mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT FOR PUBLIC REVIEW

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

AND

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT: Groothoek Coal Mining Company (Pty) Ltd

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FILE REFERENCE NUMBER SAMRAD: LP30/5/1/2/2/10111MR

IMPORTANT NOTICE

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

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

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

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

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

OBJECTIVES OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process—

a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
d) determine the—-
e) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
f) degree to which these impacts—
g) can be reversed;
h) may cause irreplaceable loss of resources, and
i) can be avoided, managed or mitigated;
j) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
k) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
l) identify suitable measures to manage, avoid or mitigate identified impacts; and
m) identify residual risks that need to be managed and monitored.

LIST OF ACRONYMS

ACRONYM:	DESCRIPTION:
AEL	Atmospheric Emissions License in terms of NEM:AQA
AMD	Acid Mine Drainage
ASTM	American Standard for Testing and Materials (followed by protocol number)
BA	Basic Assessment (process or report)
BID	Background Information Documents
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983) as amended
CBD	Central Business District (specifically LLM)
COP	Codes of Practice
C-Plan	Conservation Plan (specifically Limpopo Conservation Plan)
DMR	Department of Mineral Resources
DWS	Department of Water Affairs and Sanitation
EA	Environmental Authorisation in terms of NEMA
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act (Act 73 of 1989) as amended
EIA	Environmental Impact Assessment (process or report)
EIA Regulation	Environmental Impact Assessment Regulation published under NEMA
EIS	Ecological Importance and Sensitivity
EMF	Environmental Management Framework (specifically Waterberg District EMF)
EMPr	Environmental Management Programme Report
GDP	Gross Domestic Product
GIS	Geographical Information Systems
GN	General Notice (issued under an Act, providing notice or information)
GNR	General Notice Regulation (issued under an Act, providing instruction)
HSTP	Human Settlement Plan
I&AP	Interested and Affected Parties
IAIA SA	International Association of Impact Assessment South Africa
IDP	Integrated Development Plan (specifically LLM)
IWUL	Integrated Water Use Licence
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
LDEDET	Limpopo Department of Economic Development, Environment and Tourism
LED	Local Economic Development
LLM	Lephalale Local Municipality
LoM	Life of Mine
MCWAPII	Mokolo and Crocodile Water Augmentation Project
MHSA	Mine Health and Safety Act (Act 29 of 1996) as amended
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002) as amended

ACRONYM:	DESCRIPTION:
MR	Mining Right in terms of the MPRDA
MRA	Mining Right Application in terms of the MPRDA
NAEIS	National Atmospheric Emissions Inventory System
NEA	National Energy Act, Act 34 of 2008
NEM:AQA	National Environmental Management: Air Quality Act (act 59 of 2008) as amended
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004) as amended
NEM:PAA	National Environmental Management: Protected Areas Act (Act 57 of 2003) as amended
NEM:WA	National Environmental Management: Waste Act (Act 39 of 2004) as amended
NEMA	National Environmental Management Act (Act 107 of 1998) as amended
NFEPA	National Freshwater Ecology Priority Areas
NHRA	National Heritage Resources Act (Act No. 25 of 1999) as amended
NPAES	National Protected Area Expansion Strategy
NWA	National Water Act (Act 35 of 1998) as amended
PCD	Pollution Control Dam
PDA	Potential Development Area (in terms of the SDF)
PES	Present Ecological State (usually followed by category A-F)
PM10/5/2.5	Particulate Matter up to 10/5/2.5 micrometres
PPP	Public Participation Process
RoD	Record of Decision (for specific application)
RoM	Run of mine (in terms of coal that is extracted but not yet processed)
RWD	Return Water Dam
RWQO	Resource Water Quality Objectives
S&EIR	Scoping and Environmental Impact Reporting process
S&LP	Social and Labour Plan
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resource Agency
SAMRAD	South African Mineral Resources Administration System
SANBI	South African National Biodiversity Institute
SANS	South African National Standard (followed by standard number)
SASS5	South African Scoring System version 5 (in terms of aquatic invertebrate assessments)
SAWIS	South African Waste Information System
SDF	Spatial Development Framework (specifically LLM)
SEMA	Specific Environmental Management Acts
SMME	Small and Medium and Micro Enterprise
SOP	Standard Operating Procedure
SPLUMA	Spatial Planning and Land Use Management Act (Act No.16 of 2013)
Stats SA	Statistics South Africa
WMA	Water Management Area
WML	Waste Management Licence in terms of NEM:WA

TABLE OF CONTENTS:

LIST OF TABLES:

LIST OF FIGURES:

LIST OF PLANS:

LIST OF APPENDICES:

PART A: SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 CONTACT DETAILS

1.1 Details of the EAP

Name of the Practitioner: Jane Kennard & Barbara Kasl

Tel No.: 011 794 7534

Fax No. : 011 794 6946

e-mail address: Info@cabangaconcepts.co.za

1.2 Expertise of the EAP

1.2.1 The Qualifications of the EAP

Jane Kennard: B.Sc. (Environmental Management & Botany).

Barbara Kasl holds a PhD in Animal, Plant and Environmental Sciences from the University of the Witwatersrand.

CVs and Proof of qualifications are attached as Appendix 1

1.2.2 Summary of the EAP's Past Experience

Jane Kennard: has been practising Environmental Assessment Practitioner for approximately 10 years and is a member of IAIA SA, the International Association for Public Participation and the Environmental Law Society South Africa.

Barbara Kasl has been an environmental practitioner for over 10 years and is a registered professional with SACNASP as an ecologist and environmental scientist and a member of the South African Entomological Society.

Both have worked on mineral and environmental applications under the MPRDA and ECA and have been involved with various NEMA, NEM:WA and NEM:AQA applications since the inception of these various acts for various mines and industries.

2 DESCRIPTION OF THE PROPERTY

Please refer to Plan 1 and Plan 2 respectively. Plan 3 and Plan 4 also include proximity plans to the mine boundary and mine pits respectively, indicating the structures within 500m, 1000m and 2000m of the mine and mine pits.

2.1 Properties Included in the Mineral Right Boundary

Farm Name:	Groothoek 504 LQ
Application area (Ha)	1006.4641
Magisterial district:	Waterberg
Distance and direction from nearest town	Mineral boundary north of and adjacent to the Onverwacht residential area of Lephalale. 3.5km West of Lephalale
21 digit Surveyor General Code for each farm portion	T0LQ00000000050400000
Surface Right Holder: Exxaro Coal	Contact details: Frans de Lange Cell: 0835673117 E-mail: frans.delange@exxaro.com

Farm Name:	Eendracht 505 LQ
Application area (Ha)	1060.6021
Magisterial district:	Waterberg
Distance and direction from nearest town	1km south of Marapong 7.3km West of Lephalale
21 digit Surveyor General Code for each farm portion	T0LQ00000000050500000
Surface Right Holder: JJ Lambrecht	Contact details: Hannes Lamprecht Cell: 0724508041 E-mail: hanneslamprechtfgr@gmail.com E-mail: fancygameranch@gwisa.com

2.2 Additional Properties Affected by the Railway Link for Siding

Farm Name:	Hanglip 508 LQ Portion 2
Application area (Ha)	86.4706
Magisterial district:	Waterberg
Distance and direction from nearest town	11.5km West of Lephalale
21 digit Surveyor General Code for each farm portion	T0LQ00000000050800002
Surface Right Holder:	Contact details:

