544, 18 June 2010)			
R544, 18 June 2010	9	The construction of facilities or infrastructure exceeding 1000m in length for the bulk transport of water, sewage or storm water - with an internal diameter of 0,36 metres or more; or with a peak throughput of 120 litres per second or more, excluding where: such facilities or infrastructure are for bulk transport of water, sewage or storm water or storm water drainage inside a road reserve; or where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.	Water pipelines (from OI) Stormwater Drains Trenches and Cut-off trenches Clean and Dirty water systems Pipelines between PCDs
R544, 18 June 2010	11	The construction of: (i) canals; (ii) channels; (iii) bridges; (iv) dams; (v) weirs; (vi) bulk storm water outlet structures; (vii) marinas; (viii) jetties exceeding 50 square metres in size; (ix) slipways exceeding 50 square metres in size; (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 square metres or more  where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	Evaporation dam Crushing and Screening plant Weirs Stormwater structures close to watercourse Plant buildings

Relevant notice:	Activity No	Describe each listed activity:	Triggered by
R544, 18 June 2010	12	The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more, unless such storage falls within the ambit of activity 19 of Notice 545 of 2010;	Pollution control dams Silt dams Evaporation dams Return water dams
R544, 18 June 2010	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.	Explosive Magazines renewal
R544, 18 June 2010	18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from- (i) a watercourse; (ii) the sea; (iii) the seashore; (iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater,  but excluding where such infilling, depositing, dredging, excavation, removal or moving  (i) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or  (ii) occurs behind the development setback line.	Mining of OI
R544, 18 June 2010	22	The construction of a road, outside urban areas - (i) With a reserve wider than 13,5 meters or, (ii) Where no reserve exists where the road is wider than 8 metres, or (iii) For which an environmental authorization was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010.	Haul roads (From OI to existing roads) access roads
R544, 18 June 2010	24	The transformation of land bigger than 1000 square metres in size, to residential, retail, commercial, industrial or institutional use, where, at the time of the coming into effect of this Schedule such land was zoned open space, conservation or had an equivalent zoning.	Rezoning of Block OI to industrial will be undertaken.
R544, 18 June 2010	28	The expansion of existing facilities for any process or activity where such expansion will result in the need for a permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding 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 that Act will apply. [Activity 28 amended by GN R660 of 30 July 2010.]	Backfilling, Slimes disposal

Relevant notice:	Activity No	Describe each listed activity:	Triggered by
R544, 18 June 2010	37	The expansion of facilities or infrastructure for the bulk transportation of water, sewage or storm water where: (a) the facility or infrastructure is expanded by more than 1000 metres in length; or (b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more-excluding where such expansion: (i) relates to transportation of water, sewage or storm water within a road reserve; or (ii) where such expansion will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.	Expansion of water structures
R544, 18 June 2010	41	The expansion of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, where the combined capacity will be increased by 50000 cubic metres or more.	Existing return water dams will be put back in use - combined capacity of 80000 Cubic metres
R544, 18 June 2010	47	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres, excluding widening or lengthening occurring inside urban areas.	Haul road expansion
Listing Notice 2 (R545, 18 June 2010)			
R545, 18 June 2010	3	The construction of facilities or infrastructure for the storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	Diesel Storage of 1000 cubic metres - Fuel Depot.
R545, 18 June 2010	5	The construction of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) in which case that Act will apply.	NEM:WA activities dependant (waste license) Slimes disposal
R545, 18 June 2010	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 20ha or more, except where such physical alteration takes place for: Linear development activities; or Agriculture or afforestation where activity 16 in this Schedule will apply.	Mining OI RoM and coal stockpiles JIG and DMS plant and associated infrastructure
R545, 18 June 2010	20	Any activity which requires a mining right or renewal thereof as contemplated in section 22 and 24 respectively of the Mineral and Petroleum Resources Development Act, 200 (Act 28 of 20902). [Date of commencement of Activity 20: to be proclaimed]	Activity not yet promulgated.

An application in respect to the above listed activities was submitted to MDEDET on the 10th of July 2012. Feedback from DEDET was received on the 9<sup>th</sup> of September 2012 and the public participation phase and ESR compilation followed.

### **1.6.3 Integrated Water Use Licence Application (IWULA)**

According to NWA, water may not be used without prior authorisation from the leading authority, in this case the Department of Water Affairs (DWA). Due to the requirements of the NWA, an IWULA and IWWMP need to be compiled and handed in at the DWA to ensure the legality of the water uses.

The IWULA and IWWMP will be conducted in parallel to the EIA and EMP process. The following water uses in terms of Section 21 of the NWA are envisaged, but is still to be confirmed and will be applied for at the Regional Office of DWA:

- (a): Taking water from a water resource;
- (b): Storing water;
- (c): Impeding or diverting the flow of water in a watercourse;
- (g): Disposing of waste in a manner which may detrimentally impact on a water resource;
- (i) Altering the bed, banks, course or characteristics of a watercourse; and
- (j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

### **1.6.4 Environmental Process Objectives**

In order to mitigate potentially negative impacts and to identify any potential fatal flaws that may render the project environmentally unacceptable, GCS have adopted an integrated, step-by-step process to identify issues of concern and to thoroughly investigate these issues.

The proposed environmental investigations undertaken will address all phases related to the proposed project. These phases will include the:

- Construction phase;
- Operation phase; and
- Closure and Decommissioning phase.

To ensure that the negative impacts are identified and mitigated in the early stages of the project, and that the positive impacts are maximised, it will be necessary for the environmental study to meet the following aims:

- Follow the guideline process as outlined by the NEMA and the MPRDA;
- Ensure that impacts are identified early through investigations to minimise environmental damage and maximise benefits;
- Conduct thorough specialist investigations that will allow the project team to develop an adequate understanding of the issues to be dealt with;
- Compile an EIA that will identify, evaluate and address the potential impacts;
- Provide ongoing environmental input into the project planning and development;
- Compile an EMP that will limit the significance of the negative impacts and maximise the positive aspects;
- Ensure that all relevant I&APs / Stakeholders are consulted and involved throughout the project;
- Ensure that an open and transparent communication structure is in place during the life of the mine; and
- Strong emphasis will be placed on the NEMA, MPRDA and NWA process to ensure that the three (3) processes will be able to run concurrently, and will easily be comparable with no confusion between the different processes.

#### **1.6.5 Environmental Assessment Practitioner**

In terms of Section 17 of the NEMA, Leeuwan has to appoint environmental assessment practitioners (EAPs) before applying for an environmental authorisation of any activity listed in terms of GN 544 and 545. For this purpose Exxaro has appointed GCS (Pty) Ltd to undertake the necessary environmental assessments and to ensure that all legislative requirements are adhered to as part of the environmental authorisation process.

GCS (Pty) Limited (“GCS”) provides a professional, independent consulting service in the fields of water, environmental, engineering and earth sciences. The GCS team consists of highly trained staff that has extensive experience in the fields of hydrogeology, hydrology, pedology, engineering geology, engineering and environmental science.

GCS undertakes hydrogeological investigations for water supply projects, groundwater pollution studies, mining hydrogeology, mathematical modelling and hydrogeological aspects of waste disposal throughout sub-Saharan Africa. GCS also provides expertise in soils and geotechnical investigations and environmental management services.

The GCS engineering geological team undertakes subsoil investigations for foundations, roads, tunnels, dams and earthworks, and the environmental scientists carry out all aspects of environmental assessments and management programmes.

GCS was founded in 1987 and the broad GCS client base ranges from individuals, engineers, municipalities and mines, to Independent States and Governments. GCS is an independent practice, which is wholly owned by the partners of the company.

GCS (Pty) Ltd, is an independent environmental consulting firm and will undertake the EIA and co-ordinate the specialist investigations which form part of the EIA. GCS will also be responsible for the relevant public participation process related to the proposed project.

**Table 1.6 Environmental Consultants from GCS (Pty) Ltd**

Name	Position	General Qualifications	Experience
Tanja Bekker	Environmental Unit Manager	MSc Environmental Management (Pr.Sci.Nat)	10
Renee Janse van Rensburg	Senior Project Manager	MSc Environmental Management (Pr.Sci.Nat)	10
Jaco Viviers	Project Manager	BSc (Hons) Geograpghy and Environmental Management	7
Riana Panaino	Environmental consultant	B. Sc (Hons) Biodiversity and Conservation	4



### **1.6.6 Environmental Scoping Process**

The Environmental Scoping Phase involves the investigation of the current environmental status by means of desktop investigations and reconnaissance investigations and the identification of potential impacts and issues that need to be investigated in more detail.

Public involvement, through notification and consultation with Interested and Affected Parties (I&APs) is a key component of this phase. The Environmental Scoping Phase is concluded when the ESR is submitted to the DMR. The ESR describes the existing status of the environment prior to the proposed project activities.

Desktop investigations, a review of existing information and field investigations have been undertaken by various specialists and project team members in order to provide a broad understanding of the environment.

The ESR identifies the potential impacts and concerns associated with the project, which should be investigated by the relevant specialists and be addressed in the EIA and draft EMP. The results of the Environmental Scoping Phase, as detailed in the ESR, will determine the nature and extent of the specialist investigations that need to be undertaken in the EIA.

Comments obtained from the I&APs during the draft Environmental Scoping Phase and the 30 day review period will be addressed in detail in the Scoping Report to be submitted to DMR and MDEDET that will in turn also be addressed in detail in the EIA and EMP phase.

The Environmental Scoping Phase methodology is based on the Regulations under the MPRDA and NEMA. The objectives of the Environmental Scoping Phase are to:

- Identify I&APs / Stakeholders through communication of the project details and to provide opportunities for expression and incorporation of I&APs concerns and views into the required documentation;
- Identify relevant Government Authorities and other institutions, and inform them of the project to enable them to express their concerns and issues, which they would like to see addressed as part of the process;

- Identify the potential issues associated with the project, which are most likely to affect the biophysical and socio-economic aspects of the surrounding environment;
- Conduct a review of the applicable environmental legislation; and
- Determine and document the aspects of the project, which will require further investigations.

### **1.6.7 Report Structure**

This ESR has been compiled to identify the impacts associated with the mining activities, which should be investigated by the relevant specialists and addressed in the EIA and the EMP Report. The results of this report will determine the nature and extent of investigations that need to be undertaken in the EIA.

#### **Section 1: Background and Introduction**

- This section provides a description of the location and the land ownership of the mine, as well as the purpose, approach and methodology followed for the completion of this project.

#### **Section 2: Project Description**

- This section provides a description of the proposed project and how it is planned to be initiated and operated should the environmental investigations be sufficient.

#### **Section 3: Project Alternatives**

- This section details the project alternatives considered for the project and conducts a comparative assessment to indicate why the final option was selected if required.

#### **Section 4: Baseline Environmental Description**

- This section provides a description of the current environment (which includes the bio-physical and socio-economic components) prior to the commencing of the proposed project.

#### **Section 5: Public Participation Process**

- This section details the process undertaken for stakeholder engagement and provides a discussion on the issues raised and how these will be addressed.

#### **Section 6: Potential Impacts and Issues**

- This section assesses the potential impacts on the environment, without considering the necessary management measures, and identifying which specialist studies must be commissioned.

**Section 7: Plan of Study for EIA and draft EMP**

- This section outlines the plan for the EIA and draft EMP, all aspects that must be included into the EIA and draft EMP, and the associated timeframes.

**Section 8: Conclusion**

- The conclusion provides a brief discussion on the findings in the report and the way forward for the project investigations.

**Appendices**

- Supporting documentation.

## 2 PROPOSED SCOPING PROJECT DESCRIPTION

This section describes approved and proposed project description to give a holistic view of the Leeuwan Project.

Listed activities under the National Environmental Management Act (NEMA, No. 107 of 1998) (NEMA) didn't come into effect before 2006 and therefore didn't need approval under the NEMA. For Addendums 4 and 5 conducted in 2006 - 2007, mining applications were excluded until further notice from the EIA process legislated under the NEMA. Several activities associated with the mining operations that were proposed in Addendums 4 and 5 have however been listed under the NEMA EIA Regulations (No. R 385, 386 and 387 of 2006). As was agreed then in consultation with Mpumalanga Department of Land Administration (MDALA), since all activities are directly related to mining, it was not necessary to obtain authorisation in terms of the EIA Regulations.

### 2.1 Mining Method

#### 2.1.1 Opencast

##### 2.1.1.1 *Previously approved*

Opencast mining started on the farm Witklip in 1994, and stopped in 2005. Remaining reserves being mined are Blocks OWM, OG, OH and OJ. UI (now OI) and OL were planned to be mined previously. The mine works at UI was put on hold for further exploration and mine simulation, and was subsequently decided to convert to opencast mining. OL will be mined in 2020.

##### 2.1.1.2 *Proposed*

Leeuwan is evaluating the potential open cast mining of the coal reserves on the farms Rietkuil 249 IR and Moabsvelden 248 IR (Block OI) within its mining right area. The purpose of the proposed open cast development will be to expand the current mining operations. The reserves will be mined using the drilling, blasting, loading and hauling with truck and shovel, excavator and fleets methods.

## 2.2 Project Infrastructure

### 2.2.1.1 Previously approved

The following infrastructure was approved for the previous EMP under the MPRDA:

- Original EMP
  - Equipment workshop
  - Coal mixing bed and off-load facilities
  - Railroad of ± 3 km for the transport of coal from Leeuwan
  - Weighbridge for the road transport
  - Ablution block and administration offices
  - A linking road with the R 50 route (between Delmas and Leandra) including security buildings
  - A linking road with the P 36-2 route between Delmas and Devon
  - Pit water dam and silt dams
  - Evaporation ponds
  - Additional storm water control measures (berms)
  - Electricity supply network
  - Closed water network for process water
  - Potable water supply via pipeline
  - Sewerage infrastructure.
  - River Diversion
  - Mining of mining blocks
- Addendum2
  - New plant (final phase plant)
  - Demolition of old plant
  - Opencast block (Block OE)
  - River Diversion
- Addendum3
  - Extension of existing haul roads to Block OM, Block OH as well as Block OFPAD and Block OD;

- Relocation of the 11 kV powerlines and associated mini substations
- Clean and dirty water systems around the mining area of Block OM, Block OH, Block OFPAD and Block OD; and
- Road diversions and associated infrastructure.
- Mining of mining blocks
- Addendum4
  - Storage of water in dams and reservoirs
  - Infrastructure in the one in ten year flood line of a river or stream, or within 32 meters of the bank of a river or stream
  - The construction of a road that is wider than 4m
  - Mining of mining blocks
- Addendum5
  - Topsoil and overburden stockpiles;
  - ROM stockpile;
  - Storm water diversion channels
  - Expansion of existing haul roads
  - Water pollution management system,
  - Water supply system,
  - Ablution facilities,
  - Diesel fuel tank,
  - Workshop,
  - Site offices
  - Explosives magazine.
  - Haul road and access roads
  - Portable ablution facilities
  - Temporary workshop
  - Portable site office
  - Mining of mining blocks

### 2.2.1.2 Proposed

Infrastructure that will be associated with the Proposed Block OI development will be:

- Water pipelines (from OI) and Pipelines between PCDs;
- Stormwater Drains, Trenches and Cut-off trenches;
- Clean and Dirty water systems;
- Evaporation dam;
- Crushing and Screening plant;
- Weirs;
- Plant buildings;
- Pollution control dams;
- Silt dams;
- Explosive magazine;
- Mining of OI;
- Construction of new and extension of existing haul roads (From OI to existing roads);
- ROM en Product Stockpiles;
- Existing return water dams will be put back in use - combined capacity of 80000 Cubic metres; and
- Diesel Storage of 1000 cubic metres - Fuel Depot.

Refer to Figure 2.1 for the proposed infrastructure and mine layout.

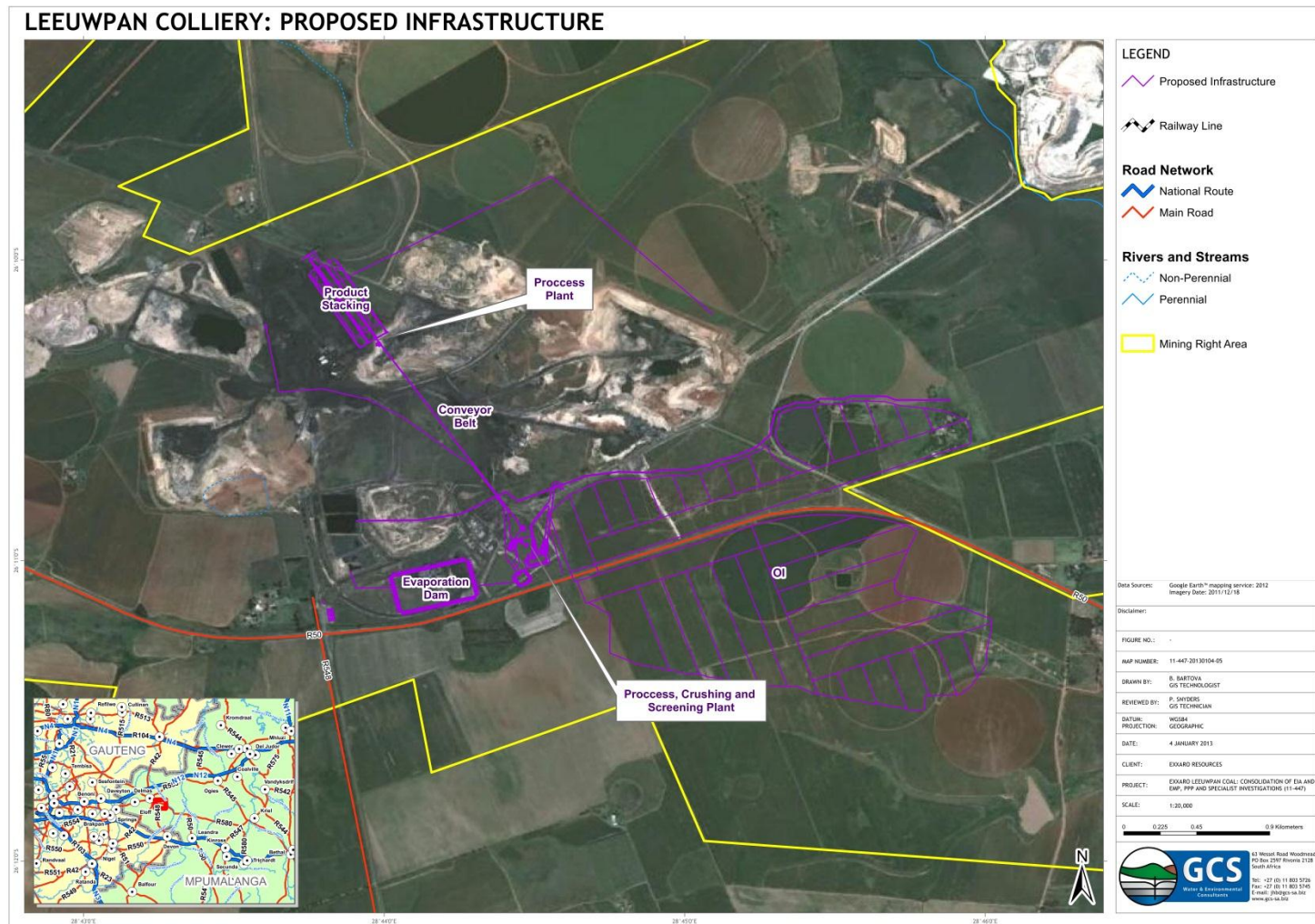


Figure 2.1 Proposed mine infrastructure and layout (see also Appendix A)



## 2.3 Roads, Railway Lines and Power Lines

### 2.3.1 *Previously approved*

- Roads:
  - New haul roads were constructed for the Kenbar Witklip sections;
  - Existing haul roads were extended to Blocks OM, OH, OFPAD and OD;
  - New roads were constructed to Blocks OJ and OL; and
  - Haul roads and access roads were constructed for block OWM.
- Railway Lines:
  - Leeuwpan has a private siding where rapid loading of train trucks including Jumbo trucks can be done. The siding links up with the Hawerklip line, 3 km east of Delmas. At the end of this siding is a 500 m loop where train trucks are loaded and turned around.
- Power Lines
  - Electricity is supplied directly to the mine by Eskom by means of a sub-station at Witklip which is linked to the nearby Eskom power line;
  - Locally the electricity is distributed by overhead powerlines; and
  - As the open pit areas progress, the power lines and the mini substations are relocated in line with the path of the open pit operations.

### 2.3.2 *Proposed*

For the purposes of the new opencast operation the following additional infrastructure will be required:

- Roads and conveyors
  - An additional Haul road will be constructed for the transport of coal from block OI to the new plant (crushing and screening) area, and the transportation system will also include a conveyor belt from the crushing and screening area to the new plant (product stacking) area (OI).
- Power Lines
  - The current power supply of 11kV will be upgraded to ~20kV to take the expansion of the mine to OI section and the additional plant into consideration.

## **2.4 Buildings, workshops, offices**

### **2.4.1 *Previously approved***

A workshop of 300m<sup>2</sup> was constructed for the first mining operations and was equipped with a 20t overhead hoist. A service station and wash area was established in front of the workshop. Offices and ablution facilities for staff was erected on one side of the workshop.

### **2.4.2 *Proposed***

Buildings comprising a change houses and offices will be constructed for the Block OI process.

## **2.5 Housing and Transport**

No housing and recreational or other facilities are planned. Workers are responsible for their own housing. Each worker is also responsible for his/her own transport between home and work.

### **2.5.1 *Previously approved***

The coal from existing pits is transported mainly by truck to the existing Final Phase Coal Processing Plant. From the plant it is transported via conveyors to the siding. The final coal product is transported by means of railroad to the different work centres or via road transport to other markets. Road transport is handled by means of a weighbridge.

### **2.5.2 *Proposed***

The coal from the proposed pit will be transported by truck and conveyor to the new Processing Plant. The final coal product is transported by means of existing railroad to the different work centres or via road transport to other markets.

## 2.6 Pollution Control Dams, Settling Dams, Slurry Dams, Evaporation Dams

### 2.6.1 *Previously approved*

The prevention of water pollution at Leeuwan Colliery was managed by way of a closed water circuit. Mine water was pumped from the open pits to evaporation dams. Plant water was first pumped to slurry dams where settling of coal fines occur and was then re-used in the coal washing process. Water was pumped back to the plant from the evaporation dams for re-use.

Storm water canals were built around the evaporation dams in order to prevent clean storm water from entering the dirty water area.

The polluted water from the existing coal refinement plant was separated in a condenser and pumped back to the plant. The slimes from the condenser were pumped to the settling dams, from where the run-off was pumped back to the plant.

The settling dams consisted of three separate dams. The settling dams were used on a rotational basis and the dried silt was reclaimed with the aid of mechanical equipment, and sold or returned to the pit. The mine stopped using these pits in 2003.

The Witklip Pit Water Settling/Evaporation Dam (PCD) (140 000m<sup>3</sup>) operated as an industrial water storage dam and was supplied by a series of boreholes. Water from this dam was pumped to the raw water settling dam. When necessary, water from the emergency overflow dam can be pumped to this dam for storage. The dam had been upgraded to include an HDPE liner.

The Raw Water Settling Dam also acted as an industrial water storage dam. Surplus water from the Raw Water Settling Dam overflows to the Emergency Overflow Dam. These dams are unlined.

The Stockpile Settling Dams captured runoff from the stockpile and the main processing plant areas.

The Slurry Dams, which contain coal fines were discontinued and being allowed to dry. The mine planned to sell the material.

A filter press was commissioned in 2003 to dewater the slimes at the main plant area. This advanced technology allows the mine to re-use process water very efficiently.

### **2.6.2 Proposed**

The decommissioned settling dams / slimes disposal dams will be recommissioned for the OI project. The dams are being cleared of all additional material.

A new evaporation dam will be constructed at the Crushing and Screening Facility. Water will be pumped back to the plant from the evaporation dam for re-use.

## **2.7 Crushing and Processing plant**

### **2.7.1 Previously approved**

Originally the coal distribution construction consisted of a crusher plant and a washer to refine the coal by means of a wet process. Final Phase Coal Processing Plant was used for washing and sorting. The Interim Phase processing plant had been dismantled and removed from the site. The final phase processing plant consisted of a Beneficiation Plant and a Jig Plant.

#### **Existing beneficiation plant**

The Beneficiation Plant consisted of a Crushing and Washing Plant. A volume of 638 520m<sup>3</sup> per year of process water, consisting of groundwater ingress into the pits and make-up water from boreholes, is used at the Beneficiation Plant.

The rate of process water use is 85m<sup>3</sup>/h. Process water is used on a continuous basis and is proportional to the amount of coal that is being washed per day. No significant daily fluctuations exist in the use of water on the mine. The Beneficiation Plant operates 24 hours a day for 313 days per year.

### **Existing Jig Plant**

In 2005, Leeuwan commissioned a new Jig Plant within the existing Plant infrastructure area of the mine. The Jig Plant is a refinement of the existing coal beneficiation process to improve the recovery percentage from ROM tons. It was estimated that the product tons would be increased from 140,000 to 164,000 tons per month with the discard decreasing from 110,000 tons to 86,000 tons. This calculates to an improvement from 56% to 65.6% recovery.

Any contaminated water generated by the Jig Plant is managed in the existing dirty water system as part of the existing water distribution network. The Jig Plant requires an additional raw water make-up requirement of approximately 45m<sup>3</sup>/h. As the product is increased while the ROM remains the same, more contaminated water is released in a non-polluting way. Furthermore, the operation of the Jig Plant results in the generation of less discard which in turn results in less contaminated water being discharged back to the Open Pits as moisture in discard.

### **2.7.2 Proposed**

A crushing and processing plant will be constructed for Block OI; product from the pit will be transported by loading and hauling with truck and shovel, excavator and fleets to the crusher where the crushed product will be transported via the conveyor system to the processing plant to be processed.

## **2.8 Solid Waste (Domestic, Industrial, Mine and Hazardous)**

### **2.8.1 Domestic Waste**

#### *2.8.1.1 Previously approved*

Domestic waste generated on-site is disposed of into allocated and marked waste bins / containers. Domestic waste is then collected and disposed of in a steel skip at the workshop located within the Leeuwan boundary area; the contents of the steel skip are emptied into 210l drums located at the old farm shed within the existing mining boundary area. The old farm shed consists of a cement slab covered from the rain. The drums located at the old farm shed are collected and delivered by Archer Mining, using a mining vehicle, to the Delmas Municipal Dump for disposal. The Delmas Municipal Dump holds a Permit from the DWAF to receive general solid household waste. No domestic waste is dumped in any unauthorised landfill site / waste site or dumped in a pit.

## **2.8.2 Mine Waste**

### *2.8.2.1 Previously approved*

Originally the mine residue consisting of carbon-carrying shales, plant residue and fine coal recovered from the slimes dams, was compacted and introduced to the mined-out pits below the groundwater table. It was then covered with a clay layer and topsoil so that it would be suitable for agricultural purposes at a later stage.

No mine residue disposal sites were constructed for Block OM, Block OH, Block OFPAD or Block OD. Discard material was placed back into the open pits.

For Blocks OJ and OL (phase 1) The topsoil was stripped and used in rehabilitation operations. The initial box cut material was also used for the development of the stormwater management berms. Backfilling at Phase 1 Pit took place 45 m from the working face. Due to the risk of pollution to the Bronkhorst River, no discard was backfilled into the Phase 1 Pit.