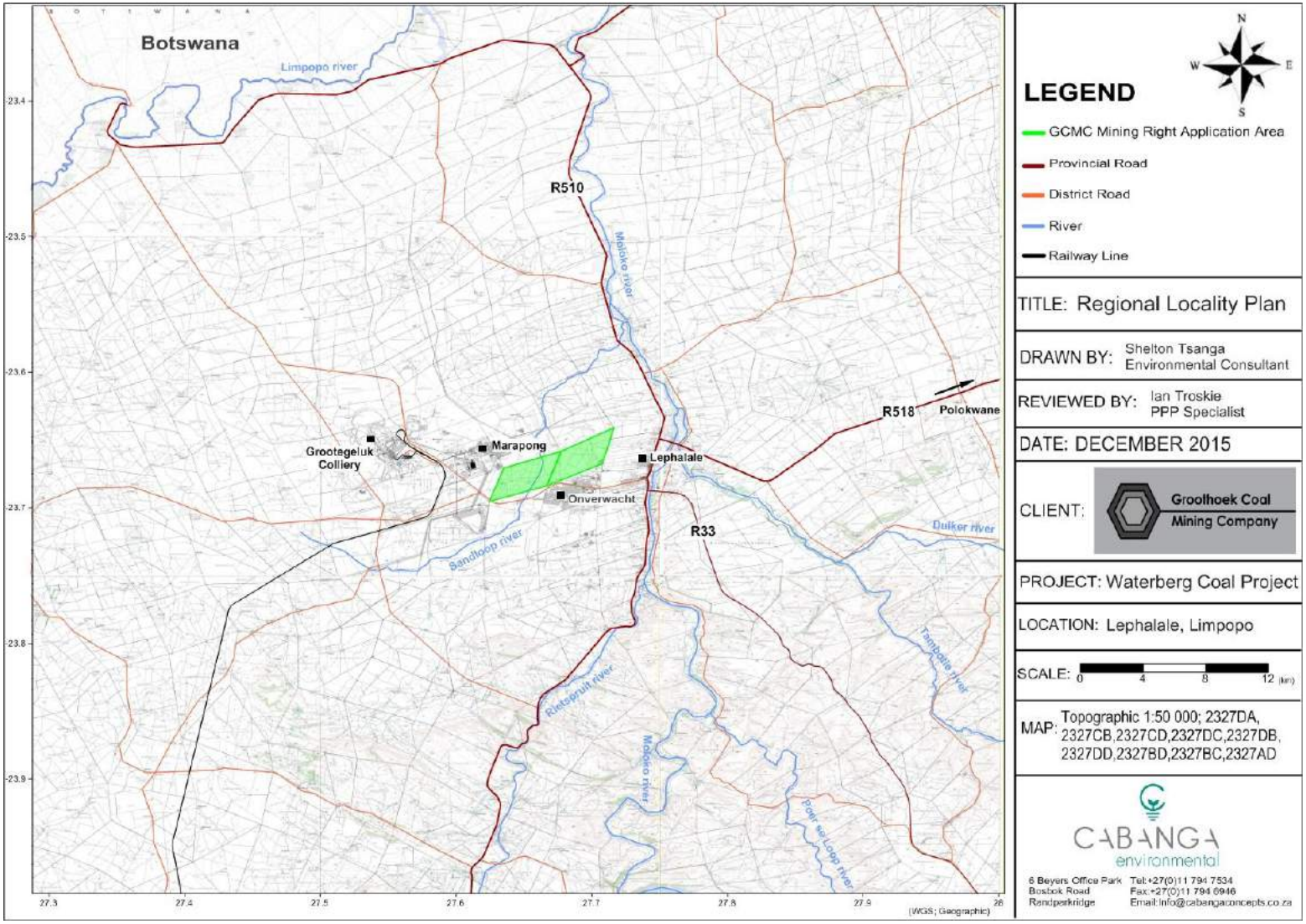
Batis Properties Pty Ltd	Emslie Guy Pearce Cell: 0828536288 E-mail: fancy@spiderconnect.co.za
Farm Name:	Hanglip 508 LQ Portion 3
Application area (Ha)	516.5980
Magisterial district:	Waterberg
Distance and direction from nearest town	11.5km West of Lephalale
21 digit Surveyor General Code for each farm portion	T0LQ00000000050800003
Surface Right Holder: Waterkloof Familie Trust	Contact details: Hendrik Pieterse Cell: 0828256003 E-mail: pietwescivils@gmail.com

Farm Name:	Naauw Ontkomen 509 LQ
Application area (Ha)	878.7423
Magisterial district:	Waterberg
Distance and direction from nearest town	16.5km West of Lephalale
21 digit Surveyor General Code for each farm portion	T0LQ00000000050900000
Surface Right Holder: Eskom Holdings	Contact details: Bronwyn Stolp Cell: 011 800 5501 E-mail: StolpBA@eskom.co.za

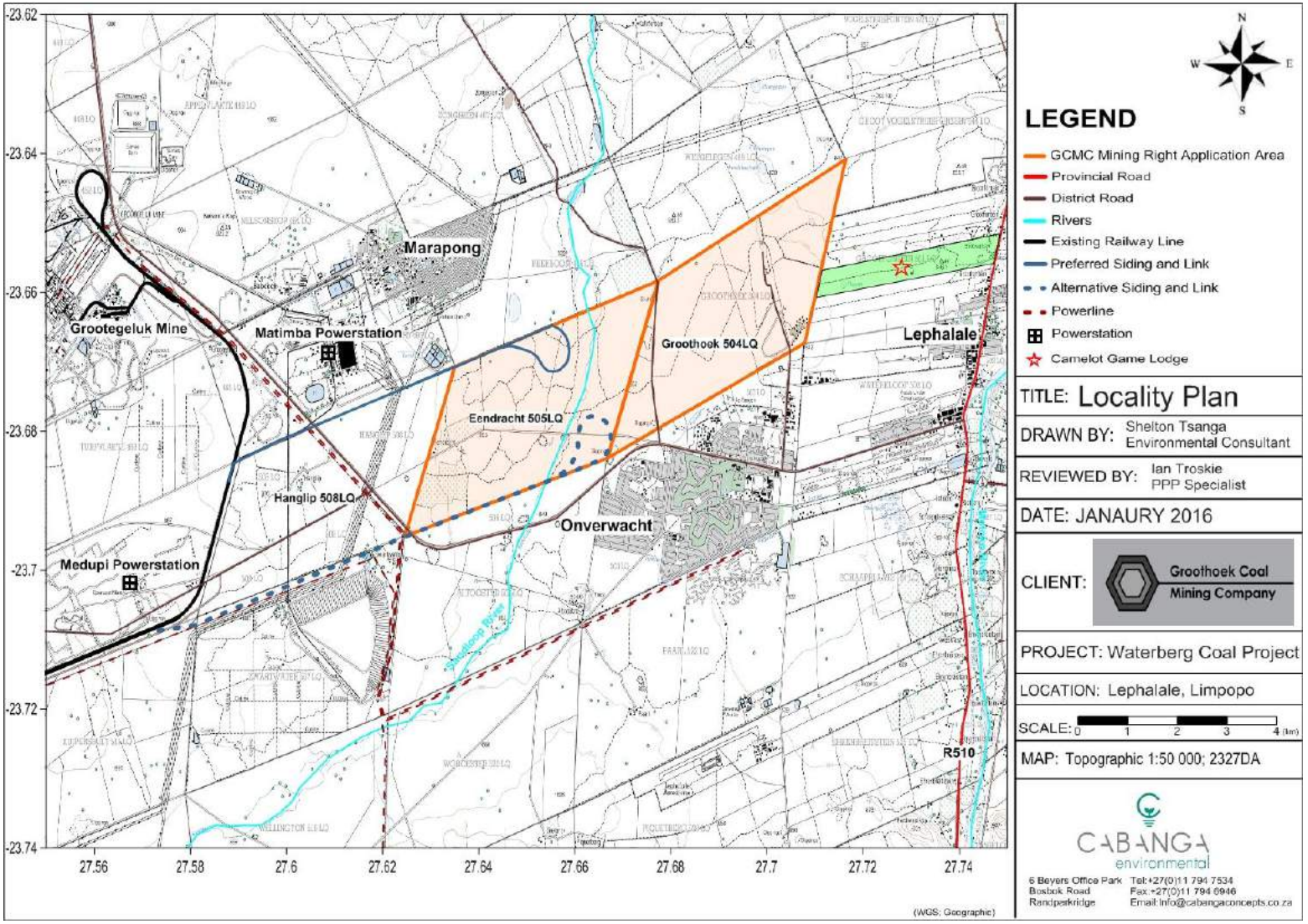
Farm Name:	Grootestryd 465 LQ Portion 0
Application area (Ha)	650.139
Magisterial district:	Waterberg
Distance and direction from nearest town	11.5km West of Lephalale
21 digit Surveyor General Code for each farm portion	T0LQ00000000046500000
Surface Right Holder: Eskom Holdings	Contact details: Bronwyn Stolp Cell: 011 800 5501 E-mail: StolpBA@eskom.co.za