For block OWM and OD carbonaceous residue material from the existing Process Plant(s), stockpiled topcoal and slurry cakes from the existing filter press, as well as overburden is disposed of back into the proposed pit as part of the mining rehabilitation process.

### *2.8.2.2 Proposed*

Backfilling will take place for the proposed Block OI project and there will be no discard dumps. Topsoil and overburden will be stockpiled for rehabilitation purposes.

## **2.8.3 Hazardous Waste**

### *2.8.3.1 Previously approved*

All hazardous waste (excluding mine waste) is stored in accordance with the minimum requirements for the handling, classification and disposal of hazardous waste - including appropriate roofing, fencing, locking (preventing unauthorised access), labelling, waterproof hard standing, protection from storm water ingress (bundling, etc.), drainage and collection system for spills and general protection from potential environmental pollution.

Any hazardous waste is disposed of in clearly marked containers, which are then be sent to the mine workshop hazardous waste storage area, located within the existing mine boundary area, and removed by a contractor to a licensed waste disposal site.

#### *2.8.3.2 Proposed*

The hazardous waste storage facility permit will be renewed for the extension of the life of Mine.

## **2.9 Diesel Storage**

### **2.9.1 Previously approved**

Diesel is currently stored on site in a capacity tank of approximately 108m<sup>3</sup>.

### **2.9.2 Proposed**

The aboveground Diesel Storage Facility will be increased to 1000m<sup>3</sup> to accommodate for additional diesel to be stored.

## **2.10 Clean and Dirty Water Processes**

### **2.10.1 Clean and Dirty Water Separation Infrastructure**

#### **2.10.1.1 Previoulsy approved**

Clean and Dirty water separation berms and channels were constructed for all the existing mining areas.

#### **2.10.1.2 Proposed**

Clean and Dirty water separation berms and channels will be constructed for the new proposed block OI pit and associated infrastructure.

## **2.11 Storm Water Management Measures**

Government Notice No. 704, published in terms of the National Water Act (Act No. 36 of 1998) requires the following, which will be adhered to:

- All clean water systems must be designed and operated in such a manner that they are at all times capable of handling the 1:50 year flood event on top of their mean operation level without spilling;
- Any water arising from an area, which causes, has caused or is likely to cause pollution of a water resource, including polluted storm water, must be contained within a dirty water system. In order to reduce the volume of polluted water, contaminated areas should be minimised. While clean water should be diverted to natural water courses, polluted water should be re-used wherever possible, thereby reducing the use of clean water; and
- Design, construct, maintain and operate any dam or tailings facility that forms part of a dirty water system to have a minimum freeboard of 0.8m above full supply level.

### ***2.11.1 Previously approved***

Storm water cut-off trenches had been constructed around all areas where affected mine water occurs or where water might become affected. This was done to prevent clean water from mixing with affected water. All storm water that falls within this area had been channelled to the evaporation dams from where it will be either evaporated or re-used.

### ***2.11.2 Proposed***

A storm water management plan will be compiled for the new block OI and the existing storm water management plan will be reviewed and updated to take the entire mine complex into consideration.

## **2.12 Potable Water Supply**

### ***2.12.1 Previously approved***

Drinking water is supplied from separate boreholes, which are used only for drinking water. Studies had shown that this water is suitable for human consumption and no further water treatment was necessary.



Potable water for domestic purposes is stored in a holding tank referred to as the Office potable water reservoir. This reservoir provides drinking water at the existing offices, ablution facilities, laboratory and workshop. The Office potable water storage reservoir has a capacity of approximately 253 m<sup>3</sup>.

#### ***2.12.2 Proposed***

The current potable water supply system will be sufficient for the new proposed project.

### **2.13 Process Water Supply**

#### ***2.13.1 Previously approved***

The only process where water is used for industrial purposes is at the existing coal beneficiation plant. The plant consists of a crushing and a washing plant. Process water is supplied from a closed system, which includes the plant, slimes dams and pit dams. Water replenishment comes from the pits, but if this is insufficient, make-up water from six boreholes is also used.

Water is used on a constant basis and is proportional to the amount of coal that is being washed per day. No significant daily fluctuations exist in the use of water on the mine. The beneficiation plant operates 24 hours a day for 313 days per year.

#### ***2.13.2 Proposed***

Process water will be supplied from a closed system, which includes the new plant, recommissioned slimes dams and new evaporation dams. Water replenishment comes from the pit areas as per the current water supply process.

### **2.14 River Diversions**

#### ***2.14.1 Previously approved***

A section of the Bronkhorstspruit on the farm Kenbar 257 IR was diverted to keep water out of the open pit. A section of a tributary to the Bronkhorstspruit on the farm Witklip 229 IR was also diverted to prevent water from flowing into the open pit. The necessary permits were obtained in accordance with Article 20 of the Water Act, 1956, (Permit nr B 187\1\220\6).

In order to prevent the tributary of the Bronkhorstspruit from flowing into the Block OWM pit, the construction of a river diversion was also deemed necessary. The EIA for the river diversion was submitted in November 2009. A Water Use Licence in terms of Chapter 4 of the National Water Act, 1998 (Act no 36 of 1998) was obtained in April 2011 (Ref: 16/2/7/B100/C27).

No additional river diversions will be required for the OI Block extension.

## **2.15 Project Planning and Associated Activities**

### **2.15.1 Construction Phase**

During the construction phase, the following activities could impact on the bio-physical environment and the cultural/social setting:

- Stripping of vegetation;
- Stripping of topsoil and subsoil as the construction activities start on site;
- Oil and fuel spills;
- Soil compaction;
- Dust dispersion from construction vehicles, infrastructure construction and boxcut construction activities;
- Noise generated by construction activities;
- Blasting;
- Establishment of new infrastructure;
- Temporary workers disrupting communities; and
- Increased traffic.

### **2.15.2 Operational Phase**

During the operational phase, the following activities could impact on the bio-physical environment and the cultural/social setting:

- Removal of coal resources;
- Topographic alteration;
- Oil and fuel spills;
- Possible compaction of soils;
- Opencast Mining Activities;
- Plant Operation;
- Change of land use;
- Establishment of waste facilities;
- Dust dispersion from vehicles and workings;
- Noise generated by earthmoving equipment and workings;
- Blasting;
- Temporary workers disrupting communities;
- Increased traffic;
- Stockpiling of RoM and overburden;
- Transport of coal product via road and conveyor systems;
- Erosion of soil stockpiles and berms by wind and water; and
- Ancillary activities (workshops, offices, etc).

### **2.15.3 Decommissioning and Closure Phase**

When the decision is taken to decommission the mine, the following objectives and proposed actions for the decommissioning and closure phase of the mine could be considered depending on the outcomes of the EIA and draft EMP:

- Prevention of Acid Mine Drainage;
- Demolition of structures not to be used in the future;

- Ripping of all compacted areas, which will be followed with amelioration and vegetation;
- Ensure that all remaining dumps, piles and slopes are sufficiently shaped to blend in with the surrounding infrastructure;
- Amelioration and vegetation of all disturbed areas;
- Maintenance of all re-vegetated areas up until such areas initiate succession and create a sustainable cover;
- Monitoring of key environmental variables (i.e. soils, vegetation, groundwater and surface water) in order to demonstrate stability of rehabilitated areas;
- Weed management after closure, limited to areas disturbed by mining or included in the mining area; and
- Monitoring will be undertaken for a specific period after closure or up until such time that all areas create a sustainable cover and ecosystem and a closure certificate is obtained.

### 3 PROJECT ALTERNATIVES

#### 3.1 Mining Method Alternatives for Opencast Pit Development

The alternatives that were considered are based on years of experience by the Leeupan mining engineers. The options included opencast mining (truck and shovel), conventional underground bord-and-pillar mining, conventional underground bord-and pillar mining followed by limited pillar extraction, conventional underground bord-and pillar mining followed by total pillar extraction, underground high extraction methods (e.g. stooping or longwall mining), and the no project option.

The mining of the Block OI coal reserve using conventional bord-and-pillar mining methods would minimise the geological impacts, since less geological layers would be destroyed by the mining technique. However this method was not chosen due to the shallow coal layers and most of the coal would be lost as this cannot be safely mined due to the levels at which the coal lies as well as geological intrusions in the coal necessitating accurate, specific mining of the areas

The conventional underground bord-and-pillar mining followed by limited pillar extraction and the conventional underground bord-and-pillar mining followed by total pillar extraction were also considered for mining at Block OI. Should these methods be implemented, negative impacts on the geological strata overlying the coal layer might occur due to subsidence. Furthermore, the roof conditions due to the shallowness of the coal seam will lead to unsafe mining conditions and since the proposed underground mining operation at Block OI will make use of only an incline shaft, unstable roof conditions can result in a serious safety risk for mine workers. The roof conditions due to the shallowness of the coal layer can possibly lead to secondary impacts on other environmental aspects, such as potential surface crack formation due to roof collapse, and the subsequent infiltration of excessive surface water to the groundwater aquifers.

The option of opencast mining by means of Truck and Shovel mining was chosen as the most economically viable option and thus the mining method that will be used for coal extraction at the proposed Block OI project site.

## 3.2 Alternative Mine Scheduling

Possible alternatives in terms of the mine plan at Block OI include the exclusion of coal reserves under sensitive landscapes (such as pans and wetlands), the inclusion of coal reserves under sensitive landscapes (such as pans and wetlands) option.

Should the coal reserves under sensitive landscapes be excluded, block OI will be divided into three separate pits, each pit needing a separate boxcut, and sterilizing roughly 74.4% of the coal resource. This is not an economically viable option.

The option to include coal reserves under sensitive landscapes and farm dams is considered to be the most economical viable option due to the high revenue value of the coal at the proposed Block OI. The sensitive landscapes in the area is also highly disturbed due to agricultural activities in the past that has had a cumulative effect over a long period of time on the importance and natural workings of the sensitive wetlands. Mining in the area will result in removal of the already altered sensitive landscapes.

Exxaro takes cognizance of the importance DWA places on wetlands and the protection of these ecosystems and will therefore commit to undertaking in depth studies as part of the updating of the approved Integrated Water Use Licence (IWUL) which will include investigating options in terms of a wetland rehabilitation programme, and/or an offset plan which will be presented to the DWA.

## 3.3 Alternative Mine Infrastructure

### 3.3.1 *Transportation of coal*

The alternatives that were considered in terms of the transportation of coal include the use of haul trucks to transport coal from the proposed opencast area to the New Process Plant - Crushing and Screening area at Leeuwan Coal via existing haul roads on-site, the use of haul trucks to transport coal from the proposed Opencast area to the New Process Plant - Crushing and Screening area at Leeuwan Coal via a newly constructed haul road, the use of a conveyor belt system to transport coal to the New Process Plant - Product Stacking area from the Crushing and Screening area, and the use of haul trucks to transport coal to the New Process Plant - Product Stacking area from the Crushing and Screening area.

The alternative of utilising haul trucks to transport coal from the opencast area to the New Process Plant area at Leeuwan Coal via existing haul roads onsite is a viable alternative if the existing roads within the mining area are upgraded to a haul road with the capacity to safely carry 100t payload trucks. Constructing a new road will economically be less viable.

The use of a conveyor belt system to transport coal to the New Process Plant area was chosen as a feasible alternative as this is a proven reliable method of coal transportation and will be constructed within the mining boundary of Leeuwan. In addition to this, this option will also reduce the need for additional mining vehicles on roads.

### **3.3.2 Process Plant**

Possible alternatives in terms of the process plant include the use of the existing Process Plant area at Leeuwan for the beneficiation of the RoM coal, the alteration of, or addition to, the existing Process Plants within the existing Process Plant area, the construction of a new Process Plant for the beneficiation of the ROM coal and the 'No Project' option.

Since the mining of the proposed Block OI coal reserve is necessary to ensure the continuation of the existing Leeuwan and the mining activities at Block OI will increase the amount of coal going through the existing Process Plant (Block OI operations will happen in conjunction with continued mining operations at other mining blocks), it was decided to construct a new Process Plant for the beneficiation of the ROM coal as the current facilities do not have the capacity to handle the increased amount of ROM and is dedicated to Eskom products from pits that will still be actively mined after the opening of block OI, which will mean effectively that product will not be delivered on time,.

The alternative to use the existing Process Plant area at Leeuwan for the beneficiation of the RoM coal was not considered to be the most viable option. As mentioned previously, the mining activities at Block OI will increase the amount of coal going through the existing Process Plant and therefore the existing Process Plant within the existing mining boundary area will need to be altered or a new Process Plant built. Due to limited land space the current plant cannot be upgraded to accommodate for the increase in coal and as such not a viable option.

### **3.3.3 Discard Material Disposal**

Possible alternatives in terms of the discard material disposal include on-surface disposal at the existing Leeuwan Coal, on-surface disposal at the proposed Block OI project site, and backfilling into existing Open Pit areas at Leeuwan Coal.

The disposal of discard on surface at the existing Leeuwan Coal and at the proposed Block OI project site, will result in increased areas of surface disturbance, and resulting impacts on the environment. The alternative of disposal of discard on-site was thus not considered viable.

Backfilling of discard material into the Open Pit areas at Leeuwan Coal, as well as backfilling into the Block OI area was decided to be the preferred method of disposal of mine residue and is the current approved method at Exxaro Leeuwan Coal.

### **3.3.4 Land Use / Development Alternatives**

Possible land use alternatives at the Block OI project sites include mining, use for grazing potential, use for crop production, conservation and ecotourism, making land available for residential development, making land available for small industries and combination of some of the abovementioned land use alternatives.

Since the area surrounding the mine is predominantly agricultural land, a large area is already assigned to crop production and after mining at the proposed Block OI has ceased, the area will be rehabilitated to grazing land with agricultural potential.

An Economic study is proposed to determine the economic value of agriculture on the land compared to the value if the mining of block OI should go ahead.

Because the proposed sites are located less than 10km from Delmas and within an approved mining area, the importance of making land available for residential development and small industries is not substantial and therefore not a viable alternative to mining.



The proposed Block OI project site is not located near any tourist routes or destinations. In addition, many other mines are situated close to the proposed Block OI project site which already contributes to the surrounding area not being considered for ecotourism.

Wetlands (including pans) do, however, occur within the proposed Block OI mining area and thus the use of land for conservation purposes thus needed to be investigated. The land use alternative of conservation and ecotourism was not found to be viable due to the disturbed nature of the wetlands and close proximity to other mining areas and their cumulative impact on the area. However, should this project prove viable, detailed studies in terms of wetland rehabilitation programmes and/or offsets must be investigated.

### **3.4 No-Go Option**

The proposed project will result in the expansion of the life of mine with an additional 18 years. The additional coal resources will supply Eskom with coal for power generation

The mine has an approved Social and Labour Plan which is set out on injecting capital, skills and services into the district municipality. Should this project be approved, and the life of mine increased, the district municipality will continue to benefit from the mining operations.

However, as with many coal opencast mines', especially in the Mpumalanga Province, there are the unavoidable environmental and social impacts. Should the project be approved the project will necessitate the permanent removal of disturbed wetlands. The project may also have a cumulative impact on water resources in the area and the loss of flora and fauna.

Exxaro is however committed to ensure that all the necessary specialist studies are undertaken to identify the potential impacts and also the significance of these. Based on this detailed management programmes will be established for soil management, ecological management, surface water and wetland management, groundwater management, air quality management, visual and noise management and any other management programme deemed necessary to reduce or eliminate potential negative impacts and enhance the positive impacts associated with the project. Exxaro is committed to investigate options for long term sustainable wetland management programmes and also possibly the potential for establishing off-set areas.

Should the proposed Block OI not be approved, the potential benefits of the project on a local, regional and national scale will be lost. If the 'No Project' alternative were implemented, all possible positive impacts resulting from the proposed development would be lost. The overall contribution to the chronic unemployment levels on a national scale makes the 'No Project' option strongly inadvisable. For the above-mentioned reasons, the implementation of the 'No Project' option is not advisable.

## 4 BASELINE ENVIRONMENTAL DESCRIPTION

For all the current and previous workings specialist studies were also undertaken and the results of the studies will be consolidated with the results from the proposed Block OI project. This will provide a holistic view of Leeuwan as a whole.

### 4.1 Geology

The information contained in this section of the report was obtained from the Baseline Ground Water Assessment conducted by GCS (Pty) Ltd, attached herewith as Appendix G.

The coal reserves located at the Leeuwan expansion project area [blocks OL and UI (now OI)] falls within the Witbank Coalfield. The Witbank coalfield's stratigraphy consists of sedimentary rocks of the Karoo Super Group; specifically the Transvaal Group and the lower coal-bearing Eccca Group. The geology map can be seen in Figure 4.1.

The UI and OWM mining block are similar in geology to that of the Witklip and Kenbar Sections of the existing Leeuwan Coal. The new mining area is thus underlain by a sedimentary rock succession of the Vryheid Formation, Eccca Group (Karoo sediments underlain by Transvaal sediments). The Karoo sediments are developed in the southeastern portion of the existing Leeuwan Coal area. The general characteristics are as follows:

- Karoo sediments have been deposited - Highly variable in thickness, varying from 0 to 60m; attributed to the uneven palaeofloor on which the Karoo sediments have been deposited
- The top portion of the Karoo sediments consists of highly weathered Eccca material. Weathering extends into the coal seam. This weathering is the result of water and oxygen movement through the Eccca sediments during infiltration of rainwater, and
- Underlying this highly weathered horizon is a thick accumulation of coal as well as some development of carbonaceous shale. The coal and shale vary in thickness between 0 - 30m.

The coal seams in the Vryheid Formation lie conformably on the Dwyka formation. Erosion has removed the uppermost parts of the Vryheid formation. The thin layer of Dwyka tillite underlying the karoo sediments is characterized by its pebbly nature in a medium to fine matrix. The colour of the matrix is usually dark grayish-brown, the latter indicating a high clay content.

The dolomitic sequence underlies the Karoo sediments. The characteristics of the dolomitic sequence are as follows:

- The top of the dolomitic sequence is marked by a sporadic accumulation of chert pebbles that may, in places, be well cemented by calcareous material. In other areas, the chert appears to be vuggy, with the result that groundwater can be transmitted with ease along this horizon. This layer represents an erosion landscape that originated after the deposition of the dolomites and before that of the Dwyka tillite.
- Underneath the pebbly chert layer lies proper dolomite of unknown thickness. The Stratigraphic relationship between the chert and the dolomite is unclear.

The Delmas coal field is situated on the western border of the Witbank coal field. Three coal seams have been identified, namely the upper, middle and lower seams. The top seam corresponds with the No. 2 seam of the Witbank coal field, the bottom seam corresponds with the No. 4 seam.

The lower seam consists of massive dull coal with scattered bands of lustrous coal. The division between the lower and the middle seam is generally shale (0.4m to 1.4m thick). In the central part of Witklip section of the existing Leeupan coal, a coal succession in a through-like structure is evident. This reaches a maximum thickness of 18m.

The upper seam (only at the Kenbar Section of the existing Leeupan coal) is on average 5m thick and consists mainly of dull and lustrous coal with alternating shale bands of which the uppermost 0.5 to 0.8m consists mainly of chert fragments, with a shale rich matrix. The base of the coal is very uneven, possibly as a result of sinkholes in the dolomite, before and after coal deposition. At the Kenbar Section of the existing Leeuwan Coal, the coal is overlain by clayey and sandy sediments approximately 2m thick. At the Witklip Section of the Existing Leeuwan, the capping is on average 10m thick and consists, for the most part clay.

Dolerite intrusions in the form of dykes and sills are widespread in both the Karoo Supergroup as well as the Malmani Subgroup, and are often found in the Leeuwan Coal area. A dolerite sill or dyke is known to sub-outcrop immediately to the south of the existing Leeuwan Coal area (Block OD EMPR, 2007).

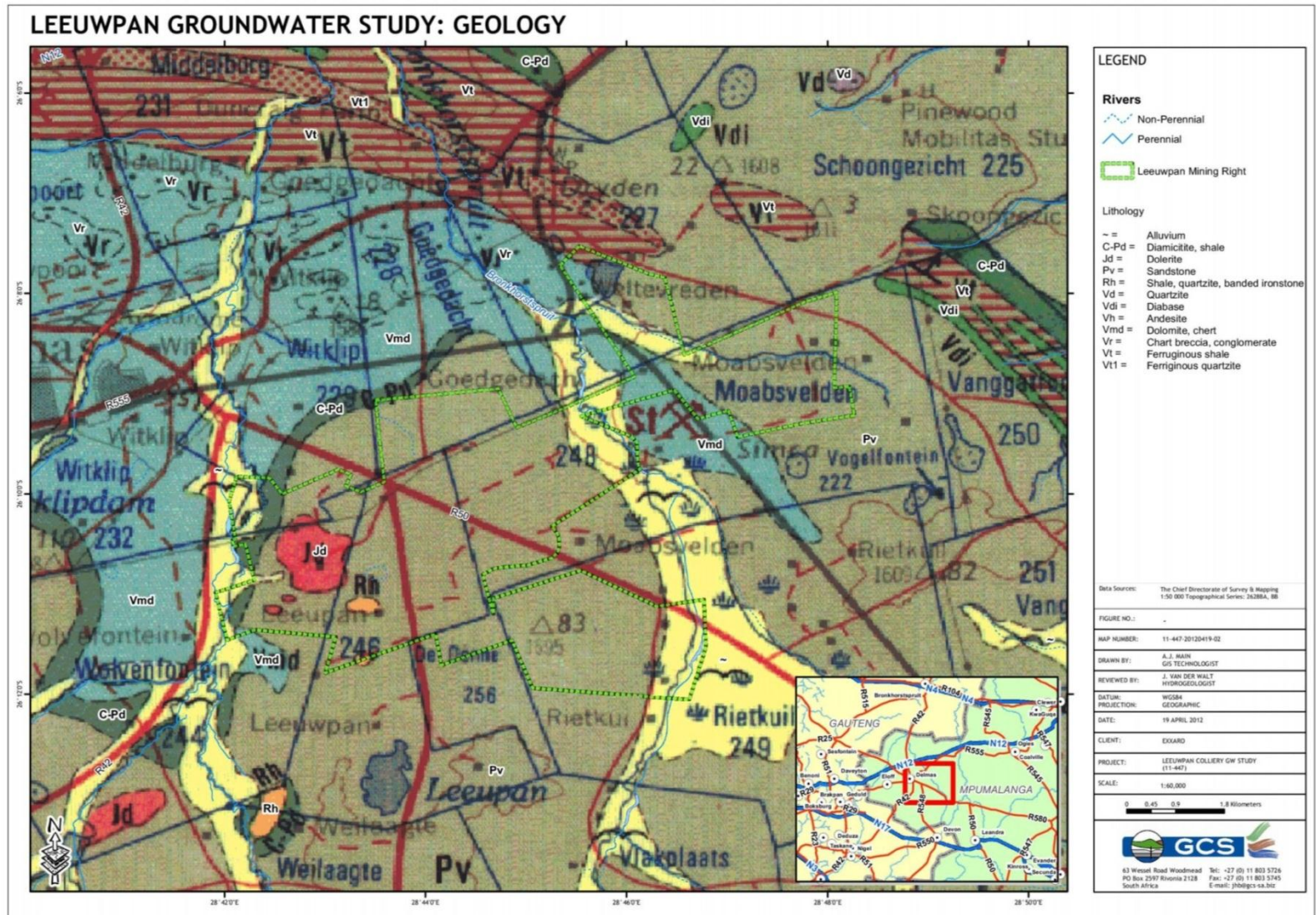


Figure 4.1 Geology of Leeuwan area

## 4.2 Climate

### 4.2.1 General description

The climate is generally moderate and dry with harsh winters, coupled with heavy frost. Rainfall is typical of Highveld conditions and occurs mainly during summer.

### 4.2.2 Temperatures

Average daily maximum temperatures range from 23.7°C in December to 11.3°C in July, with daily minima ranging from 18.8°C in January to 2.8°C in July.

Long-term monthly average maximum, mean and minimum temperatures for the nearest major town of Witbank are shown in **Error! Reference source not found.**, and long-term monthly daily maximum and minimum temperatures in **Error! Reference source not found.** (Schulze, 1986). The annual maximum, minimum and mean temperatures for Witbank are given as 33°C, -0.8°C and 16°C respectively, which are in agreement with the MM5 modelled data for the study site (see Figure 3-5). Average daily maximum temperatures range from 27°C in December to 17°C in June, and daily minima from 16°C in December to 5°C in July.

### 4.2.3 Rainfall

Witbank normally receives about 625mm of rain per year, with most rainfall occurring during summer. It receives the lowest rainfall (2mm) in July and August, and the highest (117mm) in January.

### 4.2.4 Wind direction

The local wind field is characterised by: Northerly and north-westerly winds with a strong component from the easterly sector. The north-westerly wind flow increases during day-time conditions with easterly wind flow increasing during the night. Low to moderate wind speeds with an average wind speed of 3.1m/s. Calm conditions occurring approximately 13% of the time.

### 4.3 Soils, Land use and Land Capability

The information contained in this section of the report was obtained from the Baseline Soil and Land Use Assessment conducted by TerraAfrica, attached herewith as Appendix D

Three land types i.e. Ba2, Bb3 and Ea15 are present on Leeupan.

The farms Weltevreden 227IR (Portion 7), Moabsvelden 248IR (Portions 1,4,5 and 6), Rietkuil 249IR as well as the largest parts of Wolvenfontein 224 IR and Witklip 232IR fall into the Bb3 land type. Land Type Bb3 is dominated by moderately deep to deep well-drained soils with plinthic character at depth on the higher lying areas. In the lower lying areas the soils are bleached, poorly drained sandy clay loam to clay. This land type is dominated by yellow-brown and bleached soil profiles and red soil forms are not widespread in this zone.

The farms Goedgedacht 228 IR, Leeuwpan 246 IR and the northern part of Kenbar 257IR fall into the Ba2 land type. Land Types Ba2 also consists of the same moderately deep to deep well-drained soils with plinthic character at depth but red soil forms dominate this land type.

Witklip 232 IR and Wolvenfontein 244 IR contains sections of land of Land Type Ea15. Land Type Ea15 consists of soil forms with significant clay accumulation and includes vertic, melanic and red structured soil forms. **Error! Reference source not found.** summarises the areas of each land type on the proposed site.

#### 4.3.1 Soil properties

The soils of the general Delmas area are known to be of the Clovelly and Hutton soil forms and make good agricultural lands.



Reviewing soil maps of the area indicated that the following soil forms were present on site before disturbance by mining activities: Hutton, Bainsvlei, Clovelly, Avalon, Glencoe, Sepane, Longlands, Kroonstad, Westleigh, Rensburg, Katspruit and Dresden soil forms. A small section on the far western side of the site contains more structured soils of the Sterkspruit, Bonheim and Estcourt forms. However, only small sections of the original soil profiles are left around the mining areas. The soil profiles on the farm Rietkuil 249 IR are still present and these consist out of Hutton, Bainsvlei, Clovelly, Avalon, Glencoe, Sepane, Longlands, Kroonstad, Westleigh, Rensburg and Katspruit soil forms.

#### **4.3.2 Land use**

The area has got a high agricultural potential. Land outside areas being actively mined, are used for irrigated crop production, dryland crop production, grazing and farming infrastructure. The rest of the land is used for mining and mining infrastructure.

#### **4.3.3 Land capability**

According to the Department of Agricultural Development, the agricultural land associated with the Delmas area is in the homogeneous farming area of the Magisterial District of Delmas.

Areas not yet disturbed by mining activities have arable and grazing land capability. Some rehabilitated areas may already have wilderness land capability but areas not sufficiently rehabilitated yet and active mining areas have industrial land capability.

### **4.4 Biodiversity**

The baseline Biodiversity studies were undertaken by EKOInfo (2012) (Appendix E), with consideration of all past studies undertaken for Leeupan.

#### **4.4.1 Ecosystem Diversity**

The literature review indicated the presence of one regional vegetation unit within the study area, namely the endangered Eastern Highveld Grassland.

The available small-scale datasets (Land Cover 2000, Mpumalanga Conservation Plan) indicated that less than 67% of the study area represents natural vegetation. The species composition and presence of species of concern (Red Data, Protected, Medicinal and Alien invasive) within the remaining untransformed areas will be determined during the summer/ wet season survey in October/ November 2012.

From the regional perspective, it is evident that the study area is located in a transformed and fragmented landscape. The area is not considered to be of conservation importance on a provincial scale even though it is located within a nationally threatened ecosystem. However, the remaining natural vegetation, especially terrestrial grassland is important for the mine because it represents source area for future rehabilitation and restoration. The extent and distribution of the remaining terrestrial grassland, especially those located on good agricultural land, will be determined during the detail/ EIA phase. These areas will also be surveyed for the presence of threatened Red Data plants or for their suitability as habitat for threatened plants.

#### 4.4.2 Avifauna

##### Preliminary richness statistics

According to the previous South African Bird Atlas Project (Harrison *et al.*, 1997), an average of 196 bird species have been recorded in the region based on two quarter degree grid cells that are sympatric to the study site (2628BA = 191 spp. and 2628BB = 201 spp.). This equates to 21 % of the approximate 951 species listed for the southern African sub-region<sup>1</sup>. However, the SABAP2 database suggests that the study area is more likely to sustain an average 121 species<sup>2</sup> ([www.sabap2.adu.org.za](http://www.sabap2.adu.org.za)). On a national scale, the bird richness on the study site is predicted to be moderate-high.

According to a recent site visit, the study site is represented by two distinct avifaunal assemblages consisting of (1) a community confined to the wetland features and (2) a community restricted to the grassland units. The former is dominated by the Red-knobbed Coot (*Fulica cristata*), Egyptian Goose (*Alopochen aegyptiaca*), Yellow-billed Egret (*Egretta intermedia*) and Blacksmith Lapwing (*Vanellus armatus*), and the latter by the African Pipit (*Anthus cinnamomeus*), Cape Longclaw (*Macronyx capensis*), Levillant's Cisticola (*C. tinniens*) and Ploceid weavers (weavers and bishops).

<sup>1</sup> A geographical area south of the Cunene and Zambezi Rivers (includes Namibia, Botswana, Zimbabwe, southern Mozambique, South Africa, Swaziland and Lesotho).

<sup>2</sup> According to five pentad grid localities (range = 98 - 137 species).

Table 4-1 provides an overview of threatened and near-threatened bird species recorded in the study area<sup>3</sup>, as well as those previously recorded in area based on their known distribution range and the presence of suitable habitat. A total of 18 species could occur on the study site.

#### **Orientation site visit**

A total of 83 bird species were recorded during an orientation site visit, which include the vulnerable Southern Bald Ibis (*Geronticus calvus*), African Marsh Harrier (*Circus ranivorus*) and Secretarybird (*Sagittarius serpentarius*). It is worth mentioning that 41 % of the observed species is represented by obligate and facultative aquatic species, thereby emphasising the contribution of the wetland features towards local bird diversity.

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<sup>3</sup> The study region has reference to an area that is larger than the study site itself. It incorporates external habitat types that are bordering the study site. Many bird species, especially large terrestrial species exhibit large home ranges and will move over large distances in search of food or mating partners. Therefore, the area of occupancy of some species is determined by changing environmental conditions.

Table 4-1 Threatened and near-threatened bird species

Species	Global Conservation Status*	Red Data Status**	Recorded during SABAP1	Recorded during SABAP2	Preferred Habitat	Potential Likelihood of Occurrence
<i>Anthropoides paradiseus</i> (Blue Crane)	Vulnerable	Vulnerable	Yes	No	Prefers open grasslands. Also forages in wetlands, pastures and agricultural land.	An irregular visitor on the study site. It is a regular (winter) visitor on the grasslands and cultivated fields south of the study site (Kinross - Devon area).
<i>Circus macrourus</i> (Pallid Harrier)	-	Near-threatened	No	No	Open grassland, valley bottom seeps and pastures.	An erratic (and unpredictable) summer visitor.
<i>Circus maurus</i> (Black Harrier)	Near-threatened	Near-threatened	Yes	No	Generally confined to the clay grasslands on the south-western part of Mpumalanga.	An uncommon winter visitor on the study site. It is a regular (winter) visitor on the grasslands and cultivated fields south-east of the study site (Kinross - Bethal area).
<i>Circus ranivorus</i> (African Marsh Harrier)	-	Vulnerable	Yes	Yes	Restricted to permanent wetlands with extensive reedbeds.	A regular foraging visitor to the extensive Bronkhorstpruit wetlands and associated floodplains.
<i>Eupodotis senegalensis</i> (White-bellied Korhaan)	-	Vulnerable	Yes	No	Prefers transitional habitat between grassland and savanna (e.g. Bankenveld).	Unlikely to occur.
<i>Eupodotis caerulescens</i> (Blue Korhaan)	Near-threatened	Near-threatened	Yes	No	Prefers extensive open short grassland and cultivated land.	An uncommon foraging visitor on the study site.
<i>Falco biarmicus</i> (Lanner Falcon)	-	Near-threatened	No	No	Varied, but prefers to breed in mountainous areas	Possible occasional foraging visitor.

Species	Global Conservation Status*	Red Data Status**	Recorded during SABAP1	Recorded during SABAP2	Preferred Habitat	Potential Likelihood of Occurrence
<i>Falco naumanni</i> (Lesser Kestrel)	Recently delisted	Vulnerable	Yes	No	Open grassland patches.	A fairly common summer visitor on the study site.
<i>Falco vespertinus</i> (Red-footed Falcon)	Near-threatened	-	Yes	No	Open arid savanna and grassland. Often joins flocks of Amur Falcons.	An irregular summer foraging visitor.
<i>Glareola nordmanni</i> (Black-winged Pratincole)	Near-threatened	Near-threatened	Yes	Yes	A species preferring extensive open grassland, usually near wetlands. Often forages over agricultural land and pastures.	A regular summer visitor in small numbers.
<i>Geronticus calvus</i> (Southern Bald Ibis)*	Vulnerable	Vulnerable	No	No	A species restricted to montane grassland (especially when burned) and breed/nest on steep cliffs.	A regular winter foraging visitor (small numbers only).
<i>Mirafra cheniana</i> (Melodious Lark)	Near-threatened	Near-threatened	No	Yes	A species with a preference for open dry "climax" Themeda triandra grassland or open primary grassland dominated by sour wiry grasses such as Loudetia simplex, Tristachya rehmannii and Trachypogon spicatus on well drained sandy substrates. Also secondary Eragrostis-dominated grassland.	Resident (breeding on southern part of the study site).

Species	Global Conservation Status*	Red Data Status**	Recorded during SABAP1	Recorded during SABAP2	Preferred Habitat	Potential Likelihood of Occurrence
<i>Mycteria ibis</i> (Yellow-billed Stork)	-	Near-threatened	Yes	Yes	Prefers shoreline habitat bordering large impoundments and extensive wetland systems.	An uncommon foraging visitor on the study site (known to visit some of the large dams in the region).
<i>Oxyura maccoa</i> (Maccoa Duck)	Near-threatened	-	Yes	Yes	Large saline pans and shallow impoundments.	An uncommon resident; could be present on some of the larger pans and dams adjacent to the study site.
<i>Phoenicopterus minor</i> (Lesser Flamingo)	Near-threatened	Near-threatened	Yes	Yes	Restricted to large alkaline pans and other inland water bodies.	An irregular visitor on the endorheic pans and large dams in the region.
<i>Phoenicopterus ruber</i> (Greater Flamingo)	-	Near-threatened	Yes	Yes	Restricted to large saline pans and other inland water bodies.	A regular visitor to the endorheic pans and dams in the region.
<i>Sagittarius serpentarius</i> (Secretarybird)	Vulnerable	Near-threatened	Yes	No	Prefers open grassland or lightly wooded habitat.	A regular foraging visitor.
<i>Tyto capensis</i> (African Grass-owl)	-	Vulnerable	No	Yes	Prefers rank moist grassland that borders drainage lines or wetlands.	A resident in areas with <i>Imperata cylindrica</i> . Occurs at low densities.

#### 4.4.3 Invertebrates

The unchannelled valley bottom wetlands and hillslope seeps provide suitable habitat for the vulnerable Marsh Sylph (*Metisella meninx*) butterfly. *M. meninx* is an obligate wetland species and depends on the occurrence of *Leersia hexandra* (Rice Grass), its host plant, to sustain a viable population. The latter was found growing extensively, almost forming uniform stands, in many of the wetlands features. *M. meninx* occupies wetlands in open grassland at altitudes of 1 400 to 1 700 m, often corresponding to the upper catchment regions of rivers and streams. The adults are on the wing from November to March (Henning *et al.*, 2009).

Potential Ecological Importance of the area include the following:

1. A part of the study site coincides with the floodplain of the Bronkhorstspruit and an unnamed tributary (western part of the study site). These areas experience inundation on a seasonal basis, forming extensive shallow palustrine conditions which are often used as focal congregational habitat for waterfowl and wader species.
2. The pans on the study site, including those adjacent to the study site, are all spatially interlinked with each other, and offer ephemeral foraging habitat for a variety of migratory and sedentary waterbird species. These are the only habitat to be utilised by the Yellow-billed Egret (*Egretta intermedia*).
3. The moist grassland series along the hillslope seeps and some of the pans sustain remnant patches of *Imperata cylindrica*. These provide optimal roosting and breeding habitat for the threatened African Grass-owl (*Tyto capensis*). This species has been confirmed breeding on the southern part of the study site (2009, pers. obs.).
4. The grassland patches on the eastern section of the study site, in particular those with primary compositions, have the intrinsic potential to provide habitat for threatened and conservation important bird species, especially when burned (Southern Bald Ibis *Geronticus calvus* and Secretarybird *Sagittarius serpentarius*).
5. The rocky grasslands on the eastern part of the study site show high spatial heterogeneities contributing to a myriad of microhabitat types and niche space. These areas could support a high species richness of epigaeic invertebrate taxa and provide refugia for important invertebrate guilds (e.g. pollinators).

#### 4.4.4 Herpetofauna

In general the study site and surrounding region showed a high level of habitat transformation due to the impacts of mining activities, crop agriculture, livestock grazing and uncontrolled fires. Any significant herpetofauna populations are expected to be confined to the drainage lines or the few rocky outcrops in the area.

As expected no reptiles were observed during the site visits. Only a single amphibian (*Amietia angolensis*) was heard calling intermittently at an artificial dam.

#### Desktop Study

The reptile and amphibian species expected to occur on the mine site are shown in Table 4-2 and Table 4-3 respectively. Due to the severely transformed nature of the habitat on the mine site, these tables are an over-representation of what is actually likely to be found on the site. Only a single species of conservation concern is expected to occur on the study site namely the Giant Bullfrog (*Pyxicephalus adspersus*). NEMBA (2004) declares the giant bullfrog as “protected” and Du Preez & Carruthers (2009) list this species as “vulnerable”. Therefore, any potential negative impact on the property that is likely to directly influence the above-mentioned species should be mitigated or prevented.

**Table 4-2 Reptile species expected to occur on the Leeuwan mining site.**

Family	Scientific name	Common name	Atlas region endemic
Agamidae	<i>Agama aculeata distanti</i>	Distant's Ground Agama	x
Agamidae	<i>Agama atra</i>	Southern Rock Agama	
Amphisbaenidae	<i>Monopeltis infuscata</i>	Dusky Worm Lizard	
Atractaspidae	<i>Aparallactus capensis</i>	Black-headed Centipede-eater	
Atractaspidae	<i>Atractaspis bibronii</i>	Bibron's Stiletto Snake	
Atractaspidae	<i>Homoroselaps lacteus</i>	Spotted Harlequin Snake	x
Colubridae	<i>Boaedon capensis</i>	Brown House Snake	
Colubridae	<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	
Colubridae	<i>Dasypeltis scabra</i>	Rhombic Egg-eater	
Colubridae	<i>Duberria lutrix</i>	South African Slug-eater	x
Colubridae	<i>Lamprophis aurora</i>	Aurora House Snake	x
Colubridae	<i>Lycodonomorphus inornatus</i>	Olive House Snake	x
Colubridae	<i>Lycodonomorphus rufulus</i>	Brown Water Snake	
Colubridae	<i>Lycophidion capense</i>	Cape Wolf Snake	
Colubridae	<i>Philothamnus hoplogaster</i>	South Eastern Green Snake	
Colubridae	<i>Philothamnus semivariegatus</i>	Spotted Bush Snake	
Colubridae	<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout	
Colubridae	<i>Psammophis brevirostris</i>	Short-snouted Grass Snake	



Family	Scientific name	Common name	Atlas region endemic
Colubridae	<i>Psammophis crucifer</i>	Cross-marked Grass Snake	
Colubridae	<i>Psammophylax rhombeatus</i>	Spotted Grass Snake	
Colubridae	<i>Psammophylax tritaeniatus</i>	Striped Grass Snake	
Colubridae	<i>Pseudaspis cana</i>	Mole Snake	
Cordylidae	<i>Chamaesaura aenea</i>	Coppery Grass Lizard	x
Cordylidae	<i>Chamaesaura anguina</i>	Cape Grass Lizard	x
Cordylidae	<i>Chamaesaura macrolepis</i>	Large-scaled Grass Lizard	
Cordylidae	<i>Cordylus jonesii</i>	Jones' Girdled Lizard	
Cordylidae	<i>Cordylus vittifer</i>	Common Girdled Lizard	
Elapidae	<i>Elapsoidea sundevallii media</i>	Highveld Garter Snake	
Elapidae	<i>Hemachatus haemachatus</i>	Rinkhals	
Gekkonidae	<i>Hemidactylus mabouia</i>	Common Tropical House Gecko	
Gekkonidae	<i>Lygodactylus capensis</i>	Common Dwarf Gecko	
Gekkonidae	<i>Lygodactylus nigropunctatus</i>	Black-spotted Dwarf Gecko	x
Gekkonidae	<i>Pachydactylus affinis</i>	Transvaal Gecko	x
Gekkonidae	<i>Pachydactylus capensis</i>	Cape Gecko	
Gerrhosauridae	<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	
Lacertidae	<i>Ichnotropis capensis</i>	Ornate Rough-scaled Lizard	
Lacertidae	<i>Nucras holubi</i>	Holub's Sandveld Lizard	
Lacertidae	<i>Nucras intertexta</i>	Spotted Sandveld Lizard	
Lacertidae	<i>Nucras lalandii</i>	Delalande's Sandveld Lizard	x
Lacertidae	<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard	x
Lacertidae	<i>Pedioplanis lineoocellata</i>	Spotted Sand Lizard	
Leptotyphlopidae	<i>Leptotyphlops distanti</i>	Distant's Thread Snake	
Leptotyphlopidae	<i>Leptotyphlops incognitus</i>	Incognito Thread Snake	
Leptotyphlopidae	<i>Leptotyphlops scutifrons conjunctus</i>	Eastern Cape Thread Snake	
Leptotyphlopidae	<i>Leptotyphlops scutifrons</i>	Peters' Thread Snake	
Pelomedusidae	<i>Pelomedusa subrufa</i>	Marsh Terrapin	
Scincidae	<i>Acontias gracilicauda</i>	Thin-tailed Legless Skink	x
Scincidae	<i>Afroablepharus walbergii</i>	Wahlberg's Snake-eyed Skink	
Scincidae	<i>Mochlus sundevallii</i>	Sundevall's Writhing Skink	
Scincidae	<i>Trachylepis capensis</i>	Cape Skink	
Scincidae	<i>Trachylepis punctatissima</i>	Speckled Rock Skink	
Scincidae	<i>Trachylepis varia</i>	Variable Skink	
Typhlopidae	<i>Afrotyphlops bibronii</i>	Bibron's Blind Snake	
Typhlopidae	<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	
Varanidae	<i>Varanus niloticus</i>	Water Monitor	
Viperidae	<i>Bitis arietans</i>	Puff Adder	
Viperidae	<i>Causus rhombeatus</i>	Rhombic Night Adder	

**Table 4-3 Amphibian species expected to occur on the Leeuwan mine site.**

Family	Scientific name	Common name
Bufonidae	<i>Amietophrynus garmani</i>	Eastern Olive Toad
Bufonidae	<i>Amietophrynus gutturalis</i>	Guttural Toad
Bufonidae	<i>Amietophrynus rangeri</i>	Racous Toad
Bufonidae	<i>Poyntonophrynus fenoulheti</i>	Northern Pygmy Toad
Bufonidae	<i>Schismaderma carens</i>	Red Toad
Hyperoliidae	<i>Kassina senegalensis</i>	Bubbling Kassina

Family	Scientific name	Common name
Hyperoliidae	<i>Semnodactylus wealii</i>	Rattling Frog
Microhylidae	<i>Phrynomantis bifasciatus</i>	Banded Rubber Frog
Phrynobatrachidae	<i>Phrynobatrachus natalensis</i>	Common Puddle Frog
Pipidae	<i>Xenopus laevis</i>	African Clawed Frog
Ptychadenidae	<i>Ptychadena anchietae</i>	Plain Grass Frog
Ptychadenidae	<i>Ptychadena porosissima</i>	Striped Grass Frog
Pyxicephalidae	<i>Amietia angolensis</i>	Common River Frog
Pyxicephalidae	<i>Amietia fuscigula</i>	Cape River Frog
Pyxicephalidae	<i>Cacosternum boettgeri</i>	Common Caco
Pyxicephalidae	<i>Pyxicephalus adspersus</i>	Giant Bullfrog
Pyxicephalidae	<i>Strongylopus fasciatus</i>	Striped Stream Frog
Pyxicephalidae	<i>Strongylopus grayii</i>	Clicking Stream Frog
Pyxicephalidae	<i>Tomopterna cryptotis</i>	Tremolo Sand Frog
Pyxicephalidae	<i>Tomopterna natalensis</i>	Natal Sand Frog

### Current threats to herpetofauna

Several current threats to the herpetofauna community in the region of the mine site were identified during the scoping study namely:

- Collisions with- or being run over by vehicles;
- Mining activities (clearing and fragmentation of habitat, pollution);
- Intensive cattle farming (trampling of vegetation, spreading of invasive plants);
- Crop agriculture;
- Encroachment of alien vegetation (Wattle, Pine, Bluegums).
- Uncontrolled burning.

#### 4.4.5 Mammals

This section represents the overall results from the literature and desktop review as well as detail level assessments conducted during July (dry season).

In total, 16 mammal species were recorded during the two survey periods. The complete list of mammals is shown in Table 4-4. This represents strong preliminary evidence as to a significant mammal assemblage populating the study site. Due to the complexity and diversity of body sizes, ecology and movements of mammalian fauna, as well as the strong variation in sampling techniques used for each group, it is imperative that various aspects of the data be discussed in extended detail.

**Table 4-4 List of mammal species acquired during the dry-season study**

BIOLOGICAL NAME	ENGLISH NAME	EWT 2004 STATUS	TOPS	METHOD OF ACQUISITION	NOTES	LOCAL SENSITIVITY	REGIONAL SENSITIVITY
<i>Atilax paludinosus</i>	Water Mongoose	Least Concern	Nil	Camera trap	Common wetland resident	Low	Low
<i>Aonyx capensis</i>	African Clawless Otter	Least Concern	Yes	Camera trap	Common wetland resident	Low	Low
<i>Canis mesomelas</i>	Black-backed Jackal	Least Concern	Nil	Sighting	Common resident	Low	Low
<i>Cryptomys hottentotus</i>	Common Mole-rat	Least Concern	Nil	Burrows	Common resident	Moderate	Low
<i>Cynictis penicillata</i>	Yellow Mongoose	Least Concern	Nil	Sighting	Common resident	Low	Low
<i>Galerella sanguinea</i>	Slender Mongoose	Least Concern	Nil	Sighting	Common resident	Low	Low
<i>Genetta genetta</i>	Small-spotted Genet	Least Concern	Nil	Camera trap	Common resident	Low	Low

BIOLOGICAL NAME	ENGLISH NAME	EWT 2004 STATUS	TOPS	METHOD OF ACQUISITION	NOTES	LOCAL SENSITIVITY	REGIONAL SENSITIVITY
<i>Hystrix africaeaustralis</i>	Porcupine	Least Concern	Nil	Quills	Common resident	Low	Low
<i>Leptailurus serval</i>	Serval	Near Threatened	Nil	Camera trap	Resident	Moderate	Moderate
<i>Lepus saxatilis</i>	Scrub Hare	Least Concern	Nil	Sighting	Common resident	Low	Low
<i>Otomys irroratus</i>	Vlei rat	Least Concern	Nil	Scat analysis /camera	Common resident	Low	Low
<i>Mellivora capensis</i>	Honey Badger	Near Threatened	Nil	Spoor	Common resident	Low	Low
<i>Pedetes capensis</i>	Springhare	Least Concern	Nil	Burrows	Common resident	Moderate	Low
<i>Sylvicapra grimmia</i>	Common Duiker	Least Concern	Nil	Spoor	Common resident	Low	Low
Total Number of Species	14	2	1				

### Species of conservation concern

Two red-data species were located on the study site, which represent species of conservation concern. These species are discussed below.

**Serval:** This species is listed as Near Threatened in South Africa. A serval was photographed very near to the drainage line, which is expected as the species forages on rodents which are often associated with wetland/drainage areas. The summer survey may reveal more about the prevailing serval population on site, as they may be transitory or indeed resident. Previous studies from the author has shown the servals frequently make use of ridges, eucalyptus and wattle stands for refugia, emerging to forage along drainage areas, pans, wetlands and open grassland.

**Honey Badger:** This species is listed as Near Threatened in South Africa. Honey badger tracks were periodically encountered on road networks in the study area. The low frequency of tracks as well as the lack of camera trap evidence suggests that this species may only use the study area as a migratory pathway between home ranges, rather than as a permanent core area, supporting viable populations. However, the summer study will provide more evidence as to the population status of not only honey badger, but other mesopredators found in the region.

### Trade of Protected Species Act species of concern.

**African clawless otter:** This species is listed as CITES appendix 2 and is also TOPS (Trade of Protected Species Act) listed. In Mpumalanga, otters have previously been frequently recorded on wetlands within existing operational coal mines in the area. Despite the strong presence of human and mining activities, it appears to show strong populations throughout the area. Otters are persecuted in Mpumalanga Highveld regions, as they often come into direct conflict with the trout fishing industry. However, in the Delmas area, this recreational activity is not a direct threat. It is conceivable that large water bodies that exist within mine concession boundaries provide refuge from human persecution. The biggest threat to this species from mine activities will be contamination of food supplies by toxins and heavy metals in tailings dams, although to date, the exact effects are unknown.

### **Preliminary species trends**

The species trends of the recorded mammals cannot accurately be predicted in such a short space of sampling time. However, due to the adequate spatial distribution of the sampling points, it is possible to ascertain some descriptive trends from the data. Descriptions of some of the more prevalent species observed on site are provided below.

**Slender mongoose** is an anthropogenic species which is often strongly associated with human activity. The high number of observations is expected. **Water mongooses** are also a highly synanthropic species but their presence will be limited to areas with ready access to wetlands/drainage lines.

**Yellow mongoose** is a common burrowing species which thrives, even in the presence of humans. The species frequently utilises cultivated lands where they are able to find excellent forage as well as optimal burrowing substrate. **Common duikers** will make use of plantation refugia during daylight hours and forage nocturnally. They are however, actively sought out by humans hunting with dogs in the area. The species is extremely common, even in disturbed areas exhibiting large degrees of human disturbance. **Black-backed jackals** are an extremely common meso carnivore which exhibit highly generalist feeding habits. It is an anthropogenic species which is often strongly associated with human activity. Finally, scrub hares are a very common lagomorph which is also found in disturbed areas, sometimes in great numbers. Spoor of this species was located in all parts of the study area, and numerous sightings of the animal were recorded.

Representation of the trophic breakdown and description of the mammalian assemblages cannot be made until the study is complete. There has been almost no small mammal sampling and this must be carried out in order to complete a comprehensive data collection.

#### Likelihood of occurrence results

The full likelihood of occurrence results for the red-data species found in Mpumalanga is presented in Table 4-5. As the data set is so far, incomplete, it is important to treat this summary as an organic table which may be subject to change.

**Table 4-5 likelihood of occurrence of red-data mammals for the study area**

BIOLOGICAL NAME	ENGLISH NAME	RD	Likelihood	Notes
<i>Acinonyx jubatus</i>	Cheetah	VU	Nil	Outside distribution
<i>Amblysomus hottentotus</i>	Hottentot's Golden Mole	DD	Nil	Outside distribution
<i>Amblysomus robustus</i>	Robust Golden Mole	EN	Nil	Outside distribution
<i>Amblysomus septentrionalis</i>	Highveld Golden Mole	NT	Moderate	Rare resident
<i>Atelerix frontalis</i>	South African Hedgehog	NT	Moderate	Rare resident
<i>Canis adustus</i>	Side-striped Jackal	NT	Low	Outside distribution
<i>Cercopithecus mitis</i>	Samango Monkey	VU	Nil	Outside distribution
<i>Cercopithecus mitis labiatus</i>	Samango Monkey	EN	Nil	Outside distribution
<i>Chrysoxalax villosus</i>	Rough-haired Golden Mole	CR	Low	Outside distribution
<i>Crocidura cyanea</i>	Reddish-grey Musk Shrew	DD	High	Possible wetland resident
<i>Crocidura flavescens</i>	Greater Musk Shrew	DD	Low	Rare
<i>Crocidura fuscomurina</i>	Tiny Musk Shrew	DD	Low	Rare
<i>Crocidura hirta</i>	Lesser Red Musk Shrew	DD	Low	Rare
<i>Crocidura maquassiensis</i>	Maquassie Musk Shrew	VU	Low	Rare
<i>Crocidura mariquensis</i>	Swamp Musk Shrew	DD	Low	Rare
<i>Crocidura silacea</i>	Lesser Grey-brown Musk Shrew	DD	Low	Rare
<i>Crocuta crocuta</i>	Spotted Hyaena	NT	Nil	Outside distribution
<i>Damaliscus lunatus lunatus</i>	Tsessebe	EN	Nil	Outside distribution
<i>Dasymys incomtus</i>	Water Rat	NT	Moderate	Possible wetland resident
<i>Diceros bicornis minor</i>	Black Rhinoceros	VU	Nil	Outside distribution
<i>Elephantulus brachyrhynchus</i>	Short-snouted Elephant-shrew	DD	Low	Low habitat potential
<i>Grammomys dolichurus</i>	Woodland Mouse	DD	Nil	Outside distribution
<i>Graphiurus platyops</i>	Rock Dormouse	DD	Low	Low habitat potential
<i>Hippotragus equinus</i>	Roan Antelope	VU	Nil	Outside distribution
<i>Hippotragus niger niger</i>	Sable Antelope	VU	Nil	Outside distribution
<i>Hyaena brunnea</i>	Brown Hyaena	NT	Moderate	Rare resident
<i>Lemniscomys rosalia</i>	Single-striped Mouse	DD	High	Common resident
<i>Leptailurus serval</i>	Serval	NT	Confirmed	Resident
<i>Lutra maculicollis</i>	Spotted-necked Otter	NT	Moderate	Possible wetland resident
<i>Lycaon pictus</i>	African Wild Dog	EN	Nil	Outside distribution

BIOLOGICAL NAME	ENGLISH NAME	RD	Likelihood	Notes
<i>Manis temminckii</i>	Pangolin	VU	Low	Low habitat potential
<i>Mellivora capensis</i>	Honey Badger	NT	Confirmed	Rare resident
<i>Myosorex cafer</i>	Dark-footed Forest Shrew	DD	Low	Rare
<i>Myosorex varius</i>	Forest Shrew	DD	High	Possible wetland resident
<i>Mystromys albicaudatus</i>	White-tailed Rat	EN	Low	Rare
<i>Neamblysomus juliane</i>	Juliana's Golden Mole	VU	Nil	Outside distribution
<i>Otomys slogetti</i>	Sloggett's Rat	DD	Nil	Outside distribution
<i>Ourebia ourebi</i>	Oribi	EN	Nil	Outside distribution
<i>Panthera leo</i>	Lion	VU	Nil	Outside distribution
<i>Paracynictis selousi</i>	Selous' Mongoose	DD	Nil	Outside distribution
<i>Poecilogale albinucha</i>	African Weasel	DD	Moderate	Rare
<i>Raphicerus sharpei</i>	Sharp's Grysbok	NT	Low	Outside distribution
<i>Rhynchogale melleri</i>	Meller's Mongoose	DD	Low	Outside distribution
<i>Suncus infinitesimus</i>	Least Dwarf Shrew	DD	Low	Rare
<i>Suncus lixus</i>	Greater Dwarf Shrew	DD	Low	Rare
<i>Suncus varilla</i>	Lesser Dwarf Shrew	DD	Moderate	Rare
<i>Tatera leucogaster</i>	Bushveld Gerbil	DD	High	Common resident

#### 4.5 Surface water

The information contained in this section of the report was obtained from the Baseline Hydrology Assessment conducted by GCS (Pty) Ltd, attached herewith as Appendix F.