Farm Name:	Grootestryd 465 LQ Portion 5
Application area (Ha)	69.204
Magisterial district:	Waterberg
Distance and direction from nearest town	11.5km West of Lephalale
21 digit Surveyor General Code for each farm portion	T0LQ00000000046500005
Surface Right Holder: Eskom Holdings	Contact details: Bronwyn Stolp

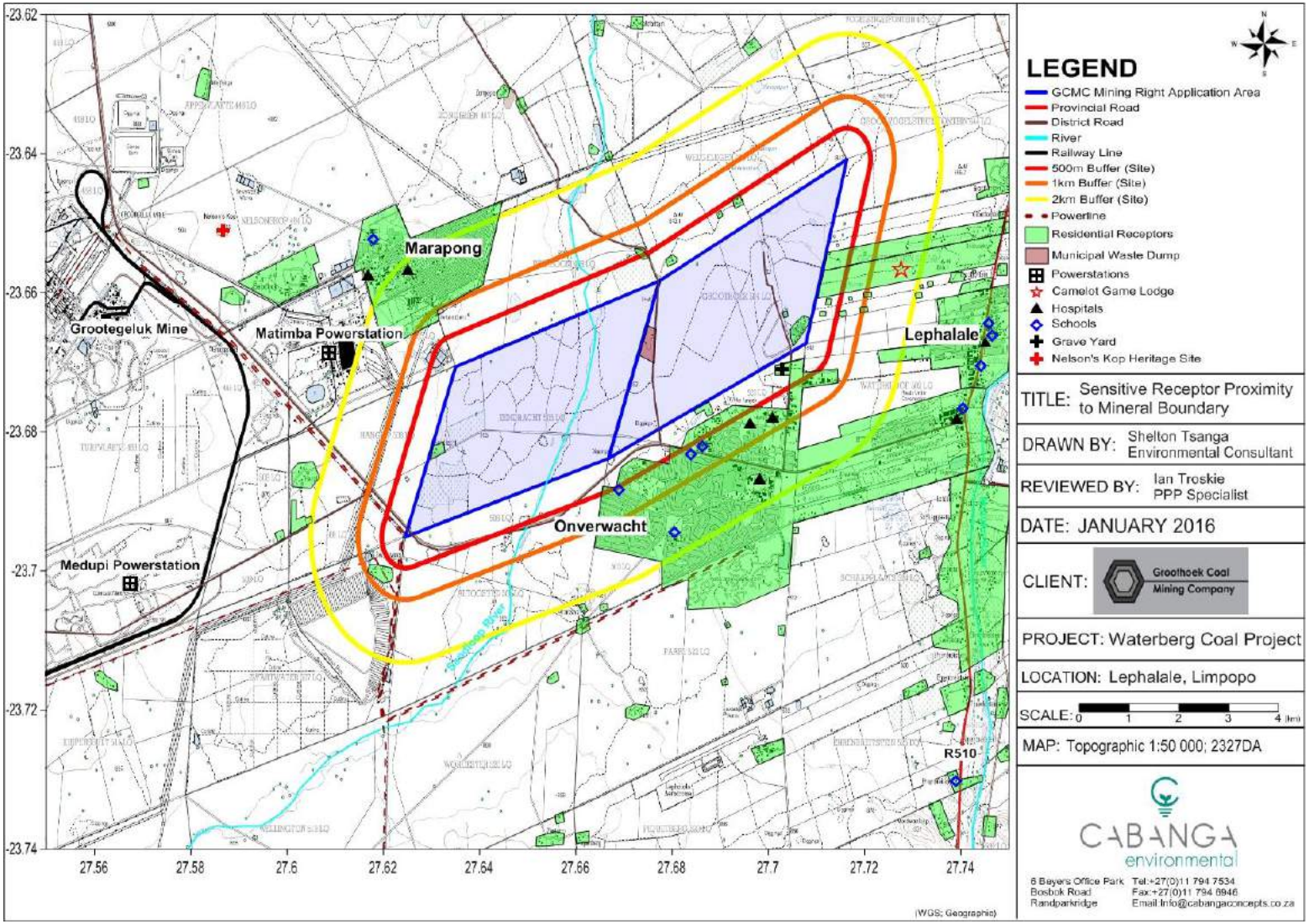
	Cell: 011 800 5501 E-mail: StolpBA@eskom.co.za