The study area is located in Water Management Area 4: Olifants and in quaternary catchment area B20A. The Bronkhorstspuit River flows in a south-north direction through the site to eventually end in the Bronkhorstspuit Dam downstream of the site area. Natural water features on site include tributaries of the Bronkhorstspuit River and pans. Artificial water features on site include farm dams, old void areas, Pollution Control Dams (PCD's), rain water in open cast pits and river diversion channels.

The watercourse on the newly proposed area that is indicated on the 1:50 000 topographical map was not flowing and did not seem to have a defined flowpath.

##### 4.5.1 Surface water use

There are four main uses of water that have been identified for the subcatchment of the Bronkhorstpruit up to the receiving water body, namely the Bronkhorstpruit Dam. The surface water uses include the following;

- Domestic use by formal and informal communities along the affected watercourse,
- Irrigation of crops, especially maize,
- Livestock watering including cattle, sheep and poultry and
- Aquatic ecosystems including fish, macro and micro-invertebrates.

Very few water bodies in the Delmas area are used for recreational purposes due to their seasonal nature. In most cases, dams are used for fishing.

No direct abstraction of water from the Bronkhorstpruit occurs for commercial irrigation or extensive domestic use. Dams are usually filled with water from the boreholes and this clean water is mainly used for irrigation. Numerous pans occur in the Delmas area, but are not utilized as a source of water for the above mentioned purposes.

#### **4.5.2 Surface water quantity**

##### *4.5.2.1 Catchment area*

Kenbar and Witklip are situated in the Bronkhorstspruits catchment area. The Bronkhorstpruit originates from a series of fountains in the dolomitic rocks south of Witklip. This source area is marshy and characterized by vleis. The Bronkhorstpruit flows past Witklip for approximately 20km before being joined by the Koffiespruit. Thereafter, it flows for another 5 km until reaching the Bronkhorstpruit Dam. Water in this dam is used for domestic, recreational and irrigation purposes.

The Wilge River flows to the east of the Bronkhorstpruit in a northerly direction towards the Premier Mine Dam. The overflow of the Bronkhorstpruit also flows into the Premier mine. The overflow of the Premier Mine Dam then flows as the Wilge River to the Loskop Dam.



#### 4.5.2.2 *Mean annual runoff*

The average annual runoff which would normally flow into the affected area from the tributary has been estimated at  $17.0 \times 10^6 \text{m}^3/\text{yr}$ .

#### 4.5.2.3 *Normal dry water flow*

Normal dry weather flow can be regarded as very low since it is not possible to extract any flowing water from the seasonal tributary of the Bronkhorstspruit River under dry weather conditions.

#### 4.5.2.4 *Surface water quality*

Both the Wilge River and the Bronkhorstspruit are relatively unpolluted, but nuisance macrophytes do occur. The Total dissolved salts concentrations and sodium absorption ratios of the water in the Wilge river catchment are usually higher during winter than in the summer rainy season. This is due to seasonality and by the fact that water regulating structures reduce the stream flow downstream. Restrictions are imposed on the construction of dams in order to limit this effect.

The catchment can be considered to be sensitive as the Wilge River has a marked positive effect on the Olifants River water quality before it reaches the Loskop dam. Without the alkaline contribution from the Wilge River, serious water quality problems may be expected in the Loskop Dam, where metal concentrations hinge on a fine margin as a result of acid mine drainage in the catchment.

The main water related problems that were identified during an investigation in 1998 include the following:

- Surplus mine water accumulated in the Witklip open pit during excessively high rainfall events. A discharge permit had to be applied for where after a volume of water was discharged into the unnamed tributary of the Bronkhorstspruit.
- The formation of acid mine water was detected close to the coal beneficiation plant. This pollution is contained in an enclosed area.

- Acid mine water is formed in the Witklip open pit if water is allowed to remain in contact with the carbonaceous material. A low pH of 2.8 has been recorded at this locality. Water is quickly pumped from this pit to a nearby evaporation dam.
- A coal slurry spill occurred close to the coal beneficiation plant and polluted a dry watercourse.
- Capacity problems were experienced on the slurry disposal facilities/ dams. These dams overflowed and slurry was deposited on areas that were considered to be clean water areas. A filter press was subsequently installed to separate coal fines and water more effectively. The problem has been resolved and the contaminated areas have been cleaned and rehabilitated/capped with clean material.

## 4.6 Ground water

The information contained in this section of the report was obtained from the Baseline Groundwater Assessment conducted by GCS, attached herewith as Appendix G

### 4.6.1 Aquifer Description

It is likely that the following three aquifers exist within the proposed mining area, of which the two upper aquifers are located within the Karoo Supergroup:

- The perched, weathered zone aquifer;
- Fractured Karoo aquifer (mainly sandstone with subordinate siltstone and shale) that possess a secondary porosity associated with weathering); and
- Dolomite & Chert rich aquifer of the Malmani Subgroup.

The fractured Karoo aquifer can be classified as the secondary source aquifer in this instance. It is generally considered low yielding (Parsons, 1995) and display characteristics of the intergranular and fractured regime, which indicate groundwater storage and flow occurs mainly within the fractures of the rock. This aquifer is reported to be approximately 40 meters thick. From previous investigation in similar geological units the saturated hydraulic conductivity of the Ecca Group was found to vary between  $1 \times 10^{-1}$  and  $1 \times 10^{-3}$  m/day.

The Malmani Subgroup forms the main aquifer, and consists mainly of alternating layers of chert free dolomite and chert rich dolomite. (Visser, 1989). Overlying this is the Vryheid Formation of thick sandstone and gritstone alternated by sandy shale and coal beds. The Dwyka Formation separates the dolomitic aquifer from the Vryheid Formation. It consists of gravely diamictite with minor varved shale and mudstone that is less permeable than both the Vryheid Formation and the Malmani dolomite. The Dwyka is normally considered as an aquiclude. An effective depth of 300 meters has been accepted as the maximum depth to which significant dissolution of the dolomite has been taking place. A hydraulic conductivity that varies between 10 to 100 m/day is considered representative of the Malmani dolomite.

#### **4.6.2            *Ground water quality***

During the 1998 baseline study of the area, it was found that the quality of ground water in the area east of Delmas was generally excellent. The only exception to this was the sample from a borehole into an old underground mine immediately east of Delmas.

#### **4.6.3    *Potential Receptors***

A number of privately used boreholes were identified in the area. Most of the boreholes identified represented sources of domestic water supply to farmers and their farm workers. In some instances the boreholes investigated were “high yielding”. The majority of the high yielding boreholes were used for irrigation (70 to 90 ha areas) of crops and vegetables. Measured groundwater levels in the area range from 1.5 mbgl to 50 mbgl. There are a number of groundwater receptors in the area. The surface water streams such as the Bronkhorstpruit may also be receptors for groundwater seepage. Leeuwpan Colliery has an active groundwater monitoring programme, with a number of monitoring boreholes involved which are also found in and 1 mbgl - metres below ground level around the mining area. The location of hydrocensus and mine monitoring boreholes can be seen in Figure 4.2.

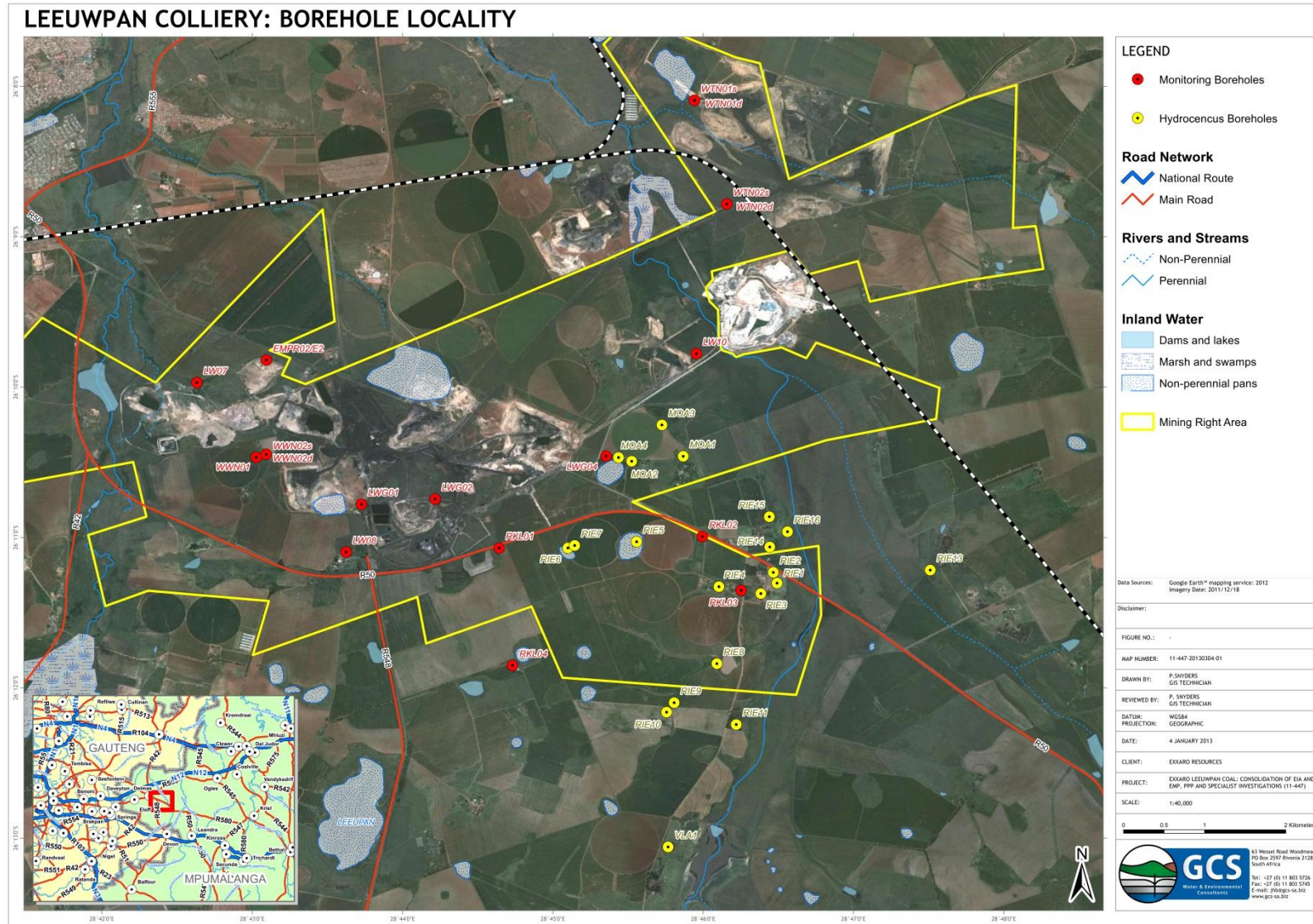


Figure 4.2 Borehole locality (Also see Appendix A)

#### **4.6.4 Ground water uses**

Groundwater uses other than the Leeuwan Coal, were identified to include the following:

- Domestic use,
- Livestock watering,
- Garden,
- Maize milling, and
- Crop irrigation

#### **4.7 Wetlands**

The information contained in this section of the report was obtained from the Desktop Wetland Assessment conducted by Wetland Consulting Services (Pty) Ltd, attached herewith as Appendix H.

The National Wetland Inventory (SANBI, 2011) and the Atlas of Freshwater Ecosystem Priority Areas in South Africa (Nel et al., 2011) indicates a number of valley bottom, hillslope seepage and pan wetlands as occurring on site. None of the wetlands are classed as FEPA's (Freshwater Ecosystem Priority Areas), and no FEPA wetlands occur within 3km of the study area boundary.

##### **4.7.1 Wetland Delineation**

The wetland delineation undertaken for Leeuwan in 2007 (Wetland Consulting Services) indicates a number of valley bottom, hillslope seepage and pan wetlands occurring on site. This delineation was extended via a desktop delineation to cover the entire study area.

The identified wetlands, based on existing information and a desktop delineation of wetness and greenness signatures visible on Google Earth imagery, are illustrated in Figure 4.3. All of the areas identified as possibly being wetlands will be further investigated in the field and the presence of wetlands and the wetland boundaries will be verified and existing information updated.

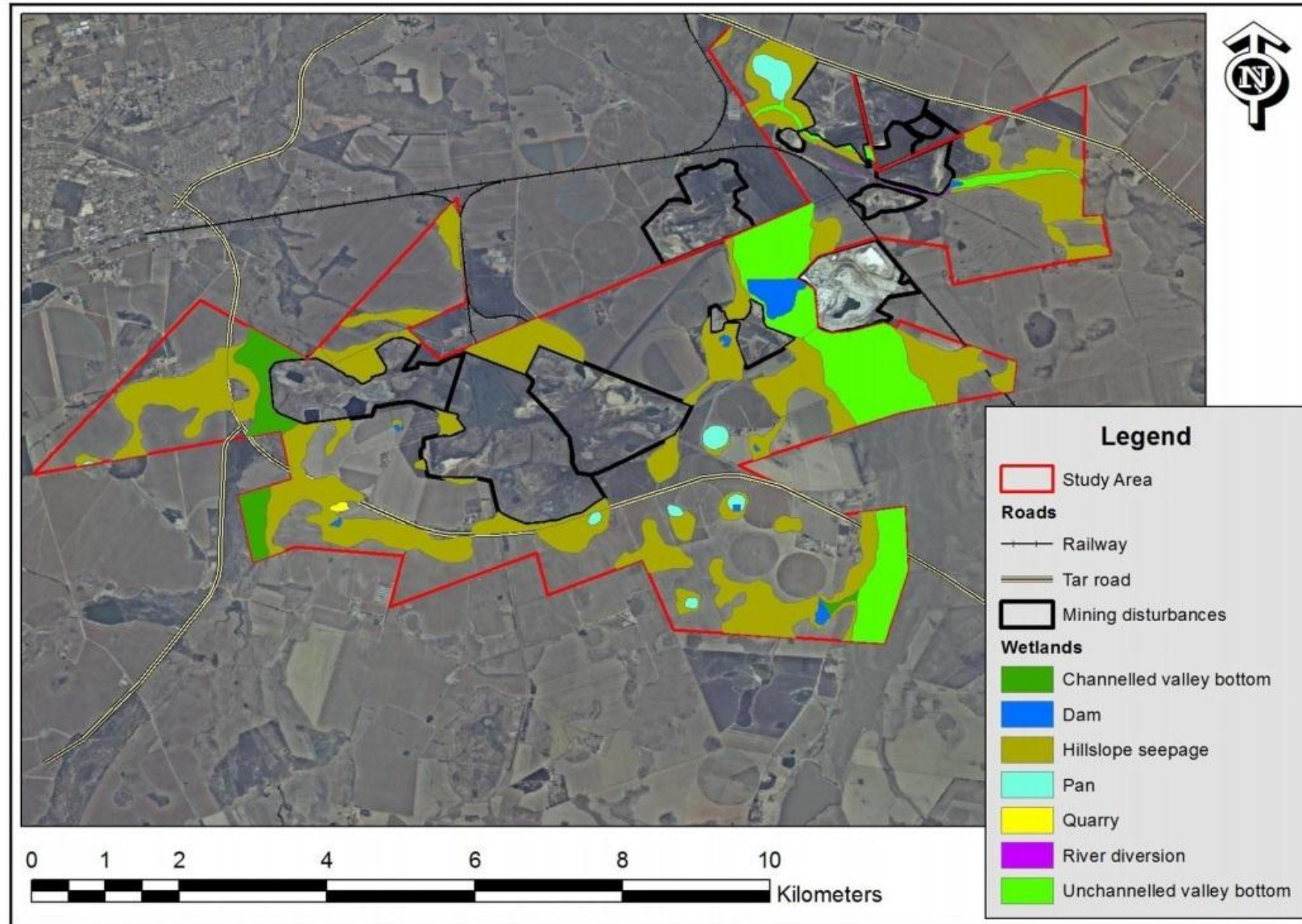


Figure 4.3 Map showing wetland areas

Based on the desktop mapping, approximately 33.5% (just over 1 420ha) of the study area is suspected to be covered by wetlands, consisting mostly of hillslope seepage wetlands (947ha) and unchannelled valley bottom wetlands (326ha). A total of 7 pans are expected to occur on site.

The dam constructed in the Bronkhorst River desiccated the wetland resulting in dry land species occurring in the area. The major functions of the wetland have been altered as a result of the presence of the dam and the associated abstraction of water. The dam and the upstream wetland however still provides habitat to a variety of species.

#### **4.8 Air quality**

The information contained in this section of the report was obtained from the Baseline Air Quality Assessment conducted by Airshed Planning Professionals (Pty) Ltd, attached herewith as Appendix I

The local study area for the assessment was selected based on the expected extent of air quality impacts and possible sensitive receptors such as individual homes and communities. A study area of 20 km east-west and 15 km north-south was identified. The extent of the study area, surrounding mines (SamQuarz Silica Mine and Stuart Colliery), farm houses, main roads and closest sensitive receptors relative to the opencast pit areas are shown in Figure 4.4.

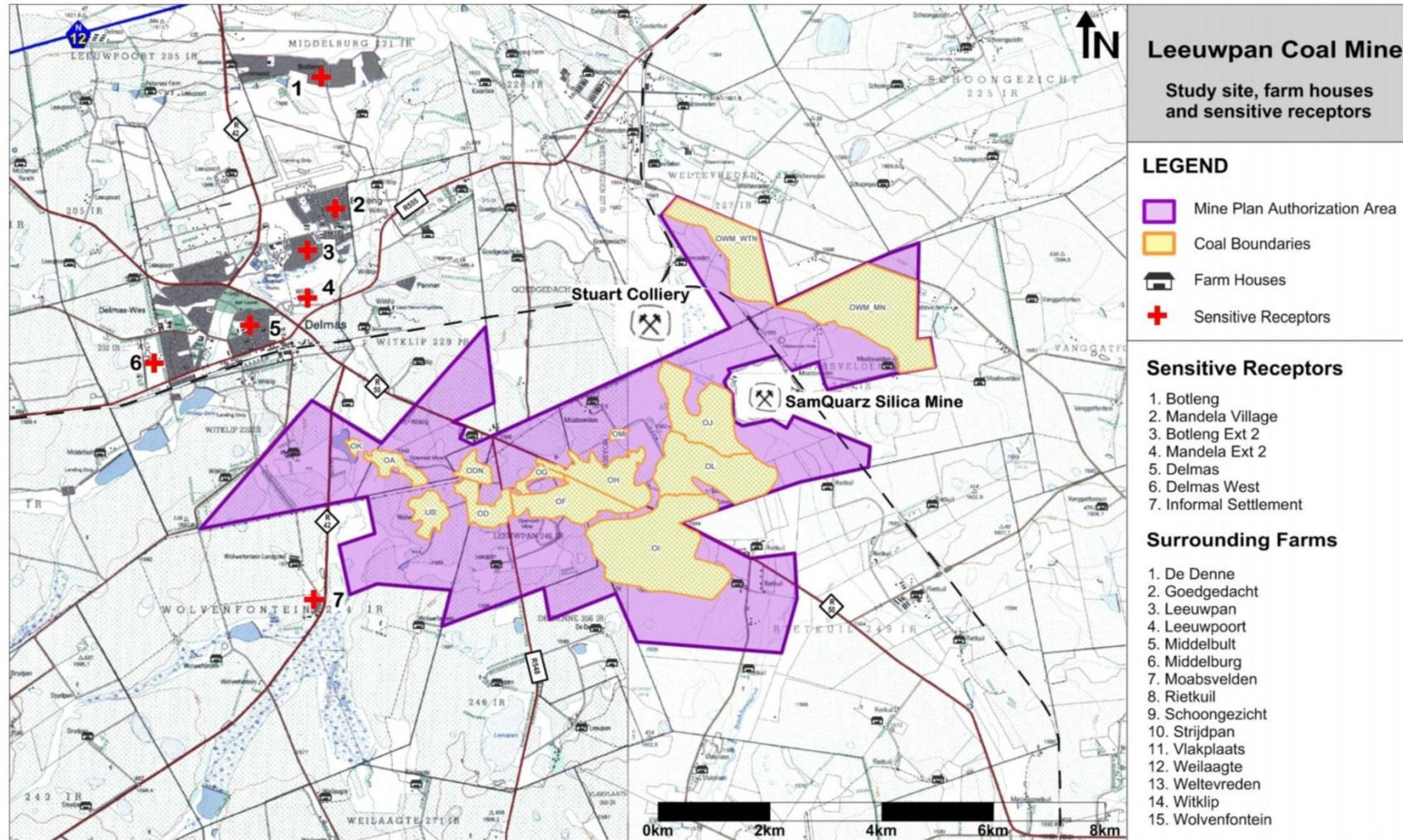


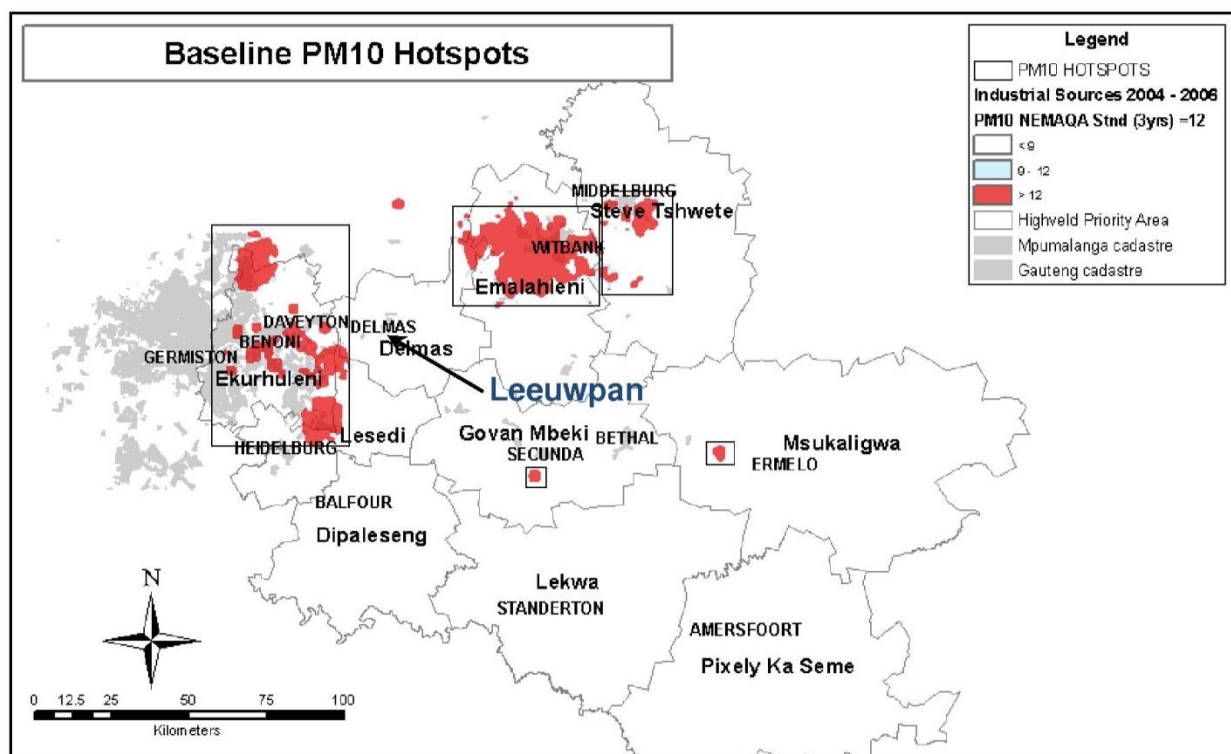
Figure 4.4 Study area for air quality



Airborne particulates represent the main pollutant of concern, given the nature of the proposed operations. The sensitive receptors were identified as the residential areas of Botleng, Botleng Ext 2, Mandela Village, Mandela Ext 2, Delmas, Delmas West and an informal settlement, as well as farm houses surrounding the project area indicated in Figure 4.4.

The highest concentrations for ground level, or near-ground level releases from non-wind dependent sources would occur during weak wind speeds and stable (night-time) atmospheric conditions. Calculations indicate that stable, neutral and unstable conditions at the site occur 45%, 13% and 42% of the time respectively.

Leeuwan Coal Mine is located in the Highveld Priority Area (HPA). According to the HPA Baseline Assessment Delmas is considered a “hotspot” area for PM10 (where ambient air quality is poor and where ambient PM10 generally exceeds air quality standards) indicated in Figure 4.5 below. The HPA dispersion modeling results showed that the study site does not fall within an area where more than the allowable 4 exceedances of the PM10 air quality standard were predicted per annum. The contribution of residential fuel burning, motor vehicles and coal mining were found to be less significant than industrial sources in the total air quality loading in the Delmas local municipality.



**Figure 4.5** Modelled frequency of exceedance of 24-hour ambient PM10 standards in the HPA, indicating the air quality hot spot areas (Draft HPA AQMP, 2011).

The findings from the HPA baseline assessment apply to the greater Delmas region. Local source contributors to ambient PM10 concentrations in the vicinity of the study site are: domestic fuel burning and vehicle activity in residential areas (Delmas town to the northwest, Botleng and Mandela Village to the north and the informal settlement to the southwest of the mine), mining activities - Stuart Coal Mine and SamQuarz Silica Mine directly adjacent to Leeuwan; and agricultural activities on the surrounding cultivated farm lands. However, the pollutants originating at the Leeuwan Coal Mine may also impact the air quality of surrounding areas. It is expected that vehicle entrainment will be the largest source of dust emissions at the mine.

Dust deposition has been measured at a number of locations around the Leeuwan site Figure 4.6. The gauges at the 7 monitoring stations are directional. For these stations, conclusions can only be drawn on the direction of the most prominent source of dust deposition impact, although the frequency of the wind from that direction also has to be taken into account. Dust deposition (TSP) results for Feb/Mar 2012, Apr/May 2012 and June 2012 show that the units with the highest and second highest average monthly fallout are monitoring unit 2 (East) and monitoring unit 4 (South) located next to a haul road and a farm respectively Figure 4.7, Figure 4.8 and Figure 4.9.

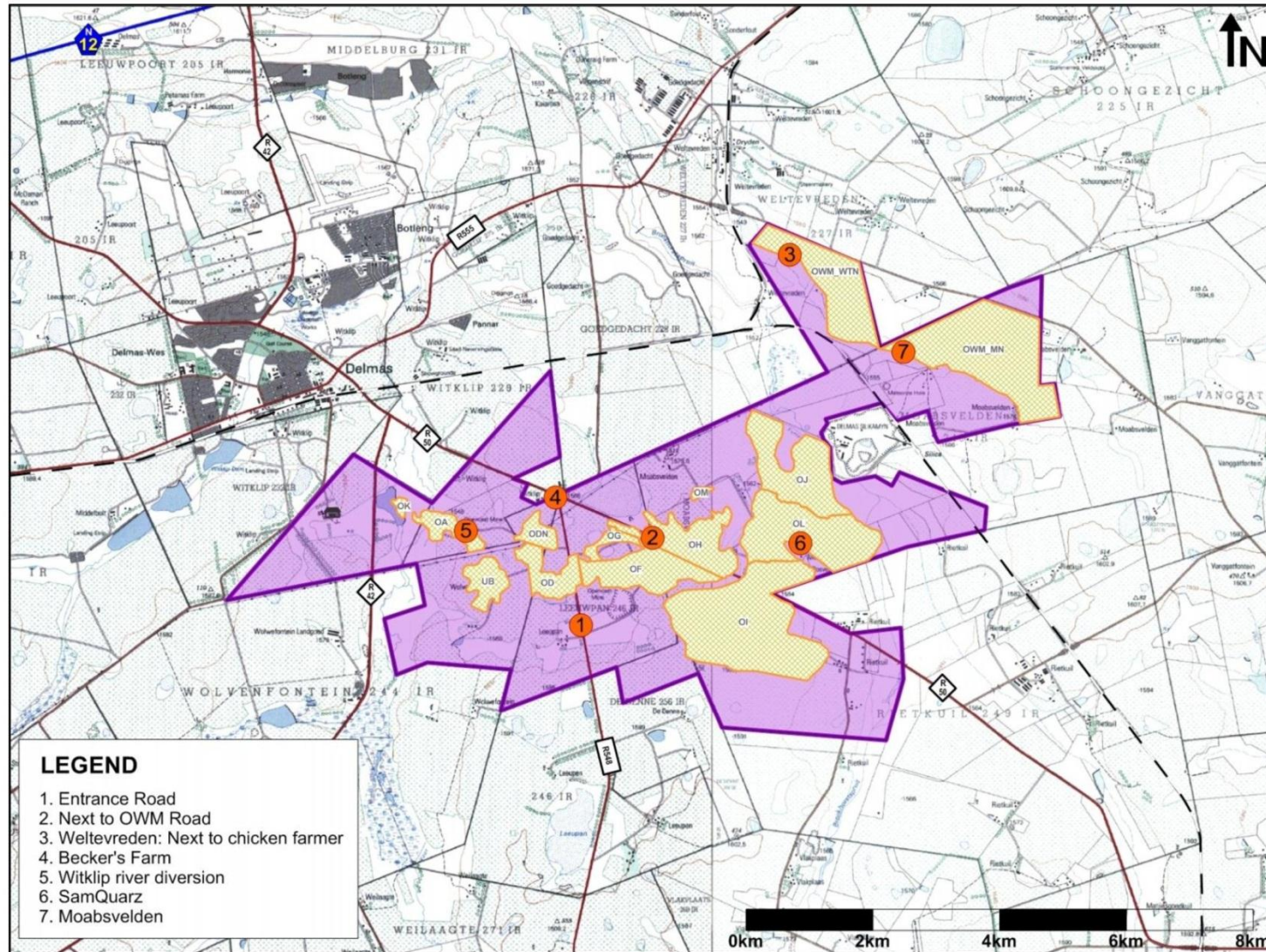


Figure 4.6 Locations of dust fallout monitoring stations

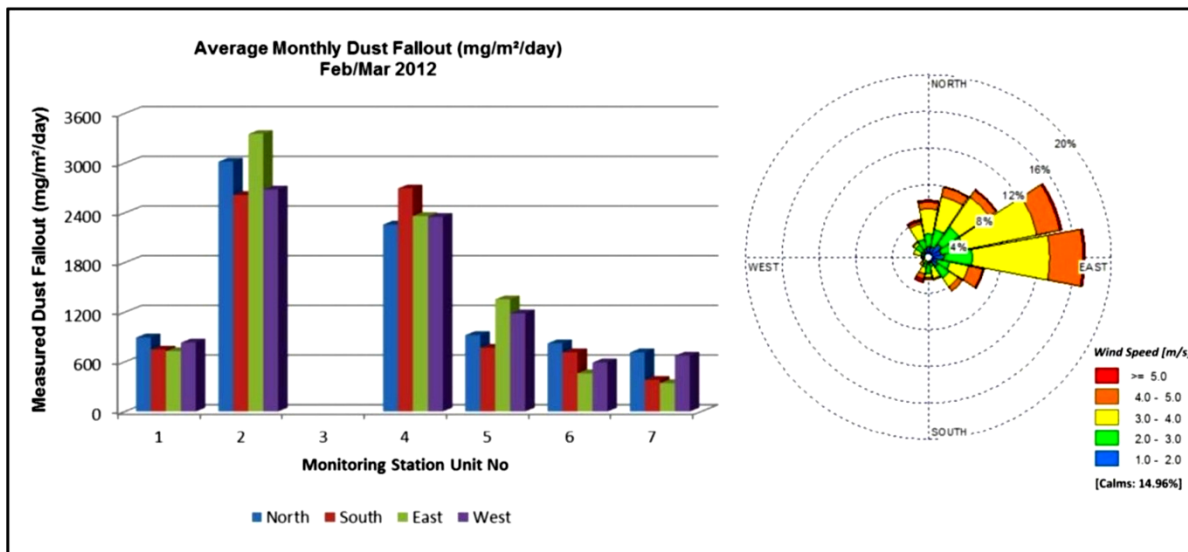


Figure 4.7 Average monthly dust fallout (mg/m<sup>2</sup>/day) (Feb/Mar 2012)

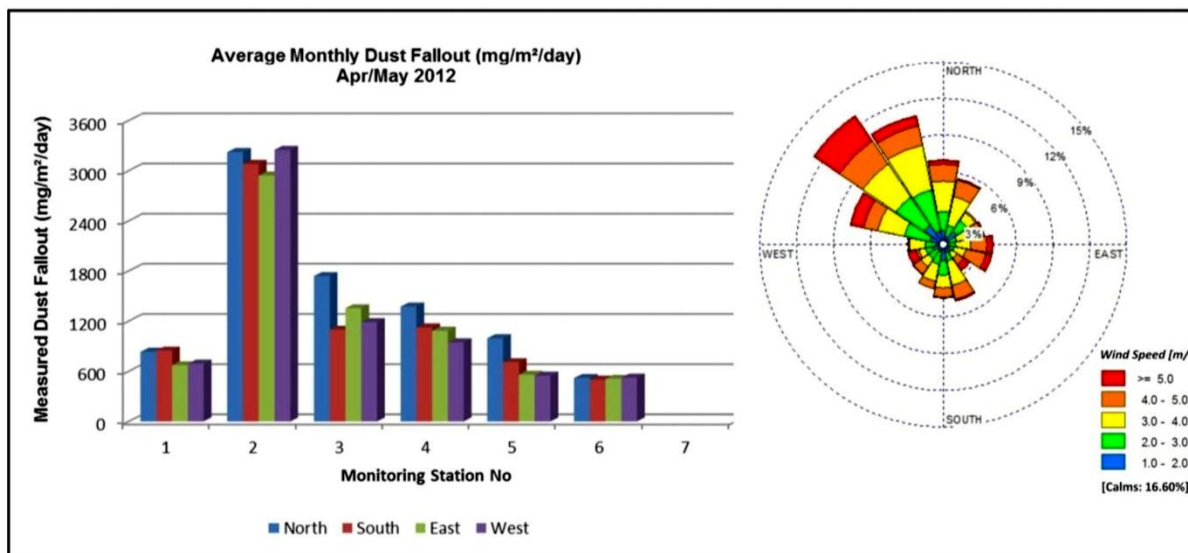


Figure 4.8 Average monthly dust fallout (mg/m<sup>2</sup>/day) (Apr/May 2012)

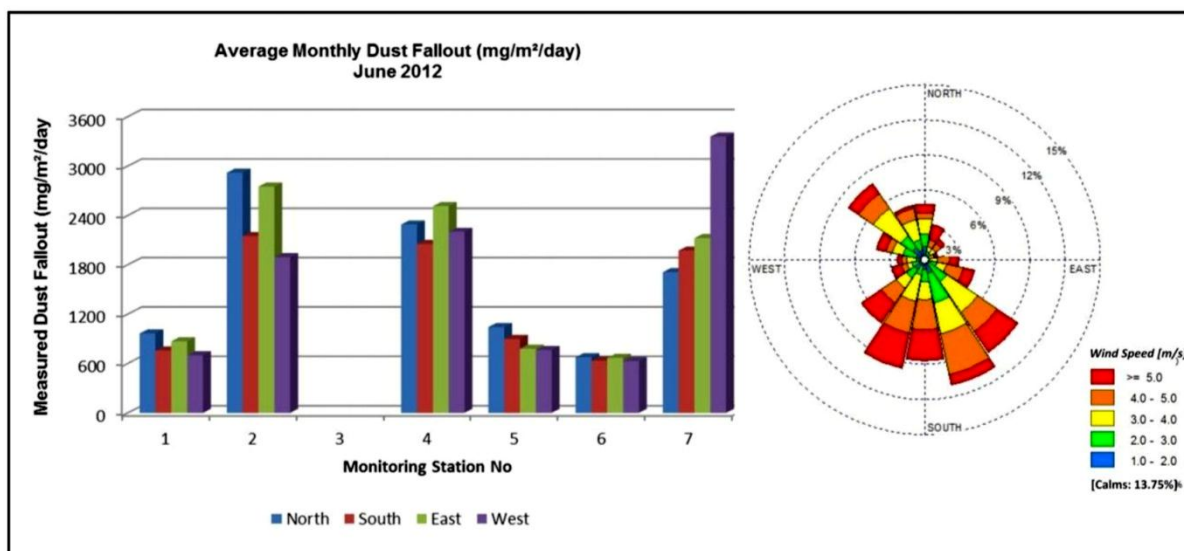


Figure 4.9 Average monthly dust fallout (mg/m<sup>2</sup>/day) (Jun 2012)

#### 4.9 Sites of historical and cultural importance

The information contained in this section of the report was obtained from the Baseline Heritage Assessment conducted by Archaetnos, attached herewith as Appendix J

The Mpumalanga Province is a cultural heartland and a tourist's destination for most of its parts, as it is home to some well-known natural wonders and nature reserves.

The expansion of early farmers who, among other things, cultivated crops, raised livestock, mined ore, and smelted metals occurred in this area between AD 400 and AD 1100. Early Iron Age settlements, homesteads and Bushmen drawings are widespread in Mpumalanga. Large cattle byres with pits are also significant feature to be found in the area.

In the surveyed area seventeen sites of cultural significance have been found. Thirteen of these are grave sites. The others are farm buildings.

Two of the graveyard sites are found just outside of the project area. Although it therefore falls outside of the mine's jurisdiction it should be noted that there are most likely to be a secondary impact on these. Things like blasting and dust may have a negative effect on these sites. It is therefore recommended that these be fenced in and a management plan written by a heritage expert. An important aspect of this plan would be the monitoring of the sites in order to preserve it.

The other grave sites are all within the mine boundary. Some of these are within the area already being mined and therefore there already is an impact. It is foreseen that the other will be impacted on in future.

#### **4.10 Noise**

The information contained in this section of the report was obtained from the Noise Assessment conducted by dBAcoustics, attached herewith as Appendix K

The mining at the proposed open cast mine will take place in the vicinity of existing mining operations and busy feeder roads. The people living in the vicinity of these mining activities are already used to the increased noise levels created by the mining activities, hauling vehicles and motor-vehicles. The vegetation such as trees and natural grass will play an important role on how the noise from the opencast activities will be propagated and how the people in the vicinity of the proposed mine will perceive the increased noise levels.

This area where the proposed opencast mine will be situated cannot be classified as a rural type district because of the existing mining activities that allow to classify this area as a Type 2(d) district with higher prevailing ambient noise levels.

The applicable Noise Control Regulations will allow the prevailing ambient noise levels to be exceeded by 7.0dBA before a noise disturbance is created.

The proposed mining activities will create a shift in the near field prevailing ambient noise levels and at times this will create a temporary shift in the far field noise levels. The noise intrusion can however be controlled by means of approved acoustic screening measures, state of the art equipment, proper noise management principles and compliance to the International Finance Corporation's Environmental Health and Safety Guidelines.

#### **4.11 Blasting and Vibrations Assessment**

The information contained in this section of the report was obtained from the Blasting Assessment conducted by Blast Management, attached herewith as Appendix L

The source area is located at Leeuwan south east of town Delmas. The receiving environment is considered the area expected to be influenced. This influence is divided into damage causing influence and nuisance or perception type influence. The site will be visited to observe and record typical structures, installations and obtain an understanding of people's perception and tolerance to possible influence.

The possible effects that could be considered contributing to damage of structures / installations in the area cannot be determined at this stage. The geology and expected drilling and blasting operations to be done with the possible influence with regards to the human perceptions of ground vibration and air blast is considered. Humans are sensitive to even very low level effects of ground vibration and air blast. In order to take this into consideration an area of 3500m is identified as area that could observe influence. This is in view that people will experience ground vibration at levels as low as 0.75mm/s.

#### **4.12 Social and Socio-economic conditions**

The information contained in this section of the report was obtained from the Social, and Socio-Economic Assessments conducted by GCS and World-Wise respectively, attached herewith as Appendix M and N.

When conceptualising a proposal to expand a coal mine, the anticipated social and environmental impacts are generally broad and not limited to one specific area or town. The proposed project falls within the Mpumalanga Province, Victor Khanye Local Municipality (LM), which is part of the Nkangala District Municipality (DM).

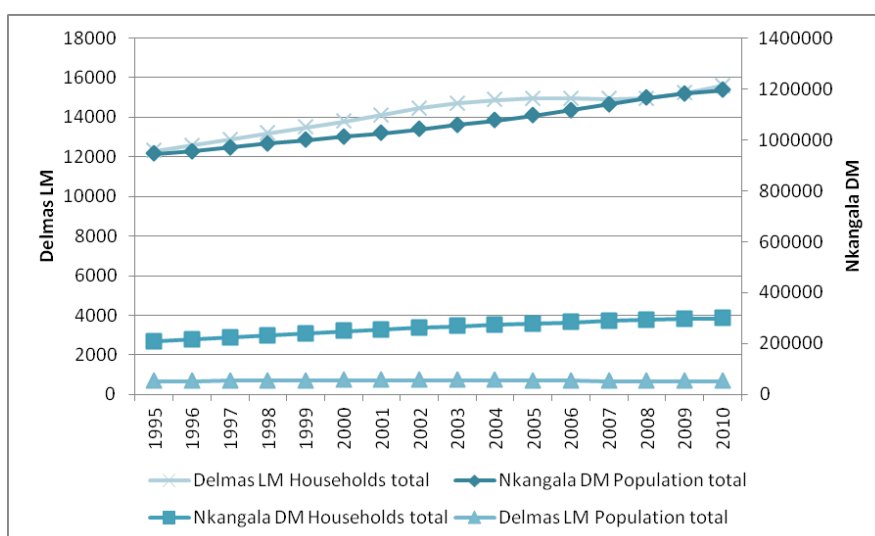
In order to assess the potential impact of the proposed project, it is important to consider the particular Province, DM, LM as well as the nearby towns in a holistic way.

The regional context of the socio-economic factors in Mpumalanga Province and the Victor Khanye LM with a thorough investigation into Delmas are discussed in the Socio Economic baseline assessment in Annexure O.

#### 4.12.1 Demographic profile

##### 4.12.1.1 Population and household profile

The population according to the '96 census was 34 894 in Delmas. This increased by 2006 to an estimated 56 208 people, of which women comprised 51.4%. According to Figure 4.10, the population size (persons) for the Victor Khanye LM increased only slightly between the 1995 to 2010 time period, growing by 0.23% since 1995. Households have however increased at the same rate as that of the Nkangala DM over the specified time period, growing by 21.16% and 20.91% respectively.



Source: Quantec Research (Pty) Ltd

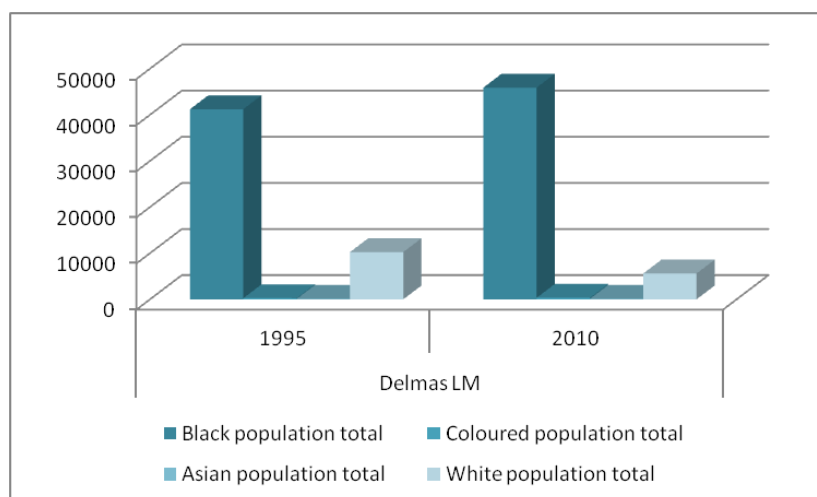


Figure 4.10 Population and household size (1995 - 2010)

## 4.12.1.2 Population group

The Victor Khanye LM population in 2010 were composed of mostly Black African persons (69.88%) followed by 8.53% White persons. The number of Black African person has increased by 10.17% since 1995, whereas the number of White persons has decreased by 82.73% since 1995.

The Nkangala DM population in 2010 consisted of mostly (93.78%) Black African persons. The number of White persons living within the DM has decreased by 44.46% since 1995 with the Black and Asian populations growing strongly.

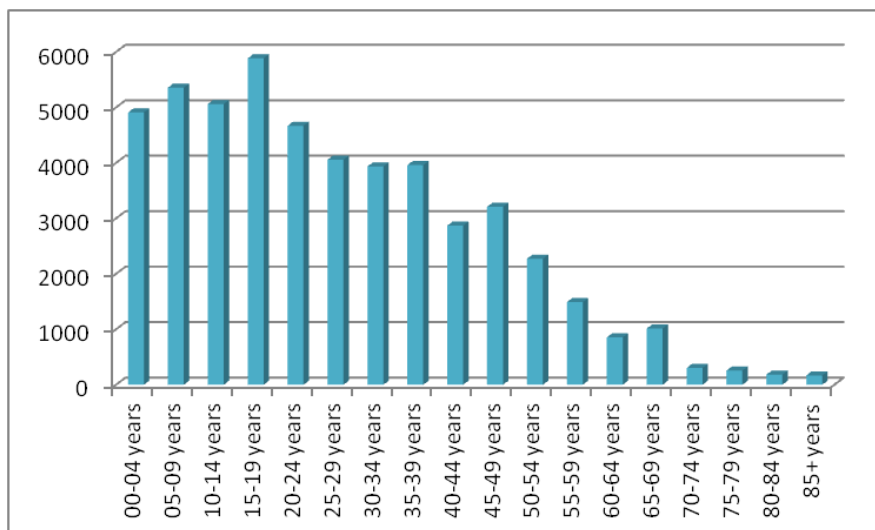


Source: Quantec Research (Pty) Ltd

Figure 4.11 Population group (1995 - 2010)

## 4.12.1.3 Age

The Victor Khanye LM population has a large adolescent population with 26.07% of the population being younger than 15 years of age (Figure 4.12) indicating that they do not form part of the Economically Active Population (EAP) of the area.



Source: Quantec Research (Pty) Ltd

Figure 4.12 Age (2007)

Approximately two thirds (65.80%) of the Victor Khanye LM population falls among the EAP (16 to 64 year) age band. These persons normally have more work experience and usually fall within the higher skilled and higher salary bracket. One can clearly note that the population starts decreasing from the age of 19 years, leaving fewer economically active individuals. The elderly population (65 years and older) is very small (3.82%), which means that less burden is placed on the EAP to support persons that are no longer economically active.

#### 4.12.1.4 Education

During 1995, the largest percentage (17.58%) of the Victor Khanye LM population has not obtained a Grade 0 or any other schooling; however, by 2010 this number had improved by 113.21%. The number of persons that have achieved a Grade 12 level of education improved by 17.33% in the same period.

#### 4.12.2 Economic profile

This section provides a delineation of the study area and a brief economic status quo pertaining to employment and labour profile.

##### 4.12.2.1 Employment and labour profile

The employment status of the population has a variety of important implications. Economically active and employed persons can contribute to the overall welfare of a specific community by paying their taxes, looking after the youth and aged and by stimulating the economy. However, should a community have a large number of economically inactive and / or unemployed persons, the burden on the EAP of that community are amplified.

Even though the working age population for the Victor Khanye LM has increased by 7.58% between 1995 and 2009, the number of employed persons has decreased by 20.53% in the same period. The unemployment rate has fortunately decreased by 17.04% since 1995; however, the labour force participation rate has decreased by 29.48%. According to the South African census '96 the unemployment figure was determined to 20.31%. In 2003, of the 34 894 inhabitants, 37.43% were employed and 42.44% were not working. This included those not looking for work, housewife, students, pensioners/retired persons and disabled persons. By 2006, the number of full time employed people was approximately 13200 from approximately 23000 people. In 2007 the unemployment figure was 27.1%. Of the 36111 inhabitants, 36% was unemployed and 36.26 were economically active.

The wholesale and retail industry is currently creating the most employment opportunities within the Victor Khanye LM (21.45%). The agriculture, forestry and fishing industry has shown a significant decrease since 1995, marking a change of 252.97% for Victor Khanye LM. The major employers in the area include I&J, Voest-Alpine, Meadow foods, the Municipality of Delmas and Delmas Colliery.

#### *4.12.3 Services and infrastructure profile*

Social service delivery centres on the provision of health, education and community development facilities and services. The concept of service delivery also comprises various elements such as affordability, quality, efficiency and access.

The following social infrastructure can be found:

- Education
  - Primary schools- 3 in Delmas  
2 in surrounding areas
  - Secondary schools- 2 in Delmas

8 in surrounding areas

- Healthcare
  - Hospital 1 in Delmas
  - Clinic 1 in Botleng
  
- Sports and recreation - Available sports facilities in Delmas include golf, athletics, rugby, soccer, tennis, squash, badminton, basketball, bowls and jukskei.

This indicator therefore examines the level of service provision in the study area. Services assessed include sanitation, water, housing and electrification. There are three priority services (water, sanitation and electricity) for the promotion of health, convenience and quality of life.

#### **4.12.4 Housing**

There are approximately 1200 houses and flats in Delmas. A very limited number of houses for are available for renting in the town. Mining labourers use existing farmsteads and temporary houses as accommodation.

The Victor Khanye LM has been steadily formalising informal settlements within its municipal area. Persons residing within formal houses<sup>4</sup> have increased by 28.54% between 1995 and 2010. There has been a decrease of 61.97% in informal housing<sup>5</sup> within the Victor Khanye LM. Significant decreases in the number of 1) traditional dwelling/hut/structure made of traditional materials (150.42%), 2) house/flat/room, in backyard (223.42%) and 3) room/flatlet not in backyard but on a shared property (229.09%) has been noted within the Victor Khanye LM.

##### *4.12.4.1 Energy use*

The use of electricity for lighting has increased by 36.80% between 1995 and 2010 within the Victor Khanye LM. With the increase in electrification, all other sources for light generation have decreased, except for paraffin which has increased by 23.49%.

<sup>4</sup> Formal housing includes: 1) House or brick structure on a separate stand or yard, 2) Flat in a block of flats and 3) Town/cluster/semi-detached house (simplex, duplex or triplex).

<sup>5</sup> Informal housing includes: 1 ) Informal dwelling/shack, in backyard and 2) Informal dwelling/shack, NOT in backyard, e.g. in an informal/squatter settlement

#### 4.12.4.2 Water

The level of water supply to households in Victor Khanye LM has incrementally increased with a 46.02% improvement in piped water inside a dwelling or yard. The use of a water-carrier/tanker/water vendor within the Victor Khanye LM has decreased by 329.41% since 1995. The number of persons relying on a nearby dam/river/stream/spring for water has been reduced by 363.27% in the same period.

#### 4.12.4.3 Healthcare

The number of HIV positive persons living within the Victor Khanye LM in 2010 has increased by 73.72% since 1995. The number of HIV related deaths has increased dramatically by 92.11%, with the number of other deaths actually decreasing slightly with 11.17%. This indicates that HIV/AIDS has had a real impact on the Victor Khanye LM since 1995, even though this trend has slowed slightly from 2004.

### 4.13 Traffic

A site visit has been conducted on the 5th of April 2012, for the purpose of the scoping investigation. Traffic counts were carried out during the morning and afternoon peaks hours (6:00 - 9:00 morning and 16:00 - 19:00 afternoon) at the above mentioned intersections. Light vehicles, heavy vehicles (2 - 4 axles) and very heavy vehicle (5 and more axles), were counted at the intersections. The AM and PM Peak hour was determined based on the highest traffic volumes registered during the morning and afternoon period respectively. The AM Peak was found to be from 7:30 to 8:30 and the PM Peak hour was recorded at 16:45 to 17:45.

The R50, R548 and R42 routes are single carriage way (2 lanes, one lane per direction), paved roads with a capacity of  $\pm 1500$  vehicles/hour/direction.

#### 4.13.1 Existing Accesses

- Access 1 is located at the R50 Road / R548 Road west of the mining area and is mainly use for mining staff, deliveries and contractors; and
- Access 2 is located on Goedgedacht Road north of the mining area. Despatch of coal is controlled through this access.

#### **4.13.2 Intersection Geometry**

The R50 Road / R548 Road intersection is a priority controlled intersection with priority on the R50 Road and currently provided access to the mine (Access 1).

The R50 Road / R42 Road intersection is a priority controlled T-intersection with priority on the R50 Road.

The R50 Road / Goedgedacht Road intersection is a priority controlled intersection with priority on the R50 Road. Goedgedacht Road links Access 2 with the R50 Road.