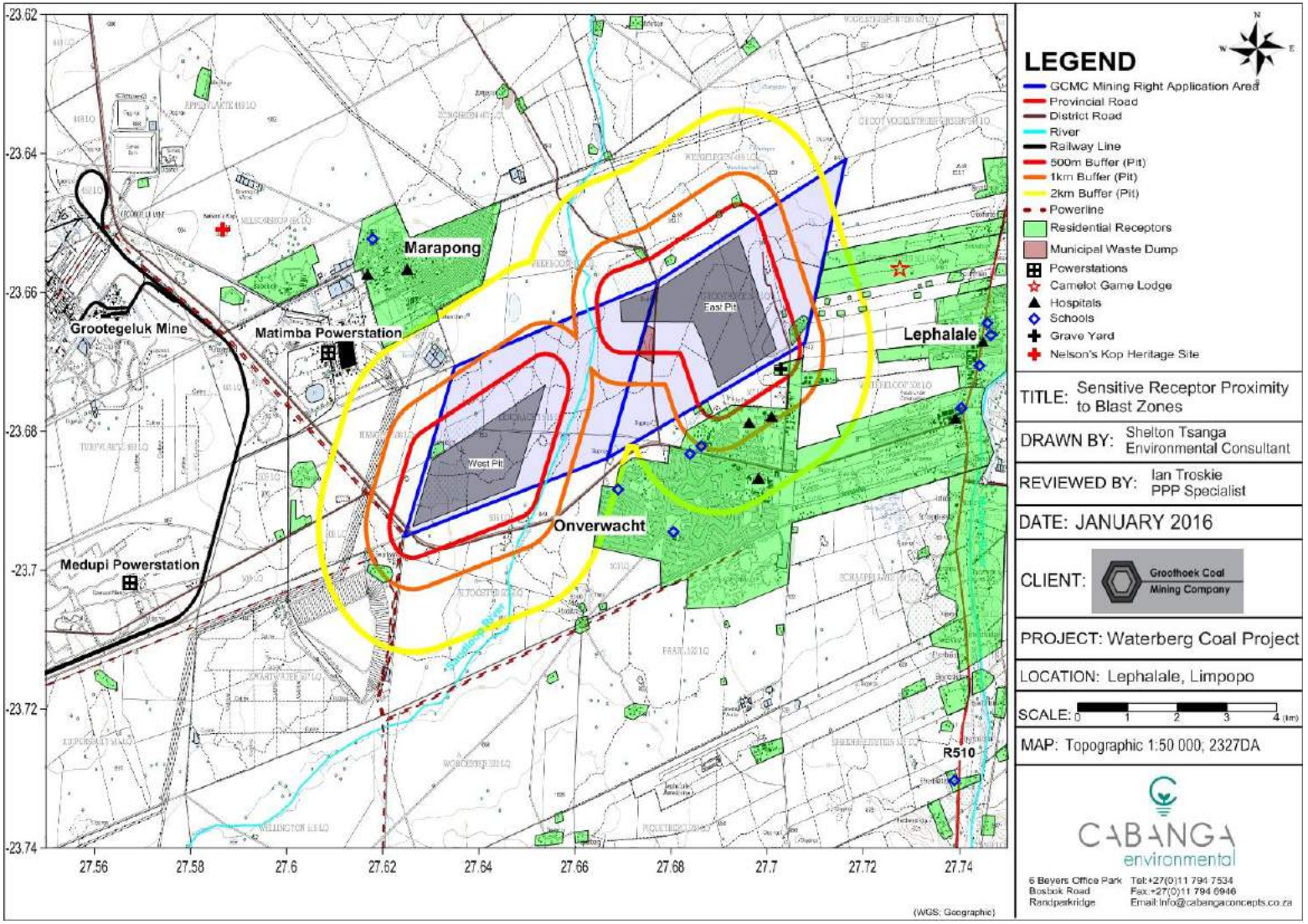
Plan 1: Regional plan



Plan 2: Locality plan



Plan 3: Proximity plan to mineral right boundary



Plan 4: Proximity plan to mine pits

3 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY LISTED AND SPECIFIED ACTIVITIES

Table 1 below lists the activities relevant to the proposed mine development. A full project description is provided in Section 3.2. The final detailed mine infrastructure plan is provided below (Plan 5) and Appendix 2.

Table 1: Listed activities and detailed description of activities

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546)
All infrastructure areas, development footprints and associated activities.	Mineral boundary: 2067ha Proposed activity area: 1250ha	X	GNR983 – Activities 22 & 28 GNR984 – Activities 6 and 15
Opencast excavations	Maximum at any one time: 50ha at each pit West Pit: 256ha East Pit: 352ha	X	GNR983 – Activities 22 & 28 GNR984 – Activities 6 and 17
Topsoil & subsoil stripping & stockpiling	West: 17ha area within the West Material Stockpile Area East: 17ha area within the East Material Stockpile Area Topsoil berms: 14588m (approximate 2-3m width)		Not listed
Overburden stockpiles (non-carbonaceous)	West: 70ha East: 183ha	X	GNR984 – Activity 6
Overburden stockpiles (carbonaceous)		X	GNR984 – Activity 6
Blasting	N/A	X	Not listed
RoM & product coal stockpiling	25ha total (excluding piles at processing plant)	X	GNR984 – Activity 6
Coal loading and conveyance on railway	9 900m of rail for preferred Northern option	X	GNR983 – Activity 12 GNR984 – Activity 12 GNR985 – Activity 14
Access and hauling along roads	10 740m of roads will be upgraded	X	GNR984 – Activity 12

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546)
	2 800m of road will be constructed		GNR983 – Activity 24 GNR985 – Activities 14 & 18
Crushing & screening & Processing Plant	38ha (includes coal stockpiles for processing / blending)	X	GNR984 – Activity 21
Water supply (potable & process)	<1ha	X	GNR983 – Activity 9
Water storage (dams / reservoirs / tanks/sumps)	6ha	X	GNR983 – Activity 13 GNR984 – Activity 6 GNR985 – Activity 2
Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	N/A		GNR984 – Activity 6 GNR921 – Activity B(7)
Slurry dams	2ha	X	GNR984 – Activity 6 GNR921 – Activities A(14), B(11) & B(10)
Storm water runoff management features	Topsoil berms: 14588m (approximate 2-3m width) Dirty water channels: 1883m (approximate 2-3m width) PCDs& Slurry Dam: 8ha	X	GNR984 – Activity 6
Water & slurry pipelines	Approximately 1600m	X	GNR983 – Activity 9
Lighting	<1ha		Not listed
Explosives magazine	0.3ha		Not listed
Waste generation & storage	<1ha		Not listed
Stores, workshops & washbays	11.5ha		Not listed
Ablutions & change house with sewage treatment plant	1ha	X	GNR983 – Activities 10 and 25 OR GNR984 – Activities 6 and 25
Fuel storage	<1ha	X	GNR984 – Activity 4
Hard park	<1ha		Not listed
Rehabilitation	Entire disturbed site	X	GNR983 – Activity 22 GNR921 – Activities B(7) & B(9)

3.1 Description of the Activities to be Undertaken

3.1.1 Reserve

The coal on the two farms is located within the coal-bearing Waterberg Basin which occurs in both the Vryheid and Grootegeluk Formations. The Grootegeluk and Vryheid Formations are divided into 11 Zones. The stratigraphic layout and features are indicated in Figure 1.

The Vryheid Formation contains Zones 1-4 of mainly dull coal which have an average thickness of 1.5–8 m with an ash content that increases upwards from ~ 20% to ~ 45%. Potential for pulverized coal injection (PCI) and metallurgical coal exists in the Vryheid formation.

The run of mine product from the Grootegeluk Formation (Zones 5-11) ranges in ash content from 45% to 65%, and so requires beneficiation to produce a blend of coking coal with a middling suitable for use as a steam coal.

The coal zones are developed from approximately 30 m below surface to approximately 130 m.

Table 2 provides reserve estimates for the project and Table 3 indicates extraction targets for the two main pits proposed for the mine.

Table 2: Resource statement (Mine Works Programme - Venmyn Deloitte)

Resource Category	Gross Tonnes In Situ	Geol Loss	Total Tonnes In Situ	% Coal	COAL TTIS	Percentage Coal TTIS
Total Resource	768 602 301	16%	646 332 713	75.1	485 273 000	100%
Indicated	629 017 438	15%	534 664 822	72.8	389 083 000	80%
Inferred	139 584 863	20%	111 667 891	86.2	96 190 000	20%

Table 3: Reserve extraction

	West Pit Option	East Pit Option
ROM Tons	12 Mt/annum	12 Mt/annum
Yield	Yield varies from 26% to 80% depending on the coal zone	
Annual sales tons	2.6 Mt/annum Eskom 2.1 Mt/annum Export	1.2 Mt/annum Eskom 5.6 Mt/annum Export
Jobs Created	700	700
LOM	20 years	14 years
First Coal	2018/2019	2018/2019

The project offers a multiproduct potential, comprising:

- Export thermal coal with a CV > 5,400 to 6,000 kcal/kg;
- A 21.5 MJ/kg CV power station coal for domestic supply to Eskom; and
- 10% ash products suitable for metallurgical applications.