#### **4.13.3 Existing Traffic Volumes**

The R50 Road is situated on the eastern side of the Exxaro Leeuwan Coal site and is part of the provincial road network in the area. The traffic data indicates that the highest flow occurs along the R50 Road with approximately 550 vph and 530 vph during the morning AM and afternoon PM peak (two-way flows) respectively. The main direction during the morning peak ( $\pm 360$ vph) is in an easterly direction. During the afternoon peak the main direction is westbound with approximately 370 vph. Approximately 20% of the total traffic volume during the peak hours is heavy vehicles.

The R548 Road carries approximately 80 vph and 70 vph during the morning AM and afternoon PM peak (two-way flows) respectively with approximately 9% of the total traffic volume being heavy vehicles during the morning peak and approximately 19% during the afternoon peak.

The R42 Road carries approximately 200 vph and 260 vph during the morning AM and afternoon PM peak (two-way flows) respectively with approximately 26% of the total traffic volume being heavy vehicles during the morning peak and approximately 42% during the afternoon peak.

Goedgedacht Road is situated on the northern side of the Exxaro Leeuwan Coal site and carries low traffic volumes with approximately 10 vph and 55 vph during the morning AM and afternoon PM peak (two-way flows) respectively with approximately 33% of the total traffic volume being heavy vehicles during the morning peak and approximately 19% during the afternoon peak.

The following external roads might be affected by the mining activities:

- R50 Road, R548 Road and Access to the mine
- R42 Road;
- Goedgedacht Road, north of the proposed site and Access 2 to the mining area.

The following intersections will be investigated:

- R50 Road / R548 Road (Access 1);
- R50 Road / R42 Road; and
- R50 Road / Goedgedacht Road (Access 2).

## 5 PUBLIC PARTICIPATION PROCESS

This section of the report documents the process, which was followed with respect to consultation of interested and affected parties (I&APs / Stakeholders) and the Government Authorities.

### 5.1 Purpose of Public Participation

Public Participation Process (PPP) is a requirement of the EIA/EMP process and ensures that all relevant I&AP's are consulted and involved. The process ensures that all stakeholders have an opportunity to raise their comments as part of an open and transparent process, which in turn ensures for a complete comprehensive environmental study.

The purpose of PPP and the engagement process is to:

- Introduce the proposed project;
- Explain the EIA/EMP and PPP processes to be undertaken;
- Determine and record public issues and concerns;
- Provide opportunities for public input and gathering of local knowledge;
- Inform a broad range of stakeholders about the project and the environmental process to be followed;
- Establish lines of communication between stakeholders and the project team;
- Identify all the significant issues in the project; and
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent environmental impacts, associated with the project.

Once the concerns of I&AP's have been established, the EIA/EMP study will aim to address these concerns.

#### 5.1.1 *Introductory authorities meeting*

An introductory authority meeting will be scheduled with the DMR at the Leeuwan offices. The Leeuwan Project will be introduced and comments received with regards to the way forward. It will be confirmed by the DMR that the application under the MPRDA will proceed as a MPRDA EIA/EMP consolidation for the proposed new project along with the current projects.



An introductory authority meeting will be scheduled with the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) at Leeuwan. A NEMA Reference number was issued and received on the 9<sup>th</sup> of September 2012 for the Block OI Opencast Project.

The authorities were notified of the scoping open day on 27 November 2012 from 12h00 to 16h00 held at Agri Lapa, Delmas via fax and email and will be notified of any meetings that are held subsequent to the public meeting.

### **5.1.2 *List of authorities consulted***

A comprehensive list of authorities was compiled during the early stages of the project. The authorities as listed below have been invited to become involved in the process by inviting them to the Scoping Open Day.

- Department of Minerals and Resources (DMR);
- Department of Economic Development, Environment and Tourism (MDEDET);
- Department of Water Affairs (DWA);
- South African Heritage Resources Agency (SAHRA);
- Mpumalanga Tourism and Parks Agency (MTPA);
- Department of Roads, Transport and Public Works (DRTPW); and
- National Department of Agriculture, Forestry and Fisheries (NDAFF).

### **5.1.3 *Identification of I&APs***

All I&APs on the existing Leeuwan database were contacted at the start of the project in terms of regulation 55 of NEMA as to allow them to register as interested and affected parties in relation to the application. During the consultation with I&APs, as well as with the mine, additional parties were identified and were included within the existing database to provide an updated database. Parties who responded to the advertisements and notifications placed, and those who registered at the Open Day were included within the database.

GCS has developed and will maintain an electronic database for the duration of the project where stakeholder details are captured and automatically updated as and when information is received from I&APs. This database comprises of all past registered stakeholders as well.

#### **5.1.4 Notification of stakeholders**

##### *5.1.4.1 Site Notices*

A2 laminated site notices according to Regulation 54 of National Environmental Management Act (Act 107 of 1998) (NEMA) have been placed on and around the project area (Figure 5.1) at the co-ordinates listed in Table 5-1. Refer to Appendix B for photographic record and locations of the site notice placement:

**Table 5-1 Site notice placements**

<b>Name</b>	<b>East_WGSdd</b>	<b>South_WGSdd</b>
Intersection-R555.R50	28.69204	-26.14746
Leeuwan Entrance	28.7301	-26.18713
Site Notice.Leeuwan 1	28.75868	-26.18025
Site Notice.Leeuwan 3	28.6736	-26.15387
Municipality-Delmas	28.6742	-26.14845
P&PAY.2	28.67588	-26.14969
P&PAY.1	28.67648	-26.1489

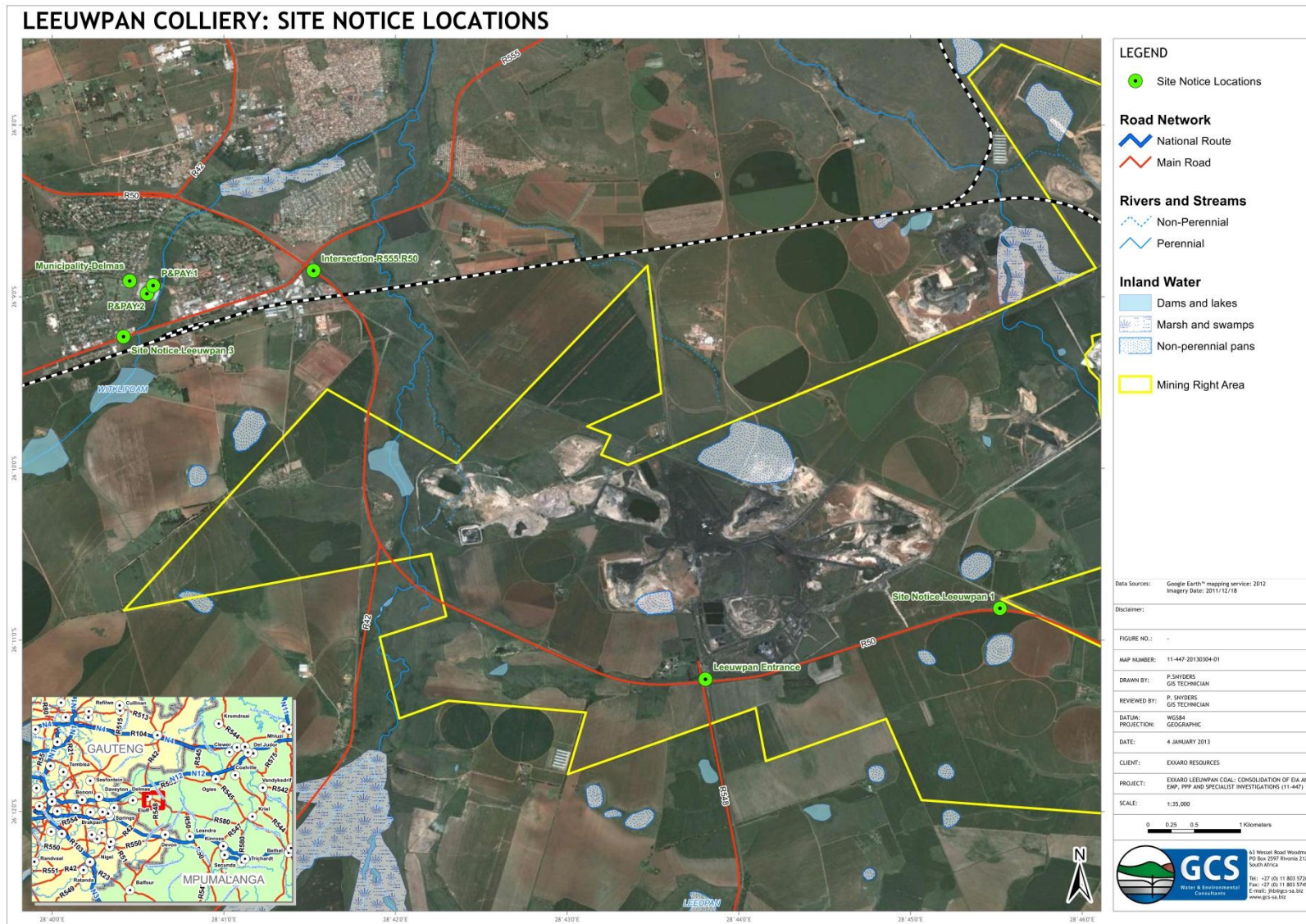


Figure 5.1 Location of Site Notices (Also see Appendix A)

#### 5.1.4.2 *Media advertisements*

Advertisements, according to Regulation 54 of NEMA regarding the project background and the assessment process being followed were placed in the following newspapers:

- The Citizen on 9th of November 2012
- Streeknuus on 16th of November 2012

Refer to Appendix B for a copy of the advertisement that was placed.

#### 5.1.4.3 *Background Information Documents (BID's)*

Background Information Documents (BID's), according to Regulation 54 of NEMA, were sent to all I&APs on the existing Leeuwan database, and were updated as new I&APs registered for the project. All I&APs were notified by way of fax, registered mail and email depending on their preferred method of contact. The BID was made available in English. The BID included details of the proposed project as well as the EIA/EMP purpose, requirements and process. It also included relevant contact details and a comment/registration sheet. I&APs/Stakeholders were invited to register and send responses by fax, telephone or e-mail to GCS (Pty) Ltd. Refer to Appendix B.

#### 5.1.5 *Public Open Day*

The registered I&AP's from the existing Leeuwan database were notified and invited to attend the Scoping Open Day on the 27<sup>th</sup> of November from 12h00 tot 16h00 held at Agri Lapa, Delmas, via registered mail, email and fax. All I&AP's were also notified of the Scoping Open Day via the site notices, and advertisements. Refer to Appendix B for a copy of the BID.

#### 5.1.6 *Issues Trail*

Through ongoing consultation, issues have been raised and will be raised during the process. This is an ongoing process and will therefore be updated as comments and responses from the authorities and public are made regarding specific issues about the project. All issues and comments raised during the Consolidation Project public participation process will be formally addressed in the Consolidation EIA/EMP.

During previous studies comments and concerns were also documented and addressed in the relevant Addendums. Table 5-2 lists comments and concerns that were previously raised by I&AP's and the relevant Addendum in which the comment and concerns were addressed.

**Table 5-2 Comments and concerns from previous addendums**

Issues raised previously	Addendum
Land claims had been lodged against the farms Moabsvelden 248 IR and Wolvenfontein 244 IR. A letter (dated: 22 April 2003) was received which further indicated that claims have also been lodged against the farms Leeuwpan 246 IR and Wolvenfontein 244 IR, Delmas	Addendum 3
Decreased water level in boreholes	Addendum 3
Cracking of the buildings due to blasting.	Addendum 3
Ground water pollution.	Addendum 3
Drying up of the underground water.	Addendum 3
Accumulation of coal dust on crops.	Addendum 3
Increase in traffic and mine vehicles.	Addendum 3
Influx of people to a new mine and possible informal settlements	Addendum 3
Increase in theft	Addendum 3
Water must be treated (chlorine and aluminium sulphate) before it can be used.	Addendum 3
The presence of worms in the water at certain times of the year was also reported.	Addendum 3
Noise produced by trucks and machines.	Addendum 3
Labour might be lured away from farm as the mine might pay higher wages.	Addendum 3
The effect that polluted water would have on the growth rate of the chickens with subsequent financial loss.	Addendum 3
The potential future impact on the groundwater of the area	Addendum 3
The impact that acid rain may have on crops and equipment, e.g. cars	Addendum 3
The future expansion plans of the mine and how it would affect properties and their activities	Addendum 3
The potential for a brickmaker to open on the doorstep of Witklip (H.J. Swanepoel) and not being consulted in this regard	Addendum 3
The mine utilizes very few facilities of the town, Delmas. For example, most of the personnel live in Pretoria.	Addendum 3
It was claimed that the mine implements no dust control measures.	Addendum 3
Mr Swanepoel bought his property for the sole reason of erecting a service station and truckstop adjacent to the busy R50. He also constructed a tuckshop next to the road. If the road were closed, both business ventures would be obsolete.	Road diversion
Mr Swanepoel's property value is connected to the location adjacent to a provincial road. If the R50 were rezoned, it would affect his property value.	Road diversion
The maintenance of the de-proclaimed road is also of concern if this is to be done by Kumba.	Road diversion
The proposed detour has financial implications i.t.o. his transport business.	Road diversion
Mr Swanepoel's main concern is the fact that he was never consulted w.r.t. adjacent mining activities or the erection of the washing plant.	Road diversion
To what will the section of the R50 be de-proclaimed?	Road diversion
To whom would the de-proclaimed road belong?	Road diversion
Who will have access to this road?	Road diversion
How will access be managed/controlled?	Road diversion
What will the road be used for?	Road diversion
The proposed road closure and diversion could have insurance and safety implications.	Road diversion
What would the impact of the mining activities be on them i.t.o. dust, noise, water and air pollution?	Road diversion

Issues raised previously	Addendum
Alternatives i.t.o. the mining plan.	Road diversion
The life expectancy of the mine.	Road diversion
How will they be compensated for planned future business ventures?	Road diversion
New Century Bricks transports sand from SamQuarz to our factory every day. If the exit road is changed, the cost of sand transport will be increased a lot'.	Road diversion
Is there any possibility of providing a shortcut to SamQuarz?	Road diversion
Alternative 3 for the Delmas Silica road would go through Mr Hoffman's worker's houses. Nine families are presently residing in this area and have lived on the farm for more than 20 years.	Road diversion
Alternative 3 for the Delmas Silica road would impact on one of Mr Hoffman's pivots and would also divide his most fertile lands in half. This would impact on his future planning.	Road diversion
Alternative 2 would be the most suitable for the Delmas Silica road.	Road diversion
According to the lease contract, Mr Hoffman must be informed of any changes 18 months in advance.	Road diversion
Access to and from Stuart Coal for trade and clients	Road diversion
Will the gravel Goedgedacht road remain a provincial road?	Road diversion
In terms of Alternative 3 for the Delmas Silica road, the gravel road should be maintained due to increased traffic.	Road diversion
In terms of Alternative 3 for the Delmas Silica road, must remember that Stuart Coal intend extending their operations (portion of Goedgedacht) which could impact on the road.	Road diversion
continued access to the mine must be guaranteed, SamQuarz is the holder of a Notarial Deed of Servitude over the access road from the mine to the provincial R50 road	Road diversion
the proposed road must be of a standard and quality necessary to meet the capacity requirements of SamQuarz. The access road currently services approximately 100 trucks per day, 24 hours a day, 7 days a week. The possibility of the formation of sinkholes, amongst other ground and surface conditions, must be taken into consideration. SamQuarz requests that gravimetric and geotechnical assessments are conducted in order to ensure the adequate standard of the road to the satisfaction of SamQuarz	Road diversion
The maintenance costs of the road must be considered in its design	Road diversion
The current relationship between SamQuarz and its surrounding neighbours should not be jeopardised by the proposed re-alignment of the access road. In this regard, we request the following: that the portion of the proposed road adjacent to farmers must be tarred to mitigate the impact of dust and noise; and that a noise barrier is constructed over the portion of the road referred to above	Road diversion
having regard to the safety aspects arising as a result of the intersection between the private access road and the provincial road, the responsibility for the safety at this intersection must be clearly defined as that of the province	Road diversion
SamQuarz's telephone and electricity cables should not be interfered with during the construction process of the proposed road. In addition, they request that glass fibres are installed in such cables	Road diversion
in the event that the alternative option for the access road is decided upon, SamQuarz requests that reasonable measures be taken to limit the curves in the road. In this regard, they request that the 'new' section of the road be tarred	Road diversion
SamQuarz requests that the economical value of SamQuarz supplying the material necessary for the construction of the road be considered taking into account the fact that SamQuarz is in a strong position to supply such material and that borrow pits have a detrimental impact on the surrounding environment	Road diversion
it should be recorded that SamQuarz owns the silica mineral rights in respect of the proposed borrow pit A and accordingly we object to such pit being excavated	Road diversion
SamQuarz is an affected party in the proposed mining activities of Kumba Resources and to this end they require consultation in the public participation process necessary for that activity once the process commences	Road diversion
The new route would mean a detour to the other lands on Witklip.	Road diversion
Provision should be made to place signboards away from the side of the road to allow tractors to pull off the road if necessary	Road diversion

Issues raised previously	Addendum
In terms of Alternative 0 for the Delmas Silica road, it should be noted that it is very close to the houses on Moabsvelden, which would impact on them in terms of dust, noise, etc.	Road diversion
The dust and vehicle emissions from the proposed gravel Delmas Silica road would impact negatively on the health of the people and animals residing on the farm Moabsvelden. One family member already has lung and heart problems and his health would deteriorate further due to the amount of dust and vehicle emissions caused by the heavy traffic	Road diversion
The dust will also impact on the planted pastures which are located directly adjacent to the proposed road	Road diversion
The property was bought with the intention of establishing a dairy farm. The infrastructure is already in place and a number of cattle have been bought. The proposed road would be extremely close to the dairy. The dust and noise created by the vehicles would impact negatively on milk production, which would in turn have a financial impact. In addition, they are currently farming with chickens, which are also very sensitive to dust and noise;	Road diversion
The proposed road would affect the property value;	Road diversion
The household and farming activities rely on the water from the borehole, which is located in close proximity of the proposed road. The water may be polluted by the dust and the vehicle emissions and the borehole may collapse due to vibrations caused by the construction activities and the vehicles utilizing the road;	Road diversion
An increase in theft is expected;	Road diversion
The close proximity of the road would pose a security risk;	Road diversion
An increased risk of veldfires;	Road diversion
The peaceful country atmosphere would be lost;	Road diversion
Access to their property may be effected;	Road diversion
The workers houses would have to be demolished in order to construct the road. Alternative housing must be provided to the workers;	Road diversion
The farmers in the area transport maize to the Dryden silos between May and August each year. The closure of the R548 (Devon) road (i.e. the section which extends through Leeuwan Coal Mine to the R50 road) would mean a detour to the silos.	Road diversion
This detour would have financial implications in terms of tyre wear-and-tear and additional diesel costs due to the increased distance.	Road diversion
The presence of tractors and trailers on the provincial road could pose an increased risk of accidents.	Road diversion
An alternative route should be provided through the mining area.	Road diversion
The re-aligned Delmas Silica road could be used if it is extended to the existing Goedgedacht gravel road, which connects to the R555 provincial road, which leads to Dryden.	Road diversion
The transport of maize cannot go via the main road to Delmas and then to Dryden due to this route being dangerous, tyre wear-and-tear being high, increased diesel costs and risk of increased accidents.	Road diversion
The existing Devon road is currently used to obtain access from the farm to Delmas. The proposed road diversion would mean a detour. If possible, an alternative route (as indicated on attached sketch, Appendix 3) should be provided to connect onto the proposed road.	Road diversion
The proposed road alignment is a much longer route to the silos than the existing road. This detour would have financial implication i.t.o. transport.	Road diversion
A new access road to Mr Labuschagne's farm will be required. Presently, he obtains access to his farm via the Devon road.	Road diversion
Access to Mr Labuschagne's farm near Dryden would also be affected. He currently accesses his farm via the Goedgedacht gravel road.	Road diversion
The possible relocation of the farm workers living on the leased property is the responsibility of Kumba Resources.	Road diversion
Concerned about obtaining access to Mr Labuschagne's other property, which is located on Portion 22 of the farm Witklip 232 IS, Delmas. According to the contract with Leeuwan Coal Mine, the section of the R50 lending access to his other property would not be decommissioned.	Road diversion
If the road is decommissioned, an alternative access road should be provided.	Road diversion
The potential impact of blasting activities on the surrounding infrastructure.	Addendum 4

Issues raised previously	Addendum
The potential flooding of surrounding operations as a result of surface water management required for the proposed operations.	Addendum 4
The impact on the water resource availability.	Addendum 4
The impact on property values.	Addendum 4
The impact of mining operations on dust fallout levels.	Addendum 4
The potential of dust to affect the health of persons.	Addendum 4
The impact of mining operations on the access to neighbouring activities.	Addendum 4
Water level has dropped 20 - 50 m.	Addendum 5
Pump takes 10 times longer than before to fill a tank.	Addendum 5
Water level and borehole supply diminished since mining commenced.	Addendum 5
Four years ago the borehole yield was 10 000 litre / hour, this reduced to 300 litre / hour.	Addendum 5
Approximately 12 boreholes were drilled without finding water due to cumulative impact of 3 mines in the area.	Addendum 5
Damage is caused to pump equipment due to boreholes collapsing.	Addendum 5
Groundwater smells like rubber / sulphur.	Addendum 5
Mine cannot replace water loss caused by mining operations.	Addendum 5
How will the proposed activities (including those associated with the proposed Block OD extension and Block UI projects) influence the availability and quality of groundwater?	Addendum 5
Springs will go dry because of the proposed mining operations - will affect the boreholes.	Addendum 5
Concern that water quality and quantity will deteriorate.	Addendum 5
Farmer would like to have regular water samples taken as proof that the water quality is deteriorating.	Addendum 5
Interest in results of geohydrological study conducted during early 2007.	Addendum 5
Surface water resources	Addendum 5
Water contaminated with coal dust.	Addendum 5
Clean and dirty water should be separated within the mining boundary area - clean water should then be made available to farmers.	Addendum 5
Enquiry as to which catchment the proposed mining operations will drain towards.	Addendum 5
Dust on property reduces quality of life - grass is covered in coal dust during winter.	Addendum 5
Air pollution (caused by dust) is a big problem in the area.	Addendum 5
It was previously decided to wet the road close to houses and cultivated land in order to suppress dust, but this does not happen - dust generated by trucks should be controlled.	Addendum 5
Farmer knows of people that suffer from coal dust on their maize, worried that it might happen to them.	Addendum 5
Farmer experiences constant nasal problems due to dust.	Addendum 5
Mine should continue to investigate dust control.	Addendum 5
Noise pollution caused by mining.	Addendum 5
Who is responsible for noise monitoring?	Addendum 5
Noise from blasting can have negative impact on trains.	Addendum 5
A noise study is suggested and train operators should be aware of the blasting schedule.	Addendum 5
Negative impact on groundwater experienced due to dynamite blasting.	Addendum 5
Negative impact of blasting on surrounding operations, livestock, dams, buildings and infrastructure.	Addendum 5
Operators of the trains should be made aware of the blasting schedule.	Addendum 5
Will mining affect the maize farming that has been identified as current land uses in the area?	Addendum 5
The surface owners of the proposed mining areas are some of Omnia's biggest clients.	Addendum 5
Farmers might leave the sector as a result of the proposed mining operations.	Addendum 5
Future generations will not be able to cultivate areas where opencast mining took place.	Addendum 5
Areas of surface disturbance will never be rehabilitated to cultivated lands potential.	Addendum 5
Proposed project description	Addendum 5
Timing of the proposed mining operations.	Addendum 5
Will the whole indicated mining block be mined or only the indicated box-cut areas?	Addendum 5
Mining will commence in Block OWM next year - timing has big influence on farmer as he has to move his chicken farm.	Addendum 5
How close to a residential area can mining operations take place?	Addendum 5
How deep are coal layers situated at the mine?	Addendum 5



Issues raised previously	Addendum
Coal fall from the trucks onto the farmer's driveway.	Addendum 5
Will the public road be utilised for coal haulage from the new proposed mining areas?	Addendum 5
Where will the mine workers live?	Addendum 5
Concern that the presence of mine workers in close proximity to surrounding properties will increase safety risks and incidences of theft.	Addendum 5
Constant nasal problems are experienced due to polluted air (dust).	Addendum 5
Who is the specialist responsible for the wetland survey?	Addendum 5
DWAF: Nelspruit Office is interested in wetland survey and involved in any stream flow reduction activities.	Addendum 5
Mining has a negative impact on the appearance of the surrounding area.	Addendum 5
A separate Authorities meeting should be scheduled where the DWAF representatives will be present.	Addendum 5
Activities of different Departments are interrelated - the DWAF can only issue a Water Use Licence after they obtained the EIA from the DACE.	Addendum 5
All proposed activities associated with the proposed projects (including the proposed haul road) could be included in the EIA(s) and EMP(s), except activities defined as Water Uses.	Addendum 5
All proposed activities associated with the proposed projects (including the proposed haul road) could be included in the EIA(s) and EMP(s), except activities defined as Water Uses.	Addendum 5
Amount of Scoping Reports already submitted to the DME.	Addendum 5
Amount of EIAs and EMPs to be submitted to the DME.	Addendum 5
Submission of specialist reports.	Addendum 5
Submission of revised IWULA.	Addendum 5
Where can previous EIA's be found?	Addendum 5
Application to DALA regarding the Eskom power line in Block OWM.	Addendum 5
Eskom's timing of launching an application to DALA should take starting date of proposed mining into account.	Addendum 5
Programme / system should be in place to provide assistance to farmers.	Addendum 5
Programme / system should be in place to provide assistance to farmers.	Addendum 5
Farmer doesn't have faith that his concerns will be addressed as part of the Public Participation Process.	Addendum 5
Mine should make a commitment to continually address all concerns of I&APs.	Addendum 5
Second public meeting to be held after the specialist reports have been completed.	Addendum 5
Discussions between the mine and I&APs cannot be limited to the public meeting. The mine should consult I&APs regularly.	Addendum 5
Delmas Municipality requested that a health inspector be invited to the public meeting, as there are no specific forums in the area that would be interested to attend the meeting.	Addendum 5
Mineral rights still belong to farmer, only coal rights belong to the mine. What will happen with clay for example?	Addendum 5
Farmer's company also applied for Mining Rights at Moabsvelden, Rietkuil and Schoongezicht.	Addendum 5
Timing of when farms will be bought from the owners.	Addendum 5
Land claims on farms.	Addendum 5

Issues and comments made at the Open Day for the proposed project are listed in Table 5-3 below:

**Table 5-3 Comments raised at the Open Day**

No	Comment Raised	By Whom	Designation	Response by EAP
1	Mines don't implement their Corporate Social Responsibility	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	Comment noted
2	PM10 - Mine pollute the	Mopale	Resident at	An Air Quality study will be conducted and the

No	Comment Raised	By Whom	Designation	Response by EAP
	air	Nyakale; George Mtshweni	Delmas Settlement	issue will be addressed in the EIA report
3	Wetlands will be destroyed	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	A wetland study will be conducted and the impact on wetlands will be addressed in the EIA report
4	People will possibly be removed or displaced by the mine	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	No relocations or displacement of any local communities will take place for the new mine expansion.
5	The mining area is located next to a food production area	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	Comment noted, the mine is situated in an area which is equally dominated by mining and farming activities.
6	The EIA / PP process is a waste of time	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	Comment noted. Section 5.1 describes the purpose of the PP Process. Section 7.3 and 7.4 describe the compilation of the EIA/EMP to comply with legislation.
7	Mining companies don't fulfill their promises after the documents have been submitted and approval for mining given	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	Exxaro Leeuwan fulfills the requirements of the DMR by conducting the required annual Performance Assessment Audits, including audits on the WULA as required by DWA. Leeuwan has a dedicated Environmental Manager on the mine to enforce findings from external auditors.
8	Affected Parties are not being consulted	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	Comment noted, all I&APs that were already on the Leeuwan database were consulted. As required under NEMA Regulations the process to identify and consult with new stakeholders are being followed as part of this consultation for the project. I&APs were encouraged to let GCS know about stakeholders that were not contacted as part of the initial process.
9	Delmas is the wrong area for mining, mining compromises land that can be used for farming	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	The mine is located in an approved mining area (since 1993), approved by the DMR, mining takes place where economical resources are located. The EIA has to take cognisance of social, economic and environmental components.
10	Residents only use 16% of the power that the coal will be used for, mining industry uses the rest and gets the electricity at lower rates.	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	Comment noted.
11	Through mining we are negotiating our own extinction	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	Comment noted.
12	Mines don't employ the local people	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	Leeuwan employs people according to their approved Social and Labour Plan.
13	Exxaro only invested in one project - a clinic which was demolished and vandalised	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	Leeuwan according to their SLP has three community projects which is currently ongoing, this includes the Botleng Extension 3 Housing Development; Delmas Community Farming Project; and Delmas Laundry & Dry Cleaning.
14	Masses aren't consulted	Mopale Nyakale;	Resident at Delmas	Comment noted, all I&APs that were already on the Leeuwan database were consulted. As

No	Comment Raised	By Whom	Designation	Response by EAP
		George Mtshweni	Settlement	required under NEMA Regulations the process to identify and consult with new stakeholders are being followed as part of this consultation for the project. I&APs were encouraged to let GCS know about stakeholders that were not contacted as part of the initial process. If additional consultation is required the I&APs may request for such a consultation.
15	Exxaro Leeuwan has displaced a lot of people and nothing was done about them.	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	Exxaro Leeuwan has not in any stage of their development process displaced any informal communities.
16	We are not negotiating in good faith - how long are we going to take this?	Mopale Nyakale; George Mtshweni	Resident at Delmas Settlement	GCS are conducting the EIA process as an independent consultant as required by NEMA and as EAP as required by EAPSA. The process requires that GCS consult with the public to make sure all comments from stakeholders are noted and addressed. GCS do not negotiate on behalf of Exxaro regarding the project.
17	No one informed him	Peet Bezuidenhout	Farmer	An invitation to the public open day was sent via email on 9 November 2012.
18	Will the whole area become Leeuwan?	Peet Bezuidenhout	Farmer	The project does not entail the consolidation of farms; it is a consolidation of the existing EMP's. The existing mining right includes the farm Rietkuil, which will now become an extension of the existing mine. Therefore, no additional mining rights are required. (Igna Dougal)
19	We want the previous EMP's	Elise Tempelhoff	Journalist - Beeld	The reports compiled by GCS will be available for public review and comment. All registered I&APs will be informed of the availability of these reports. Previous EMP's as it relates to the existing Exxaro Leeuwan Mine can be requested from the DMR or Exxaro Head Office.
20	Are you mining Weltevredenpan?	Elise Tempelhoff	Journalist - Beeld	Mining has stopped at Weltevredenpan (Igna Dougal)
21	How far are you from the river? You know that you are not allowed to be within 100m from the river?	Elise Tempelhoff	Journalist - Beeld	Will be addressed in the EIA report.
22	Where is the Water Use License for Weltevredenpan?	Elise Tempelhoff	Journalist - Beeld	The WULA for Weltevredenpan is approved and available from the relevant department, and also a separate matter and does not form part of the current project (Igna Dougal). A WULA will be applied for for new water uses related to the extension of the mine.
23	Part of this project is the rehabilitation; will we get the rehabilitation plan?	Elise Tempelhoff	Journalist - Beeld	The mine works with concurrent rehabilitation. The rehabilitation plans for the project will be included in the EMP, also the cost of rehabilitation. On the existing mine the berm at the channel in front of the offices will be permanent. Excess clay is being sold to external buyers. (Igna Dougal)
24	Is it approved in the current EMP to sell excess clay?	Elise Tempelhoff	Journalist - Beeld	The current EMP approves of the selling of excess clay (Igna Dougal)
25	Is the underground mine now going to be an opencast mine?	Elise Tempelhoff	Journalist - Beeld	Yes, the underground mine (UI) were approved by the DMR previously, but Leeuwan cannot mine optimally

No	Comment Raised	By Whom	Designation	Response by EAP
				underground. The mining method for the same area needs to change and this will be addressed as part of the current EIA and EMP process. (Igna Dougal)
26	What will happen to the land after it has been mined? We need the costs of rehabilitation.	Elise Tempelhoff	Journalist - Beeld	Will be addressed in the EIA report, this will form part of the specialist investigations.
27	How will they get the coal from Rietkuil to the main plant?	Elise Tempelhoff	Journalist - Beeld	The coal will be transported via overland conveyors that will go through under the R50 to reach the new proposed plant on Leeuwpán.
28	Where will the R50 be diverted to?	Willie Joubert	Farmer	This does not form part of this process, and will be dealt with at a later stage in a different process. The road will be on the property that the mine wants to buy for Block OI. (Igna Dougal)
29	I'm worried about the quality of the groundwater at my farm.	Willie Joubert	Farmer	A detailed hydrogeological report will be undertaken as part of the EIA phase.
30	Water quality has decreased over the past couple of years.	Willie Joubert	Farmer	Water quality trends will be considered as part of the detailed hydrogeological report.
31	Where will the overburden be placed?	Willie Joubert	Farmer	Overburden will be backfilled, and will be located close to the backfill area.
32	Will I loose farm land that I've been renting, and will there be other areas to rent for farming?	Willie Joubert	Farmer	The possible R50 diversion does not form part of this process. The road diversion is still being investigated. Leeuwpán are investigating the purchase of farms that will relate to the diversion of the road and some farming areas that are currently being rented to farm may not be available. Exxaro will continuously consult with the surrounding landowners and lessee's regarding the possible diversion and Exxaro will investigate the availability of land for farmers to rent.

### 5.1.7 Document Review

The DSR will be made available for review by I&APs on the 18<sup>th</sup> of January 2013 and all registered I&APs will be informed of the report's availability, if I&APs require a copy on CD, if possible, that will be provided. The document will also be available on the GCS website: [www.gcs-sa.biz](http://www.gcs-sa.biz).

After comment from the public has been received the document will be updated to include comment in the Issues and Responses table. Thereafter further issues and responses will be documented and incorporated in the EIA/EMP reports.

Preliminary timeframes for the process to be followed and time for review are given below:

Submission of the Draft Scoping Report (DSR) (Public 30 days)	18 January 2013
Public review end for public	18 February 2013
Submission of the DSR (Commenting Authorities 40 days)	18 January 2013

Detailed timeframes will be communicated to the I&APs as the project progress, specifically on the process to follow after the submission of the Final Scoping Report to the Authorities. The draft EIA/EMP will be made available for comment as soon as the documents and specialist reports have been completed.

## **6 POTENTIAL IMPACTS, ISSUES AND METHODOLOGY**

Based on the environmental setting, as well as the issues raised during consultation thus far, and presented in Table 6.1, GCS and the specialist team has identified a preliminary list of impact, which highlights areas requiring specialist studies.

**Table 6-1 Potential Impacts relating to the Leeuwan Project**

Type of Environment	Potential Impact Description	Phase of Project	Specialist Study Required
Geology	Loss of geological strata due to the removal of coal resources.	Construction, Operational, and Decommissioning	Existing information
Topography	A potential impact from the proposed mining and additional infrastructure will be the temporary stockpiles at the new mine areas. Existing mining infrastructure is currently an impact to local topography	Construction, Operational, and Decommissioning	Cumulative study, taking into consideration Soils; Land Use; Land Capability ; and Ecological Studies
Soils, Land Use and Capability	The removal of vegetation (crops and veld grass) may lead to soil erosion caused by wind and water movement over the soil surface.	Construction, and Operational	Ecology; Soils
	Topsoil will be stripped and stockpiled which will cause the major disturbance to the functionality and productivity of the soil and may also result in a loss of topsoil.	Construction	Soils; soils capability
	Chemical soil pollution may occur as a result of oil and fuel spills as well as cement and other construction materials.	Construction	Soils
	Soil compaction will be a potential impact, especially in areas where construction vehicles will drive.	Construction	Soils
	Acidification of soil as result of the coal mining processes is also a significant impact.	Operational	Soils
	Impact on land use will be the change of land use from crop production and cattle farming to that of mining.	Construction, Operational, and Decommissioning	Land use study
	The land capability of the areas where the proposed mining areas will be located will change from arable and grazing land capability to industrial. Should the area not be rehabilitated again to pre-mining land capability after mining operations have ceased, the land capability may be reduced to wilderness.	Construction, Operational, Decommissioning and Post-closure	Land capability study
	Areas with wetland land capability may be affected by the proposed activities when the source of the groundwater and/or surface water is impacted upon.	Construction, Operational, Decommissioning and Post-closure	Land capability, Surface water and Groundwater, Wetland Assessment
Flora	Possible impacts on threatened and protected flora.	Construction, Operational, and Decommissioning	Ecological and Wetland Assessments
	Possible habitat destruction and modifications.	Construction, Operational, and Decommissioning	Ecological Assessments
Fauna	Possible loss and displacement of waterbirds and grassland birds caused by mining activities.	Construction, Operational, and Decommissioning	Wetland and Ecological Assessments
	Indirect, long-term impacts associated with the acidification of soils and surface water (acid mine drainage), thereby affecting avifaunal reproduction and mortality	Post-closure	Ecological Assessments
	Possible disruption of ecosystem service on primary grassland patches	Construction, Operational, and Decommissioning	Ecological Assessments

Type of Environment	Potential Impact Description	Phase of Project	Specialist Study Required
	Increased fragmentation and loss of ecological connectivity	Construction, Operational, and Decommissioning	Ecological Assessments
Groundwater	Dewatering of the groundwater as a result of mining is likely to be local	Operational, and Decommissioning	Groundwater Study
	Potential contamination of the groundwater resources may occur as a result of mining, waste facilities such as discard dumps, pollution controls dams etc	Operational, Decommissioning and Post-closure	Groundwater Study refer to Appendix F
Surface Water	Pans: Pans have been identified in close proximity to the proposed excavation pits.	Construction, Operational, and Decommissioning	Surface Water and Wetland Assessment
Air Quality	Potential increase in dust dispersion due to mining activities	Construction, Operational, and Decommissioning	Air Quality Assessment
Noise	Noise from the earthmoving equipment, and operations and blasting will have to be assessed as this might impact on the surrounding environment	Construction, Operational and Decommissioning	Noise Assessment
Heritage	Blasting and dust may have a negative effect on the grave sites	Construction and Operational	Heritage Assessment
	Should any of the graves be directly impacted on by the mine the graves will have to be exhumed and the human remains reburied.	Construction	Heritage Assessment
Social and socio-economic			Social and Socio-economic
	Decrease in property values of the site as productive agricultural land	Closure	Social and Socio-economic
	Increase in Economic Output/production due to Project Activities - positive	Construction, Operational	Social and Socio-economic
	Loss of Productive Agricultural Assets and loss of Agricultural Production	Construction, Operational, Decommissioning	Social and Socio-economic
	Increased costs of clean water availability (if water quality impacts have been identified in water related studies)	Operational, Decommissioning	Social and Socio-economic
	Presence of temporary workers disrupting communities	Construction, Operational, Decommissioning	Social and Socio-economic
Traffic	Possible increased traffic demand levels during the AM and PM peak hours on roads surrounding the mine	Construction, Operational, Decommissioning	Traffic assessment
	Safety of the local communities (in terms of pedestrian movement)	Construction, Operational, Decommissioning	Traffic assessment
	Adequate public transport facilities	Construction, Operational, Decommissioning	Traffic assessment
	Delays at the access to the mine	Construction, Operational, Decommissioning	Traffic assessment

It should be noted that the above list is not finite and that a full list of environmental/social impacts will be included in the EIA/EMP documents



## 7 PLAN OF STUDY FOR THE EIA AND EMP

Based on the outcome of the Scoping Phase, an EIA and an EMP Report must be submitted to the MDEDET for consideration and approval under NEMA. This section details the proposed way forward for the EIA/EMP.

### 7.1 Specialist Studies

A number of specialist investigations will be commissioned for the project to ensure that all issues relating to the Leeuwan EIA/EMP are addressed with the appropriate level of detail. The specialist investigations will be conducted by a team of professionals, each with specific expertise.

Each specialist study will address the standard requirements for an investigation of this nature. In addition, the issues raised during the consultation process will be addressed / taken into account by the specialists. An outline of the approach and the aspects to be addressed under each study are provided below.

It is anticipated that the following specialist investigations would be required due to the nature and size of the proposed development and the associated listed activities according to NEMA, MPRDA and NWA:

- Geohydrological Impact Assessment;
- Hydrological Impact Assessment;
- Blasting and Vibrations Assessment;
- Noise Assessment;
- Traffic Assessment;
- Air Quality Assessment
- Wetland and Aquatics Impact Assessment;
- Ecology (Fauna & Flora) Impact Assessment;
- Soil, Land Use and Land Capability Assessment
- Archaeological Assessment; and

- Socio-Economic Assessment.

### **7.1.1 Soils, Land Use and Land Capability Assessment**

A desktop study of existing maps and broad soil classes will be conducted to establish broad baseline conditions and areas of environmental sensitivity as well as old mining areas and areas currently being mined. Once the areas still undisturbed by mining activities have been determined, a detailed soil survey (150 m x 150 m) will be conducted in these areas. Observations will be made regarding soil texture, depth of soil, soil structure, organic matter content and slope of the area. The soil characteristics of each sample point will be noted and logged with a global positioning system. Soil samples for chemical analysis will be taken at certain sampling points and at each point both topsoil (0-300mm) and subsoil (300-600mm) will be sampled.

The soils will be described using the S.A. Soil Classification Taxonomic System (Soil Classification Working Group, 1991) published as memoirs on the Agricultural Natural Resources of South Africa No.15. Soils will be grouped into classes with relatively similar soil properties and pedogenesis. A cold 10% hydrochloric acid solution will be used on site to test for the presence of carbonates in the soil.

All streams, drainage lines, wetlands and pans within the surface area of Exxaro Leeuwan Coal will be surveyed in order to conduct detailed wetland delineation. These soil surveys will also be conducted within the adjacent wetlands in order to determine the boundaries of the wetlands based on soil classification.

The rehabilitated area will also be surveyed in order to determine the current physical and chemical properties of the soil, including recommendations to improve the status of soils and the grass cover. The chemical soil analysis will focus on the organic carbon content of the soil as well as the presence of sulphates and other pollutants. This part of the study will include the analysis of 6 samples.

The capability of the land will be defined using the information obtained during the soil investigation. The results from the soil survey results will be used in conjunction with the Chamber of Mines method and the system developed by Camp to interpret the capability of the land. During the assessment of the land, the economic and ecological implications of the mining operation will be described as well as the steps that need to be followed for rehabilitation. The result of this study will be a report on the land capability, which will be integrated into the soils report, the EIA and EMP reports.

The land uses of the entire surface area of Exxaro Leeuwan Coal will be defined by analyses of aerial photos and by means of ground references during the soil survey to be able to define all existing land uses and describe how the identified land uses may be affected by the present, past and future mining operation and/or mining related infrastructure development.

### **7.1.2 Biodiversity Assessments**

#### *7.1.2.1 Floral Assessment*

##### **Ecosystem diversity**

The Braun-Blanquet approach will be applied, which is basically the standard for phytosociological studies (plant description and mapping) in South Africa. The Braun-Blanquet plot method is the preferred sampling technique of the National Spatial Biodiversity Assessment team (Rouget *et al* 2004)

A minimum of 20 plots will be sampled during the October/ November 2012 based on available soil - and landscape information and physiognomic differences observed on large-scale aerial photographs and satellite imagery. The National Spatial Biodiversity Assessment team indicated that twenty (20) plots are the minimum number of plots, which can be included in the national biodiversity datasets (Rouget *et al* 2004). The random, *pro rata* placement of the sampling plots will be facilitated with the aid of a Geographic Information System (GIS). The co-ordinates of the plots will be exported to Mapsource and uploaded to a GARMIN Montana Global Positioning System (GPS) receiver for navigation in the field. Actual location in the field will be recorded within a 5 m accuracy interval.

At each plot, the following abiotic attributes will be documented:

- Topography - altitude, terrain unit, percentage slope;
- Soil - soil form, soil depth (mm), erosion, estimated percentage clay of A horizon; and
- Estimated percentage rock cover - gravel, small, medium, large.

The following overall vegetation characteristics will be documented:

- Vegetation cover - total, trees, shrubs, herbs, open water, rock; and
- Estimated average height of trees, shrubs and herbs - highest and lowest categories.

A list of all species within an approximate 100m<sup>2</sup> area will be recorded in the following growth form categories: grasses, forbs and woody species. Cover abundance values will be estimated for each species within the plot. Unknown species or potential red data species will be identified using field guides (Van Oudtshoorn 1991, Van Wyk & Malan 1988), the University of Pretoria's herbarium and specialists from the National Botanical Institute.

The survey results will be entered into a relational database for record purposes and analysis of the abiotic and vegetation characteristics. The species data will be entered into TURBOVEG (Hennekens 1996) and analysed with Juice. A vegetation map will be compiled/refined, based on the results of the phytosociological table and boundaries of the homogenous units.

### **Species diversity**

An identity kit will be compiled for each species listed as Red Data according to the February 2009 Red Data list from the South Africa National Biodiversity Institute (SANBI). The compilation of an identity kit involves a literature study to:

- Determine habitat preferences; and
- Obtain a picture/ photo of the actual species or similar species.

Large-scale aerial photograph and available GIS data will be used to determine whether potential habitat occur in the study area. GIS datasets applied were:

- Small scale - geology, pedology, terrain and vegetation; and

- Large scale - digital terrain models, soil survey.

During the site visit, the presence or absence of the actual Red Data species or potential habitat will be assessed.

#### 7.1.2.2 Avifauna

##### Literature and desktop survey

A desktop and literature review of the area under investigation was commissioned to collate as much information as possible prior to the summer baseline survey. The following literatures were consulted:

- Hockey *et al.* (2005), Harrison *et al.* (1997) and del Hoyo *et al.* (1992-2011) were consulted for general information on the life history attributes of the relevant bird species;
- Barnes (1998) was consulted for information regarding the biogeographic affinities of selected bird species;
- The conservation status of bird species was categorised according to the IUCN Red List of threatened species (IUCN, 2012) and Barnes (2000);
- Distributional data was sourced from the South African Bird Atlas Project (SABAP1) and verified against Harrison *et al.* (1997) for species recorded from the quarter-degree grid cell (QDGC) 2628BA (Delmas) and 2628BB (Kendal). The SABAP1 data provides a “snapshot” of the abundance and composition of species recorded within a quarter degree grid cell (QDGC) which was the sampling unit chosen. It should be noted that the atlas data makes use of reporting rates that were calculated from observer cards submitted by the public as well as citizen scientists. It therefore provides an indication of the thoroughness of which the QDGCs were surveyed between 1987 and 1991;
- Additional distributional data was also sourced from the SABAP2 database (<http://www.sabap2.adu.org.za>). Since bird distributions are dynamic (based on landscape changes such as fragmentation and climate change), SABAP2 was born (and launched in 2007) from SABAP1 with the main difference being that all sampling is done at a finer scale known as pentad grids (5 min lat x 5 min long, equating to 9 pentads within a QDGC). Therefore, the data is more site-specific, recent and more comparable with observations made during the site visit (due to increased standardisation of data collection); and

- The choice of scientific nomenclature, taxonomy and common names were recommended by the International Ornithological Committee (the IOC World Bird Names), unless otherwise specified (see [www.worldbirdnames.org](http://www.worldbirdnames.org); Gill & Donsker, 2012). The nomenclatural sequence of Sibley & Ahlquist (1990) was adopted with slight modifications to the inferred phylogenies of the passerines due to the lack of robust taxonomic structure (Hockey *et al.*, 2005).

### Point count surveys

A list of bird species detected on the study site will not suffice on its own when addressing environmental impacts. To describe the baseline conditions and dynamics relative to the avifaunal communities on the study site, it is necessary to obtain information on their distribution and abundance.

Therefore, bird data will be collected by means of *point counts* (Buckland *et al.*, 1993). The data from the point counts will then be analysed to determine indicator species and to delineate the different communities present. The use of point counts is advantageous since it is the preferred method to use for cryptic or elusive species. In addition, it is the preferred method to line transect counts where access is problematic, or when the terrain appears to be complex. It is a good method to use, and very efficient for gathering a large amount of data in a short period of time (Sutherland, 2006).

At each point count the number of bird species seen will be recorded, as well as their respective abundances. Each point count will last approximately 10 minutes and will cover approximately 2 ha (Sutherland *et al.*, 2004). To ensure the independence of observations, points will be at least 200 m apart. The data generated from the point counts will then be analysed according to Clarke & Warwick (1994) based on the computed percentage contribution (%) of each species including the consistency (calculated as the similarity coefficient/standard deviation) of its contribution. Hierarchical Agglomerative Clustering (a cluster analysis based group-average linkages; Clarke & Warwick 1994) will be performed on calculated Bray-Curtis coefficients derived from the data. A cluster analysis is used to assign associations between samples with the aim to objectively delineate groups or assemblages. Therefore, sampling entities that group together (being more similar) are believed to have similar compositions.

The species diversity of each community will be analysed by means of rarefaction, while richness measures (such as the total number of species recorded (S) and various diversity indices) will aim to compare the communities with each other. The advantage of rarefaction is that it adjusts the number of species expected from each sample if all were reduced to a standard size. The equitability of each species in each community will be presented by means of rank-abundance curves.

### Construction of guild profiles

Bird guilds are a better alternative to species lists or inventories. The bird community on the study site represents a “guild profile”, consisting of an array of different feeding and nesting guilds, each represented by one or more species (Feinsinger, 2001). For example, a forest patch may have several species that are insectivorous, although they utilise different ways (e.g. gleaning, probing, hawking) at different strata (vertical levels) to obtain their prey. Hence, a forest patch with a high diversity of guilds is therefore often highly functional. Since richness values and species composition alone are not as good ecological indicators, the “guild profile” may be more sensitive to the effects of human-induced activities. The “guild profile” of each bird community will be analysed and interpreted (e.g. dominant guilds vs. “missing” guilds).

### Additional methods to be applied

The following methods will be applied to augment the baseline avifaunal survey:

- Bird species will be identified, and where necessary, verified using Roberts Birds of Southern Africa, VIIth ed. (Hockey *et al.*, 2005). The presence of bird species will also be verified by means of their calls and other signs such as nests, discarded egg shells (Tarboton, 2001) and feathers. Particular attention will be paid to suitable roosting, foraging and nesting habitat for threatened species, in particular the “vulnerable” African Grass Owl (*Tyto capensis*);
- The potential occurrence of elusive species will be verified by the playback of their respective calls;
- All areas consisting of suitable African Grass Owl (*Tyto capensis*) habitat will surveyed on foot by means of dragging a 60 m rope. Although seemingly unethical, rope-dragging is considered to be the most reliable and rapid method to establish the presence of Grass Owls when time is limited or when large areas of habitat are to be screened; and

- All observations will be processed for submission to the South African Bird Atlas Project (SABAP2).

#### 7.1.2.3 *Invertebrates*

Surveys dealing with invertebrate groups impose significant problems especially when dealing with a huge global taxonomic impediment. Perhaps a better alternative in addressing developmental issues is to limit the number of taxa to a few species or target groups - often referred to as indicator groups. For example, data from field surveys aims at inquiring for signals or “thresholds” that will inform environmental changes at hand - e.g. changes to the abundance and distribution of target species or groups. Therefore, to address any question about the health or integrity of an ecosystem, a surrogate (or “shortcut”) is needed, which in itself plays an integral part of the system. In addition, any responses reflected in the target group should also be reflected on other species forming part of the system.

For an indicator or target group/species to be successful, it should meet the following criteria (Feinsinger, 2001):

- It must be easy to sample objectively;
- It should be a group/species that can be sampled efficiently;
- The target group must provide large numbers per unit effort;
- Sampling should be cost-effective;
- The target group/species should be well-known (familiar);
- The scale at which the target group operates should correspond to the scale of the question raised (e.g. study site);
- The target group should be sensitive to factors of conservation concern;
- The target should respond consistently to environmental change over time and space, in either a similar or opposite direction;
- The target should be active at all seasons when sampling might occur; and
- The target should preferably be of interest to a wide spectrum of communities (e.g. the rural community).



For this assessment, it is believed that beetle diversities and butterfly richness could represent feasible target groups. Beetles (especially Scarab and Caraboid beetles) are often used as indicator groups reflecting rapid changes in above-ground landscapes (Hanski & Cambefort, 1991) and are particularly vulnerable to habitat change (Halffter *et al.*, 1992). The order Coleoptera (beetles) it is the largest order of living organisms in the world. They vary greatly in size, form and more importantly, function. Therefore, systems with a high diversity of beetle families, are also likely to consist of a high guild membership and ecological integrity. Beetles are easy and relatively cheap to sample objectively by means of standard sampling methods.

Butterflies, like birds and mammals are charismatic and obvious in nature. They qualify as a valid target group, but seldom do so as a biodiversity indicator since their responses to habitat variables and human activities are complex (Feinsinger, 2001). The latter is partly explained by the difference in lifestyles and resource requirements between larvae and adults. In addition, some species could be vagrant, which is sometimes difficult to distinguish from visiting species. However, butterflies will be included in the study since they are one of the few insect groups that are globally assessed in terms of the IUCN criteria. They are widespread, relatively diverse and easy to identify in the field (being day-flying and conspicuous). Butterflies are also one of a few groups of invertebrates that are taxonomically well known and many species exhibit precise ecological requirements and are thus known to respond to particular changes in the environment (New, 1997). In conclusion, they are undoubtedly useful to include in habitat assessments conducted on a local spatial scale.

Main literature/resources will include:

- *Butterflies*: Henning *et al.* (2009) for the IUCN status of butterflies and Woodhall (2005) for information regarding the distribution patterns of butterfly species;
- *Scorpions*: All taxa collected will be identified by Mr Ian Engelbrecht (Gauteng Department of Agriculture and Rural Development) and Mr. Lorenzo Prendini (American Natural History Museum); and
- *Dung beetles*: Scholtz *et al.* (2009) will be consulted for general information and conservation of dung beetles while Davis *et al.* (2008) and Krell (1998) will provide identification keys.

#### Qualitative taxon-specific surveys

### *Diurnal butterflies (Families: Papilionidae & Hesperidae)*

Butterflies will be collected by means of active pursuit methods along random transect walks using a standard sweepnet. In addition, the occurrence of the vulnerable *Metisella meninx* (Marsh Sylph) butterfly will be verified in areas consisting of suitable habitat.

### *Scorpions*

The presence of scorpion taxa will be verified by means of hand searching and rock lifting.