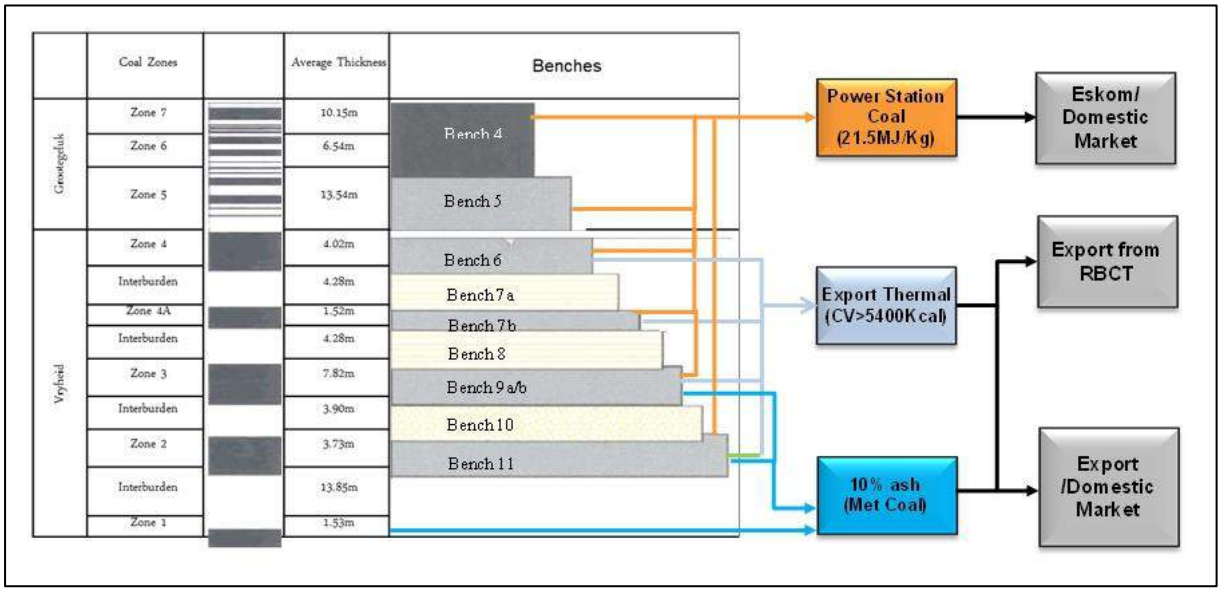


Figure 1: Stratigraphic section of the coal-bearing formations and main products

A number of faults have been identified on the property and these define the resource blocks. The western portion of the resource, found mainly on Eendracht farm appears to be a downthrown block of step faults and hosts all 10 zones, with the upper coal zones eroding away toward the north and west. The eastern portion of the resource, found exclusively on the farm Groothoek, is dominated by Zones 1 to 4, with the coal zones pinching out toward the basin edge to the north and east.

3.1.2 Mine Plan and Method

3.1.2.1 Opencast Mining

Two independent open pit mining areas have been identified on the Project area through the reserve determination process. These are located on Groothoek 504LQ and Eendracht 505LQ and are named the East Pit and West Pit respectively. Both open pits will be opencast mined simultaneously. Options to phase the mine development of each pit will be considered depending on the demand for the respective products, and associated coal sales agreement.

The selection of the two open pit site areas is governed by a combination of surface restraints on the mine property, and on surrounding properties including local residential zones and environmentally sensitive ecological areas along with the key criteria of coal quality and structural geological constraints.

Opencast pit and strip mining will be conducted through truck-and-shovel, roll-over mining with successive cuts opened as old mined cuts are rehabilitated. The area affected by the opencast will be 1250 ha. It is anticipated that 1 million tons will be mined from each pit every month (2 million tons total) during steady state production. Access to open pits will be via a low wall ramp. These access ramps will progress with the roll-over mining. The opencast mining sequence will be as follows:

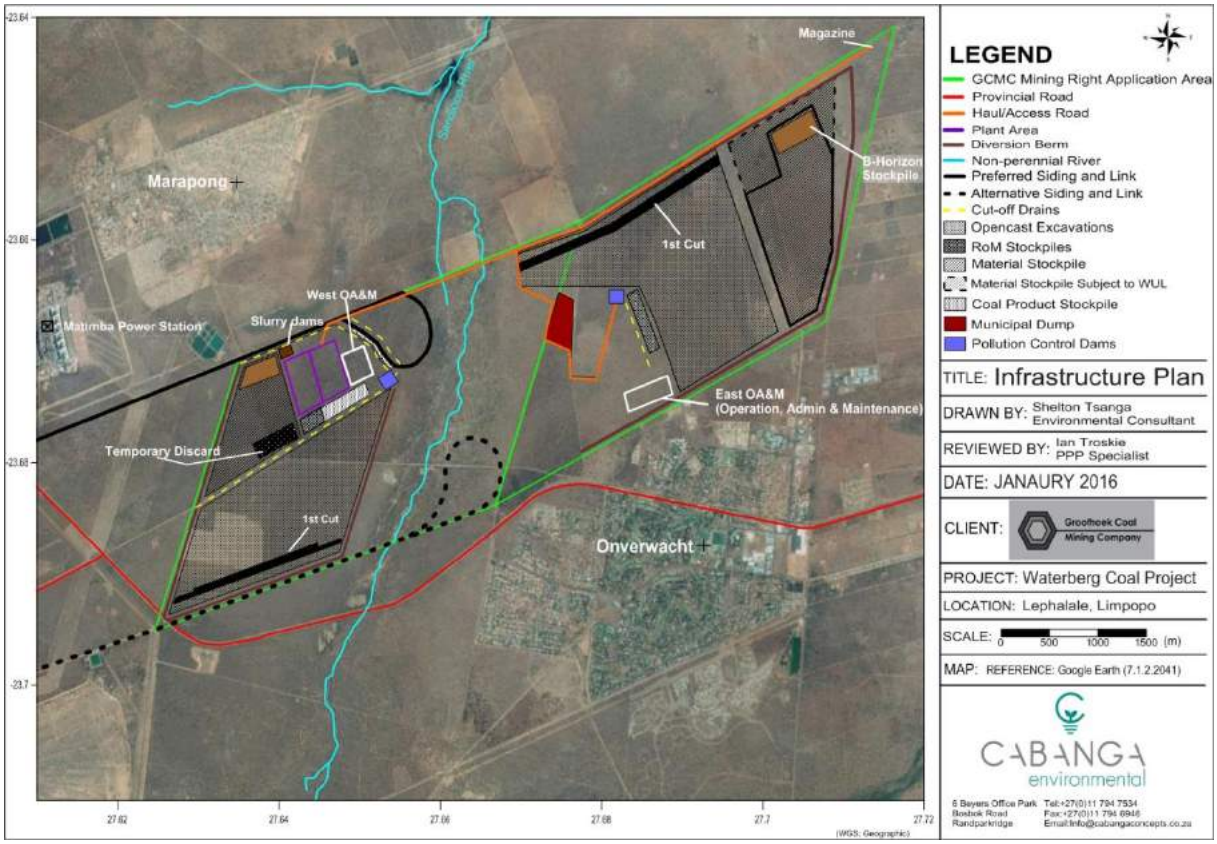
- Remove maximum topsoil and either place directly on levelled spoil from previous mine cuts (steady-state operation) or place on a topsoil stockpile, as close to the final void as possible (applicable to first cuts).
- Remove soft overburden with excavator and trucks to 2 meters above the hard rock. Place directly on hard overburden in previous mine cuts (steady-state operation) or place onto soft overburden stockpile, as close to the final void as possible (applicable to first cuts).
- Drill and blast the remaining overburden and remove all but 2.5m to 3m of the overburden with a bulldozer push-over operation. Remove the remaining overburden with an excavator and truck to expose the coal. Place directly into previous mine cuts (steady-state operation) or place onto overburden stockpile, as close to the final void as possible (applicable to first cuts).
- Exposed coal is drilled and blasted only when necessary and then loaded and hauled to the crusher and beneficiation plant. It is expected that most of the coal can be excavated without blasting (free digging) which should be prioritised as this will assist in the reduction of fine coal dust emission and blast noise and vibration.
- Bullet 3 and Bullet 4 above is repeated as necessary to access the next seam down.

West Pit mining will commence in the south and progress northwards; East Pit mining will commence in the north and progress southwards (Plan 5 and Appendix 2).

3.1.2.2 Underground Mining

No underground mining is currently planned.

On this note it must be stated that the excavation of the Zone 1 coal has not been planned for the open pit layouts due to the thick competent sandstone parting between Zone 2 floor and Zone 1 roof, resulting in a high strip ratio. This coal could be mined at a later date through an underground mining layout using access points from the open pits. The relevant amendment will be made should this option be considered in future.



Plan 5: Infrastructure plan (A3 plan provided in Appendix 2)

3.1.3 Coal Processing

Mined coal will be trucked to the on-site RoM coal stockpile area near the processing facility. The plant and associated infrastructure area will affect approximately 200 ha, with the overburden and soil stockpile sites occupying around 300 ha. The Coal Handling and Preparation Plant (CHPP) has been sited within the project area and located so as to minimise any future sterilisation of coal resources and any environmental impacts. The general process is described below.

The proposed CHPP is designed to treat mineable coal from various zones from the open pit operations. The mineable coal production profile delivered to the CHPP will be mined from different coal zones in varying amounts over a period of time. This mix of different Coal Zones would vary over the LoM of the operation with a higher ratio of Lower Zone Coals planned from the West Open Pit area as compared to the East Open Pit.

The conceptual CHPP facility has been designed to produce both crushed raw and washed coals which will exhibit a wide range of separation factors. Washing yields for these different plant feeds are expected to range from as low as 20% to as much as 80%, which will be determined by the variable coal qualities associated with the different coal zones as well as the likely range of low to high coal quality specifications. Forecast sale tonnes are expected to range from 400ktpm to 600ktpm.

In order to accommodate the variable qualities of the mineable coal delivered to the CHPP, a plant design consisting of two complexes (each complex consisting of two interconnected 600tph process modules) is proposed.

Figure 2 shows the module flow diagram and Figure 3 shows the conceptual layout for the CHPP arrangement.

3.1.4 Mine Residue Handling

The coal mined on the project area can typically be described as highly friable with varying vitrinite content within the individual coal plies. This is expected to generally result in a crushed coal product with a high distribution of particle sizes less than 0.5mm. This fine material will report to the slurry ponds or to the coal fines spiral treatment section of the CHPP.

Taking cognisance of the highly friable and in some cases weathered nature of the coal feed, the conceptual plant design has introduced a Bradford Breaker immediately after the grizzly feeder. Any oversize material (> 300 mm) from the Bradford Breaker can be returned to the open pit for disposal as spoils. In order to minimise fines creation, primary, secondary and tertiary screening and crushing circuits have been proposed. This design approach should ensure the optimal removal of the desired lump size (ranging from -35 mm to -10 mm dependent on prevailing market conditions) at each of the primary, tertiary and secondary stages in the crushing circuit.

Furthermore, the coal flow diagram from the Bradford Breaker section through to coal wash plant is designed to reduce the detrimental effects of crushing stone and coal simultaneously, creating the undesirable water retaining < 1 mm material in any coal processing facility. This would reduce loss of water through the process and therefore assist in water-saving initiatives on site.

Provided environmental permission can be granted it is envisaged that wash plant discards will report to the open pit area for co-disposal with strip mining overburden operations. Due to the multiple seem mining, it will take 3-5 years to reach the floor of the first cut and therefore temporary discard disposal will take place within a designated area in the West Material Stockpile area. The site will be engineer-designed with underdrainage which will report to a lined dirty water trench draining to the west PCD. The site will also be lined with a Class C barrier. Subsoil will be utilised to clad the sides of the temporary discard dump to reduce the risk of spontaneous combustion. At commencement of backfilling, the discard will be disposed of in thin layers and tyre compacted at the base of the pit, and will never be disposed of at depths shallower that the upper coal seam level.

Coal slurry will report to a slurry settling pond for water recycling. At this stage it is envisaged that filter press treatment of slurry will take place and the slurry blended into product. The water will be recycled to the processing plant as far as possible.