### **Invertebrates: Quantitative surveys**

The objective of quantitative surveys is to evaluate the arthropod and Coleopteran diversity by comparing major habitat types (primary, secondary and rocky grassland) with each other.

### *Sweepnetting*

Sweepnetting will be used to collect invertebrates from above-ground foliage pertaining to grassland seres. During sweepnetting the grassy layer will be brushed back and forth to dislodge invertebrates up to a height of 1 m above the ground. Each sweep sample consists of a linear transect of 100 sweeps each.

### *Pitfall trapping*

Ideally, a total of 54 pitfall traps (depending on the habitat diversity) will be positioned within the major habitat types, consisting of three replicates of 6 buckets (2L) each. The buckets will be dug into the soil with the opening level with the soil surface. The traps will be left *in situ* for four weeks before removal.

Order-level and beetle family-level diversities will be calculated using the Shannon-Weaver index ( $H'$ ) (in Zilihona & Nummelin, 2001) and rarefaction, while Bray-Curtis similarity coefficients will be used to compare arthropod and beetle abundance distributions between the different habitat types. A cluster analysis based on Bray-Curtis similarity coefficients (Clarke & Warwick, 1994) will estimate the similarity of the taxa involved between the different habitat types.

#### 7.1.2.4 Herpetofauna

##### **Survey timing**

The Highveld region of South Africa exhibits strong seasonal variation in climate which greatly affects herpetofauna activity. It is therefore important to time the summer survey to coincide with the peak activity of herpetofauna. This peak in activity is usually observed for several days after heavy rains have fallen if the temperature rises appreciably and remains warm. The best chance of encountering such conditions is between October and December.

##### **Survey duration**

Herpetofauna are secretive and difficult to observe, especially snakes. Their movement habits are also notoriously unpredictable making it difficult to trap them effectively. The only way to counteract this is by increasing the trapping duration which increases the probability of trap success. It is therefore recommended that each funnel trap array be deployed for a minimum of 5 nights. Up to four trap arrays can be deployed and managed simultaneously.

##### **Funnel Traps**

Funnel trap drift fence arrays will be placed within the selected areas where herpetofauna diversity is expected to be greatest within a particular habitat and where possible (depending on the soil conditions and slope). These sites will be finally selected through ground-truthing inspection at the initiation of the summer survey. Pitfall traps are very effective in trapping small reptiles, particularly lizards, small snakes and amphibians (Corn & Bury 1990; Branch 1998; Crosswhite *et. al.* 1999). The efficacy of pitfall trap arrays is increased by the addition of funnel traps along the drift fences (e.g. Masterson *et. al.* 2009). The funnel-trap drift fence arrays allow for the placement of traps where it is not possible to sink a 25 litre bucket (e.g. rocky or boggy ground) and provide greater trapping success (L. Verburgt, pers obs). Traps will be inspected daily in the morning and all captured specimens will be photographed and released away from the traps.

##### **Active searching during point sampling**

Reptiles will be searched for on foot within the study area during the day. Active searching for reptiles will involve:

- Photographing active reptiles from a distance with a telephoto lens;
- Lifting up and searching under debris or rocks (rocks will be returned to their original position);
- Excavation of suitable burrows that appear to be in use;
- Scanning for any signs of reptiles such as shed skins, the positive identification of which will be taken as an observation of that species; and
- Catching any observed reptile by hand. All captured reptiles will be photographed and released unharmed.

Nocturnal snakes will be searched for by driving very slowly on the roads at night. Amphibians (frogs and toads) are nocturnal and will be searched for by torchlight at night along dam/pond edges and in wetland areas. Each amphibian species encountered at a particular site will be photographed. Positive identification of acoustic signals (males call to attract females) will also be used as a means of identifying amphibians. Acoustic signals will be recorded with high-precision recording equipment where possible and identification confirmed with existing recordings (Du Preez & Carruthers 2009). Remote sound recording equipment will be deployed at suitable sites for amphibians and will be set to record for 4 hours during each night. Recordings will be analyzed *post hoc* to identify any species calling that was not directly observed during active searching.

#### 7.1.2.5 *Mammals*

The summer survey will be carried out at least two weeks after the onset of the first summer rains, preferably in middle to late November or afterwards.

**Sherman trapping:** During the summer wet-season survey period, small mammal trapping will represent a primary component of the sample methodology. Sherman traps are too placed in trap lines of 15, within 5 sites in the study area for a period of 5 nights. The locations of the traplines will be decided during the study period but the placement will be designed to represent the five habitat types that can realistically be sampled (excluding the actual mining area). Bait used is a combination of peanut butter, sardines, vegetable oil and oats as recommended by Chimimba (pers.comm<sup>6</sup>). The use of Sherman traps to sample small mammal populations are necessary in order to comply with minimum sampling requirements for regional and international conservation authority standards.

There are various levels of information that may be obtained from the use of intensive small mammal Sherman trapping.

- a) The diversity of the small mammals in the area can be used to indicate the impacts of mining disturbance. Assemblages can be directly compared to disturbance in order to indicate the effects of the activities on populations and diversity; and
- b) System health can be indicated by the average percentage trap success and/or species diversity for a given trap line.

**Nocturnal assessments:** This technique is an essential tool in mammalian sampling, simply because most of the target species only are active after dark. Each nocturnal survey lasts between two and three hours and three night drives should be carried out per season/sample period. Some animals may be located from vocalisations.

**Herpetological arrays:** The herpetological arrays that will be set up to capture amphibians and reptiles are also important sampling tools for small mammals. In areas such as Delmas, these traps are only effective in summer months when climatic conditions and basal coverage are optimal for herpetofaunal activity. Smaller mammal species that are foraging will often become trapped in the herpetological array, in a form of passive capture. These data cannot be used in the overall small mammal assessment (more specifically trap success) but contribute to the overall species diversity results for a given area.

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<sup>6</sup> Professor Christian T Chimimba, Mammal Research Institute, University of Pretoria, South Africa.

**Habitat assessment:** Habitat assessment was based on a simple structural classification of the vegetation within the study site. Subsequently, a number of factors are then combined to provide a basic sensitivity rating to be used in mapping. The factors combined as the basis of habitat sensitivity are as follows:

**Overall habitat potential:** Relates to the ability of a given habitat to support a given mammalian species/group.

**Refugia potential:** The ability of a given habitat to fulfil shelter requirements of a given mammalian species/group.

**Forage potential:** The ability of a given habitat to fulfil food requirements of a given mammalian species/group.

**Habitat connectivity:** The ability of a given habitat to allow for migratory movement as well as genetic exchange, for a given mammalian species/group.

**Overall Mammalian importance:** The relevant importance of the sub-population of a given mammalian species/group in the context of the region/country and entire species/group community as a whole.

#### **Discussion with local communities**

Throughout southern Africa, the acquisition of local knowledge has proved to be a highly useful method for obtaining data. Basic questions were posed to local communities as to the mammalian assemblages within the project footprint, extent of subsistence hunting and current livestock practices. Interviews were facilitated through the use of field guides to avoid confusion between nomenclatures

#### **Vegetation classification**

A description of mammalian assemblages within the study area in context with the described vegetation units will be carried out once the botanical study is complete. Like many other aspects of biodiversity surveys, botanical assessments require the growing season (November to April) to accurately evaluate and classify the prevailing vegetation characteristics.

### **Impacts and Mitigation**

Once the final data set has been obtained, it will be possible to create an Impacts and Mitigations summary, describing and quantifying the effects of the mine development (expansion) on the prevailing mammal assemblages within the study area. The impacts and mitigations are vital in driving the creation of the Environmental Management Plan and aiding in the reduction of the effects on regional and local mammal populations.

#### **7.1.3 Surface Water**

The Leeuwan project consists of existing mining activities and infrastructure as well as newly proposed mining activities and associated infrastructure. The official Scope of Work (SoW) for the EIA can be summarised as follows:

- To conduct detailed hydrology over the entire project boundary area including the following;
  - Baseline quality evaluation;
  - Average flow contributions; and
  - Flood lines.
- To establish a “status quo” condition on site with regards to Storm Water Management (SWM);
- To compile a conceptual SWM Plan (SWMP) for the entire project boundary area (existing mining activities and infrastructure as well as newly proposed mining activities and associated infrastructure);
- To do PCD analyses;
- To provide preliminary conceptual designs of all proposed infrastructure;
- To update the existing Water Balance (WB) Process Flow Diagram (PFD);
- To update the existing Water and Salt Balance (W&SB);

- To investigate treatment options (desktop level);
- To create a detailed monitoring program;
- To give ratings on potential environmental impacts; and
- To propose mitigation measures.

The hydrological investigation will form part of the amendments to the EIA, EMP and WULA authorisation processes.

#### **7.1.4 Groundwater**

The plan of study for the EIA will be covered during the following more comprehensive phase of which the findings will be documented in the final report:

- Geochemical Assessment of different lithological units to establish the ABA potential;
- Drilling and installation of monitoring testing holes to perform aquifer tests to obtain parameters for calibration of the groundwater model;
- Performing a dry season (winter) hydro census investigation to consider worst case scenario aquifer conditions; and
- A groundwater management plan will be formulated during the detailed investigation.

A more involved EIA groundwater study investigation will follow as mentioned above, and will quantify groundwater related impacts as a result of mining.

#### **7.1.5 Wetland Investigation**



Following on from the desktop assessment, a site visit will be undertaken to ground truth all potential wetland areas within the affected area and verify the existence and extent of all wetland areas. Wetland boundaries will be delineated using both soil wetness indicators (mottling and gleying) and vegetation indicators according to the method prescribed in the document “*A practical field procedure for identification and delineation of wetland and riparian areas*” (DWAF, 2005). During the site visit, information regarding impacts on, and condition of, the wetlands will be collected enabling an evaluation of both the ecological health (PES) and the ecological importance and sensitivity (EIS) of the wetlands using standard tools such as WET-Health (Macfarlane, 2009).

Based on the information collected in the field and experience from working on other EIA and EMP processes, potential impacts will be identified and appropriate mitigation measures recommended where the impact on the wetlands is unavoidable. Where applicable, suitable management measures will also be recommended, and a biomonitoring plan compiled.

The findings of the study will be collated and a wetland assessment report will be compiled, which will also include appropriate sections for inclusion in the EMP.

#### **7.1.6 Archaeological Investigation**

##### **Survey of literature**

A survey of literature will be undertaken in order to obtain background information regarding the area. This includes previous heritage reports from the area.

##### **Field survey**

The survey will be conducted according to generally accepted HIA practices and will be aimed at locating all possible objects, sites and features of cultural significance in the area of proposed development. If required, the location/position of any site will be determined by means of a Global Positioning System (GPS), while photographs will also be taken where needed. The survey will be undertaken by a physical survey via off-road vehicle and on foot.

##### **Oral histories**

People from local communities will be interviewed in order to obtain information relating to the surveyed area. It needs to be stated that this is not applicable under all circumstances. When applicable, the information will be included in the text.

### **Documentation**

All sites, objects features and structures identified will be documented according to the general minimum standards accepted by the archaeological profession. Co-ordinates of individual localities will be determined by means of the Global Positioning System (GPS).The information will then be added to the description in order to facilitate the identification of each locality.

### **Evaluation of Heritage sites**

The evaluation of heritage sites will be done by giving a field rating of each using the following criteria:

- The unique nature of a site;
- The integrity of the archaeological deposit;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined or is known);
- The preservation condition of the site;
- Uniqueness of the site; and
- Potential to answer present research questions.

#### **7.1.7 Noise Pollution**

The existing baseline noise information and the new noise information will be used to assess the possible noise impact during the EIA phase and this information will be used to compile the EMP. The plan of study for the EIA phase will consist out of the following:

- Noise impact assessment and determine the prevailing ambient noise levels at all 4 wind directions at the three open cast pits, discard dump and along the railway line and the conveyer line;

- Evaluate such information with existing baseline information and/or noise standards;
- Establish noise contours;
- Design and recommendations on engineering control measures;
- Make use of the six-step model to ensure compliance to environmental noise control standards; and
- Compile a noise management control document.

### **7.1.8 Social Assessment**

Specialist input into the Environmental Impact Assessment and Environmental Management Plan Phase will include the following:

- Reporting, which includes an assessment of the following:
  - Baseline conditions of the project area;
  - Potential impacts associated with the proposed project;
  - Assessment of the significance of the potential impacts. The impact assessment may require revision after the stakeholder feedback meeting to address concerns raised by Interested and Affect Parties (I&APs);
  - Recommended mitigation and management measures; and
  - Environmental Management/Action plan with associated timeframes where necessary.
- All aspects will take into cognizance the construction, operational, and decommissioning and closure phases.
- The report will follow the general structure as indicated below:
  - Introduction;
  - Methodology;
  - Baseline description;
  - Impact Assessment;
  - Management Plan; and
  - Conclusion.

The following categories will be used to assess the predicted impacts:

- Health and Social wellbeing;
- Quality of the living environment;
- Economic impacts and material wellbeing;
- Cultural impacts;
- Family and Community impacts;
- Institutional, legal, political and equity impacts;
- Gender relations; and
- Sense of place.

The impacts will be examined and discussed according to the following four categories as indicated below:

- Originating prior to construction phase;
- Expected to set in during construction phase;
- Expected during operational phase; and
- Expected during the decommissioning phase.

#### **7.1.9 Traffic Assessment**

The study will be carried out based on the following methodology:

- Identification of the affected external roads,
- Status quo investigation of internal and external road network:
  - Existing traffic volumes, and
  - Basic road network investigation (cross sections, condition of the road),
- Capacity evaluation of the existing road network (link capacity and intersection capacity),
- Projection of the future traffic demand (background and mining traffic),
- Re-evaluation of the road network to accommodate future traffic demand,
- Propose mitigation measure to minimise the impact on the external road network

- Public Transport and pedestrian movement investigation, and
- Preparation of the assessment report, including possible mitigating measures.

## **7.2 Compilation of the EIA/EMP**

The following sections provide the reader with a view on how the potential impacts will be rated in terms of their significant and what the contents of the EIA/EMP will entail.

### **7.2.1 Environmental Impact Significance Rating Methodology**

To ensure uniformity, the assessment of potential impacts will be addressed in a standard manner so that a wide range of impacts is comparable. For this reason a clearly defined rating scale will be provided to the specialist to assess the impacts associated with their investigation.

Each impact identified will be assessed in terms of probability (likelihood of occurring), scale (spatial scale), magnitude (severity) and duration (temporal scale). To enable a scientific approach to the determination of the environmental significance (importance), a numerical value will be linked to each rating scale.

The following criteria will be applied to the impact assessment for the EIA/EMP.

#### **Occurrence**

- Probability of occurrence (how likely is it that the impact may occur?), and
- Duration of occurrence (how long may impact last?).

#### **Severity**

- Magnitude (severity) of impact (will the impact be of high, moderate or low severity?), and
- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?)

In order to assess each of these factors for each impact, the following ranking scales were used:

<i>Probability:=P</i>	<i>Duration:=D</i>
5 - Definite/don't know	5 - Permanent
4 - Highly probable	4 - Long-term (ceases with the operational life)
3 - Medium probability	3 - Medium-term (5-15 years)
2 - Low probability	2 - Short-term (0-5 years)
1 - Improbable	1 - Immediate
0 - None	
<i>Scale:=S</i>	<i>Magnitude:=M</i>
5 - International	10 - Very high/don't know
4 - National	8 - High
3 - Regional	6 - Moderate
2 - Local	4 - Low
1 - Site only	2 - Minor
0 - None	

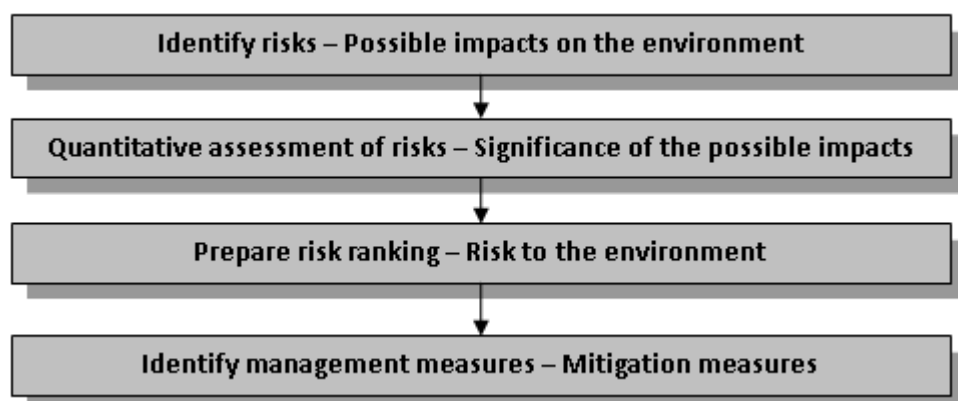
Once the above factors had been ranked for each impact, the environmental significance of each was assessed using the following formula:

$$SP = (magnitude + duration + scale) \times probability$$

The maximum value is 100 significance points (SP). Environmental effects were rated as either of high, moderate or low significance on the following basis:

- More than 60 significance points indicated high (H) environmental significance;
- Between 30 and 60 significance points indicated moderate (M) environmental significance; and
- Less than 30 significance points indicated low (L) environmental significance.

The following process will be followed:



### 7.2.2 Reporting

Based on the outcome of the environmental scoping phase, an EIA and an EMP Report will be submitted to the DMR for consideration and approval.

## 7.3 Environmental Impact Assessment Report (EIA Report in terms of the NEMA)

An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 36, and must include -

- (a) details of -
  - (i) the EAP who compiled the report;
  - (ii) the expertise of the EAP to carry out an environmental impact assessment
- (b) a detailed description of the proposed activity;
- (c) a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is -
  - (i) a linear activity, a description of the route of the activity; or
  - (ii) an ocean-based activity, the coordinates where the activity is to be undertaken;
- (d) a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;
- (e) details of the public participation process conducted in terms of subregulation (1), including -
  - (i) steps undertaken in accordance with the plan of study

- (ii) a list of persons, organisations and organs of state that were registered as interested and affected parties;
  - (iii) a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and
  - (iv) copies of any representations, objections and comments received from registered interested and affected parties;
- (f) a description of the need and desirability of the proposed activity and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;
- (g) an indication of the methodology used in determining the significance of potential environmental impacts;
- (h) a description and comparative assessment of all alternatives identified during the environmental impact assessment process;
- (i) a summary of the findings and recommendations of any specialist report or report on a specialised process;
- (j) a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
- (k) an assessment of each identified potentially significant impact, including -
- (i) cumulative impacts;
  - (ii) the nature of the impact;
  - (iii) the extent and duration of the impact;
  - (iv) the probability of the impact occurring;
  - (v) the degree to which the impact can be reversed;
  - (vi) the degree to which the impact may cause irreplaceable loss of resources; and
  - (vii) the degree to which the impact can be mitigated.
- (l) a description of any assumptions, uncertainties and gaps in knowledge;
- (m) an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;
- (n) an environmental impact statement which contains -
- (i) a summary of the key findings of the environmental impact assessment; and
  - (ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;



- (o) a draft environmental management plan that complies with regulation 34;
- (p) copies of any specialist reports and reports on specialised processes complying with regulation 33; and
- (q) any specific information that may be required by the competent authority.

#### **7.4 Environmental Management Programme Report (EMP in terms of the NEMA)**

Each specialist will be required to identify means of avoiding, mitigating and/or managing the negative impacts in his/her particular aspect of the investigation. The recommended management strategies will be synthesised by GCS to formulate the Environmental Management Programme (EMP) for the proposed mining operation.

Wherever possible, management strategies will be incorporated into the mine systems to avoid, or appropriately manage impacts from the outset.

A draft environmental management plan must include -

(a) details of -

- (i) the person who prepared the environmental management plan; and
- (ii) the expertise of that person to prepare an environmental management plan

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

- (i) planning and design;
- (ii) pre-construction and construction activities;
- (iii) operation or undertaking of the activity;
- (iv) rehabilitation of the environment; and
- (v) closure, where relevant.

(c) a detailed description of the aspects of the activity that are covered by the draft environmental management plan;

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

(e) where appropriate, time periods within which the measures contemplated in the draft environmental management plan must be implemented; and

(f) proposed mechanisms for monitoring compliance with the environmental management plan and reporting thereon.

## 7.5 EIA/EMP Feedback and Review

A feedback meeting will be held with the stakeholders and authorities in order to give them an opportunity to comment on the document as well as ask relevant questions about aspects associated with the project. Once completed, the comments will be incorporated into the EMP and the DMR and MDEDET will be asked to make a final decision on the EIA/EMP.

## 7.6 Preliminary Timeframes

Preliminary timeframes for the process to be followed and time for review are given below:

Submission of the Draft Scoping Report (DSR) (Public 30 days)	18 January 2013
Public review end for public	18 February 2013
Submission of the DSR (Commenting Authorities 40 days)	18 January 2013

Detailed timeframes will be communicated to the I&APs as the project progresses.

## 7.7 Other Environmental Applications

In addition to the NEMA application, it will be necessary to undertake environmental applications in terms of the National Water Act (Act No. 36 of 1998) (NWA) and an EMP according to the MPRDA. These applications are running concurrent with the NEMA process.

### 7.7.1 MPRDA process

In terms of Section 102 of the MPRDA, when a change or addition of new activities occurs after an EIA/EMP has been approved, an amendment to the Environmental Impact

Assessment and Environmental Management Plan (EIA/EMP) needs to be submitted to the DMR. Leeuwan is required to conduct a new environmental assessment for all new or changed activities and submit an Environmental Scoping Report (ESR) and updated EIA/EMP to the Department of Mineral Resources (DMR) in Mpumalanga for authorisation.

The DMR has however requested the consolidation of all the previous EMPR's along with the proposed mining of Block OI in order to have one document for the whole mine updating previous studies done. The MPRDA process will thus address the project as a whole including all activities regarding the new block OI mine.

### ***7.7.2 Integrated Water Use Licence Application***

According to NWA, water may not be used without prior authorisation from the leading authority, in this case the Department of Water Affairs (DWA). Due to the requirements of the NWA, an Integrated Water Use License Application needs to be compiled and handed in at the Department of Water Affairs (DWA) to ensure the legality of the Leeuwan water uses. GCS will be undertaking the updating of the required Water Use Licenses as per the NWA.

The Integrated Water Use License Application (IWULA) and Integrated Water and Waste Management Plan (IWWMP) will be conducted in parallel to the EIA and EMP process.

The following water uses in terms of Section 21 of the NWA may be applied for, but is still to be finalised. Application will be made to the Regional Office of DWA:

- (a): Taking water from a water resource;
- (b): Storing water;
- (c): Impeding or diverting the flow of water in a watercourse;
- (g): Disposing of waste in a manner which may detrimentally impact on a water resource;
- (i): Altering the bed, banks, course or characteristics of a watercourse; and
- (j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

## 8 CONCLUSION

Leeuwpán was initially owned by Iscor when it started in 1992, later by Kumba Resources and now Exxaro.

Leeuwpán is an operational mine, and operates according to the previous approved Environmental Management Plans (EMP's) for several different mining blocks that were submitted to the Department of Minerals and Energy (DME), now the Department of Mineral Resources (DMR), thus making Leeuwpán a lawful mining operation as stated under the Mineral and Petroleum Resources Development Act, 2002 (Act no. 28 of 2002) (MPRDA).

Leeuwpán is planning the development of an additional opencast pit (Block OI) which will be located on portions of the farm Moabsvelden and Rietkuil. New infrastructure and activities that will be associated with the Proposed Block OI development are:

- Water pipelines (from OI) and Pipelines between PCDs
- Stormwater Drains, Trenches and Cut-off trenches
- Clean and Dirty water systems
- Evaporation dam
- Crushing and Screening plant
- Weirs
- Plant buildings
- Pollution control dams
- Silt dams
- Explosive magazine
- Mining of OI
- Construction of new and extension of existing haul roads (From OI to existing roads)
- ROM and Product Stockpiles
- Backfilling of discard material,

- Existing return water dams will be put back in use - combined capacity of 80000 Cubic metres
- Diesel Storage of 1000 cubic metres - Fuel Depot.

The project environmental process will be undertaken in three (3) parallel processes namely the NEMA process for all the associated listed activities, the MPRDA process to develop an EIA/EMP for the DMR, and the NWA process regarding the water uses that will be associated with the proposed development.

A comprehensive Public Participation Process will be followed and is an ongoing process where all i& AP's will be involved in. News paper adverts, site notices, BID's, Open day scoping meeting have already been conducted. The process will continue to engage all parties to ensure an ongoing open and transparent public participation process.

Potential impacts that have been identified include:

- Loss of geological strata due to the removal of coal resources;
- A potential impact from the proposed mining and additional infrastructure on topography;
- Soil erosion;
- Disturbance to the functionality and productivity of the soil;
- Chemical soil pollution;
- Soil compaction;
- Land capability may be reduced to wilderness;
- Possible impacts on threatened and protected flora;
- Possible habitat destruction and modifications;
- Possible disruption of ecosystem service on primary grassland patches;
- Increased fragmentation and loss of ecological connectivity;
- Dewatering of the groundwater;
- Potential contamination of the groundwater resources;
- Loss of wetlands;

- Potential increase in dust dispersion due to mining activities;
- Noise from the earthmoving equipment, and operations might impact on the surrounding environment;
- Decrease in property values of the site;
- Increase in Economic Output/production due to Project Activities - positive;
- Loss of Productive Agricultural Assets and loss of Agricultural Production;
- Presence of temporary workers disrupting communities;
- Possible increased traffic demand; and
- Safety of the local communities (in terms of pedestrian movement).

Specialist investigations were commissioned to ensure that all issues relating to the project are addressed with the appropriate level of detail. The following specialist investigations have been considered for the project:

- Hydrogeological Impact Assessment;
- Hydrological Impact Assessment;
- Blasting and Vibrations Assessment;
- Noise;
- Wetland and Aquatics Impact Assessment;
- Ecology (Fauna & Flora) Impact Assessment;
- Soil, Land Use and Land Capability Assessment
- Heritage Assessment;
- Traffic;
- Social and Socio-Economic; and
- Visual Impact Assessment.

All impacts and remedial measures will be presented to the registered stakeholders on completion of the environmental investigations.

At this stage no fatal flaws have been identified, however some potentially significant impacts which will require important management measures could possibly occur if the mining of block OI proceeds. These will be assessed in detail in the EIA/EMP phase, and by compiling a comprehensive EMP the potential impacts will be minimized or eliminated.

## **9 GAP ANALYSIS**

The following gaps still present themselves, and will be addressed during the EIA/EMP phase of this project.

- The No-go Option of the project will have to be conducted in much greater detail, indicating the positive and negative aspects according to every specialist study conducted.

The gap analysis as summarized above is not finite, and areas of low confidence will be further investigated by specialists.

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**APPENDIX A**

*Details for Appendix A.*

**APPENDIX B**

*Details for Appendix B.*

**APPENDIX C**

*Details for Appendix B.*

**APPENDIX D**

*Details for Appendix B.*

**APPENDIX E**

*Details for Appendix B.*

**APPENDIX F**

*Details for Appendix B.*

**APPENDIX G**

*Details for Appendix B.*

**APPENDIX H**

*Details for Appendix B.*

**APPENDIX I**

*Details for Appendix B.*

**APPENDIX J**

*Details for Appendix B.*

**APPENDIX K**

*Details for Appendix B.*

**APPENDIX L**

*Details for Appendix B.*

**APPENDIX M**

*Details for Appendix B.*

**APPENDIX N**

*Details for Appendix B.*