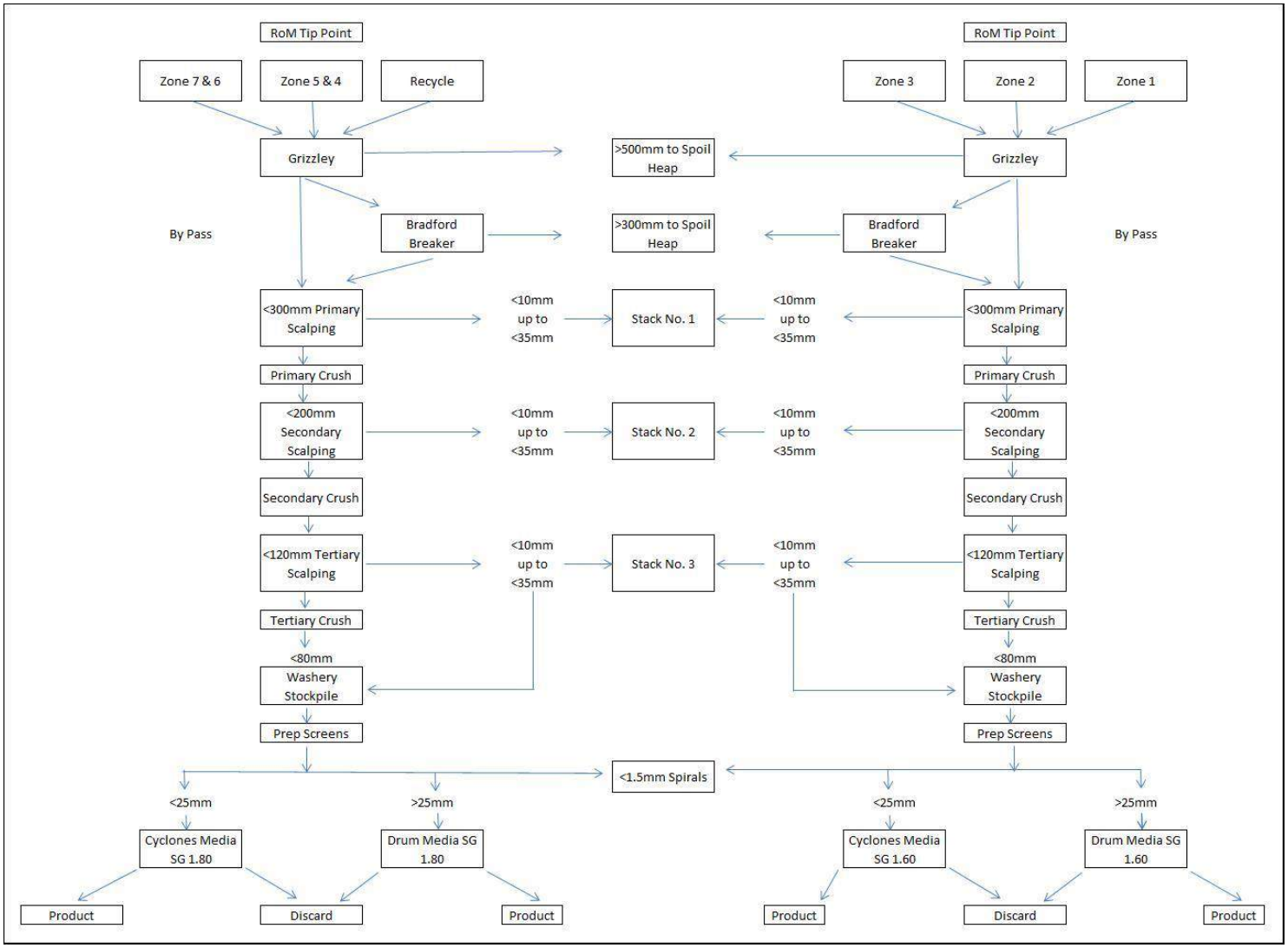


Figure 2: CHPP proposed module flow diagram

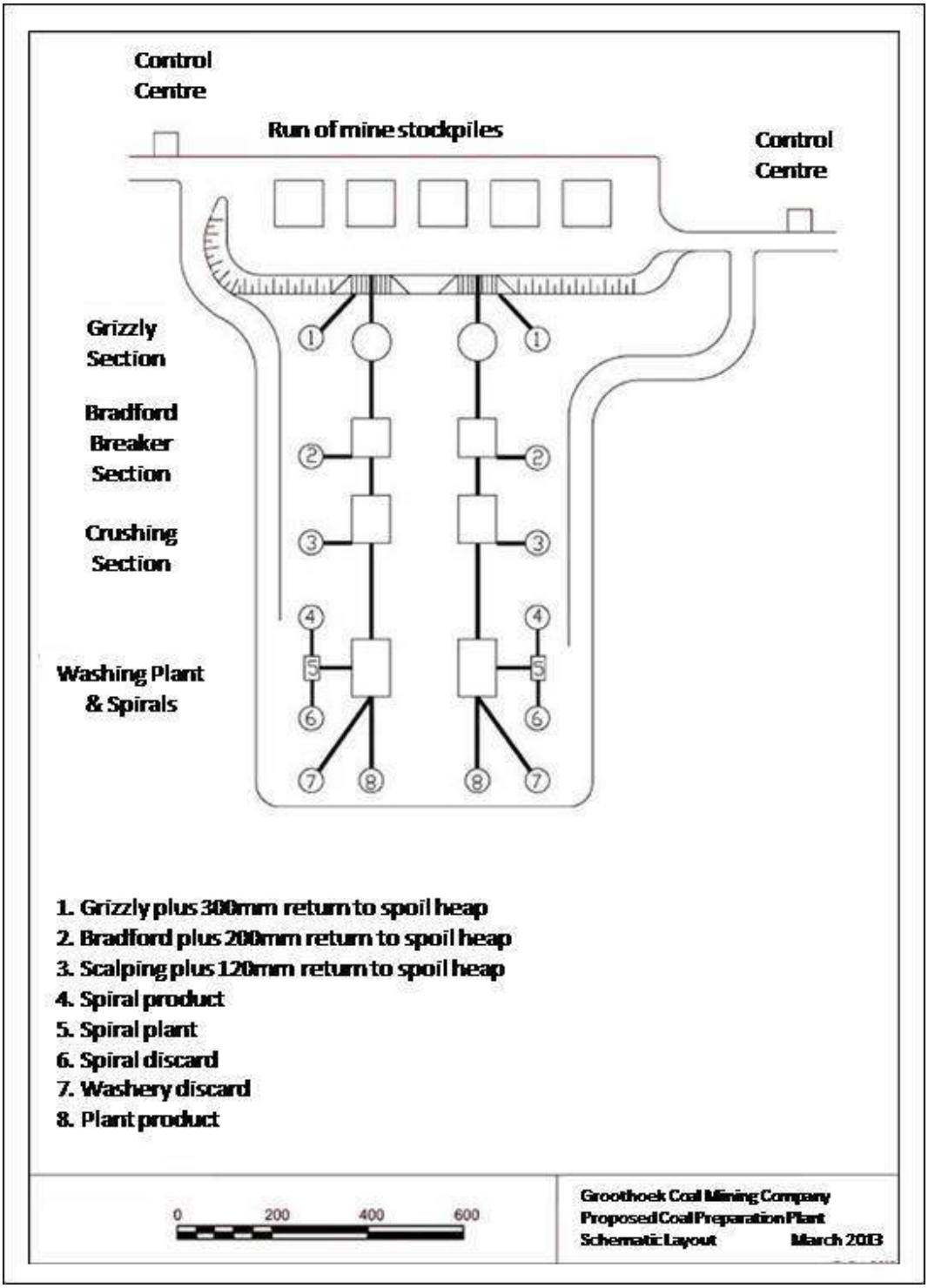


Figure 3: CHPP Conceptual Layout

The slurry dams will be designed and constructed as per engineered designs in line with the Department of Water and Sanitation's (DWS) Best Practise Guidelines, and will be concrete-lined to allow for access to clear slurry without damage to lining. Water recovered from the slurry dam, via floating penstocks, will be recycled to the pollution control dam or directly to

the wash plant for reuse within the plant. The dried slurry will be incorporated into product that will be sold.

3.1.5 Coal Transport

Various options were considered for transport of the various coal products from site – detailed in the alternatives assessment (see Section 6).

The preferred option is by the northern siding alternative and its associated railway link, as indicated in Appendix 2.

The existing Transnet rail line is located five kilometres from the Project. The line transports coal from Grootegeluk to Gauteng and to the Richard's Bay Coal Terminal for international export. Transnet Freight Rail (TFR) is planning to upgrade the existing Waterberg coal line from its current 4 Mtpa capacity to 26 Mtpa by 2019. This interim ramp-up phase will proceed in parallel with a longer-term solution to increase volumes to between 40-million tonnes and 80-million tonnes from 2021.

Rail options and load-out stations site selection are currently being considered together with TFR and a Memorandum of Understanding (MOU) has been signed between GCMC and TFR. The Project will be part of TFR's project planning for the entire Waterberg Coalfield.

3.1.6 Additional Associated Activities, Infrastructure and Services

The proposed mine infrastructure sites will include the coal beneficiation, mine residue handling facilities and loop sidings as detailed above along with mine offices, security fencing and lighting, ablutions, workshops, contractors fleet repair bays, fuel supply bays, power supply substations and the mine security camp. Two potential areas have been identified for siting this infrastructure at the north-east corner of Eendracht or the north-west corner of Groothoek. Both areas will result in minimal sterilisation of coal resources. Access to both areas can be configured through existing roads.

An additional 310 ha will be disturbed by various associated infrastructure, in addition to the material stockpile and opencast cast areas.

3.1.6.1 Coal Transport

Coal from the opencast will be loaded by means of front-end loaders and excavators onto dump trucks and hauled directly from the face to the RoM coal stockpile at the beneficiation facility. Product coal will be transported off-site via railway line.

3.1.6.2 Access and Haul Roads

Existing access roads will be utilised as far as possible and haul roads will be created within opencast pit areas. The location of haul roads will change as opencast strip mining progresses.

3.1.6.3 Material Stockpiles

Topsoil and subsoil will be stockpiled separately and utilised to construct upslope diversion berms and berms between the operations and surface water features, just downslope of the dirty water diversion channels to provide additional protective measure for surface water bodies. Stripped soil stockpiles will be placed near to the final void for use in rehabilitation of the final void. Remaining soils stripped through roll-over opencast mining will be replaced on previously mined cuts to rehabilitate these areas during steady state mining.

All soil stockpiles will be placed in clean areas and toe and top perimeter berms will be constructed around these to reduce loss of soil and sedimentation. Long terms stockpiles (more than 6 months) and soil berms will be seeded; and vegetated cover maintained for the life of the structure.

Overburden will be stockpiled separately near to the final void for use in in-filling of the final void. Remaining overburden removed through roll-over opencast mining will be replaced in previously mined cuts to fill these cuts in preparation for rehabilitation during steady state mining.

Carbonaceous and non-carbonaceous overburden material will be stockpiled separately. Carbonaceous overburden will be placed and compacted into the base of mined out voids, with non-carbonaceous overburden being placed over this.

3.1.6.4 Mine Water Dams

Surface water management will take into account GN704 guidelines relating to water management on mines. Exemption will be applied for from DWS for any GN704 principals as necessary. In general the on-site surface water management will maintain the activity footprint as small as possible, separate clean and dirty water runoff, prevent clean water runoff flowing onto the activity footprint and prevent dirty water runoff from the activity area from entering clean water runoff areas through berms and trenches as needed. Dirty water will be contained on site in the necessary dirty water storage dams.

The site will require the following water management facilities:

- A Pollution control dam (PCD A) to contain surface water runoff from the plant and coal stockpiling area as well as the carbonaceous overburden stockpiles at the West Pit.
- A PCD (PCD B) will be required to contain surface water runoff from the RoM coal stockpile at the East Pit. A small sump and pump system may be required to capture runoff from potential carbonaceous overburden stockpiles. The water will be pumped to PCD B.
- A compartmentalised slurry dam to recycle supernatant water and reclaim slurry for blending.
- It is also anticipated that a raw water dam (reservoir) will be required to supply the beneficiation plant.

3.1.6.5 Change House & Ablution Facilities

A change house will be established on site. In addition to this, portable toilets will be made available at the mine areas.

A sewage treatment plant will be constructed on site for the management and treatment of sewage effluent.

It is anticipated at this stage that a modular pre-engineered and pre-fabricated sewage treatment system will be installed on site. The volumes required for the sewage treatment plant are still being finalised but will be sized to accommodate the full component of employees and contractors on site.

The flow diagram is presented in Figure 4.

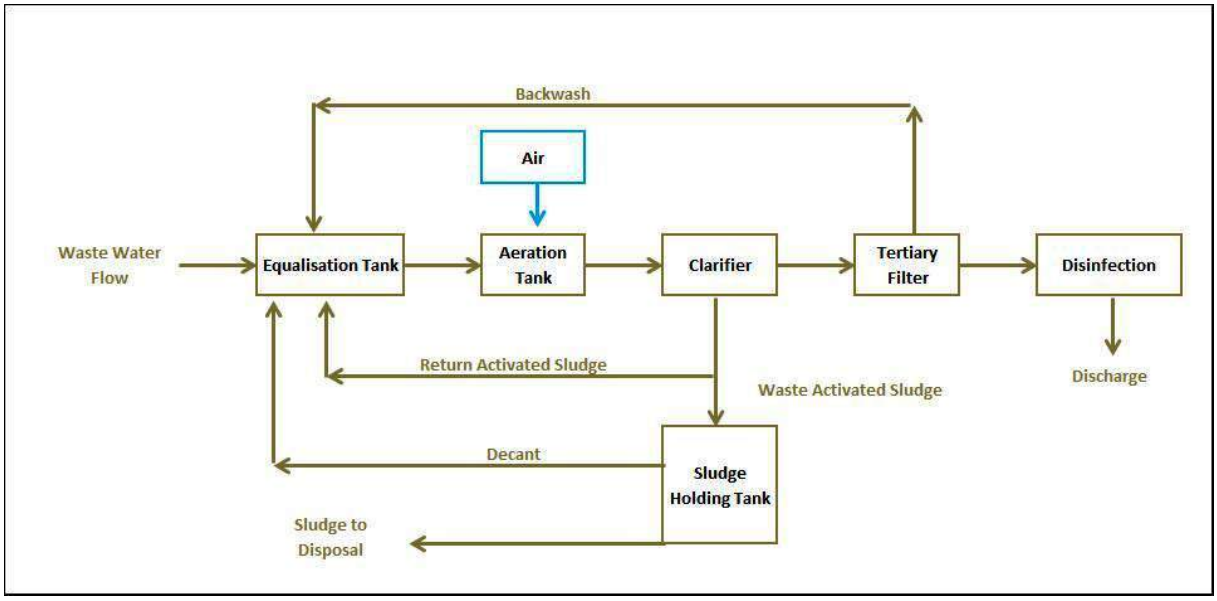


Figure 4: Sewage treatment process flow diagram (Pollution Control Systems Inc.)

The waste water flow will flow through a screen to remove all solids. These solids will be periodically removed and will be disposed at a licensed facility. The water will flow to an equalisation tank which provides regulated feed to the sewage treatment plant. The aeration chamber allows for aeration of the waste water to allow for microorganism to break down the sewage into carbon dioxide (released as gas), water and the sludge component (both which are treated further). The clarifier is essentially a settling phase where the sludge component settles apart from the water component.

A component of the sludge from the clarifier is returned to the start of the process to provide microorganisms back into the process. The bulk of the sludge is removed to the sludge holding tank where it is further digested. Here the minor component of solid undigested sludge is removed for disposal to an approved disposal site and the rest of the digested sludge is returned to the start of the process.

The water component from the clarifier is then disinfected to remove harmful microorganisms and discharged. In this case the water will be recycled to process requirements. The tertiary filtration system may be installed if higher quality water is required.

3.1.6.6 Administration Block

Offices will be in the form of prefabricated structures / mobile containers and limited for administrative functions.

3.1.6.7 Weighbridge

A weighbridge will be installed at site to weigh product coal leaving the site.

3.1.6.8 Power Supply

Power is likely to be sourced from South Africa's power utility, Eskom. Surface power reticulation requirements for the preparation plant and surface facilities will be approximately 5 MVa (Table 4).

Table 4: Power requirements for the Project

Surface power usage	MVa
Coal Preparation Plant Module	4
Other Surface Power	1
Total Surface Power Usage	5

Generators will be utilised to provide back-up power. Mining will be done with diesel driven equipment.

3.1.6.9 Diesel Supply

Diesel will be supplied from bulk storage facilities onsite. Diesel will be stored and transferred from tanks established in appropriately sized and designed bunded area. The bunding area will have a release valve which will only be opened under controlled circumstances to drain water and oil in the bunding area to an oil trap. The oil from the oil trap will be dealt with as used hydrocarbon waste further described below. The water component will report to the PCD and be recycled as process water.

3.1.6.10 Magazine

Drill rods and drill bits will be used to drill the hard overburden above the coal seam. Explosives will be stored in the magazine located at site, but away from the main active areas for safety reasons.

3.1.6.11 Laboratory and Chemical Storage

A lab for coal testing will be established on site. The various chemicals required will be stored on site as per their Material Safety Data Sheets (MSDS). MSDS for all chemicals will be available on site.

3.1.6.12 Workshop & Wash Bay

A full workshop area will be constructed at the wash plant area and contractors camp. The workshops will constitute a concrete floor with appropriate drainage and / or bunding to direct all water runoff from the workshop area to an oil trap.

The oil from the oil trap will be dealt with as used hydrocarbon waste further described below. The water component will report to the PCD and be recycled as process water.

A full wash bay will also be constructed near the workshop. The wash bay will also have concrete flooring with appropriate bunding/drainage to direct water runoff through an oil trap to the dirty water channel and PCD.

No repairs will take place on open, unprotected ground and all vehicles will be serviced at the workshops.

3.1.6.13 Lighting

Light masts will be erected at various locations to provide lighting at times of poor visibility and during the night as the colliery will be a 24 hour facility.

3.1.6.14 Security and Access

The site will have access control and dangerous areas will be fenced off. The site will be patrolled on a 24hr basis.

3.1.7 Water Requirements and Handling

3.1.7.1 Water Runoff Management

The mine will operate in the Mokolo River catchment area. All the main infrastructure and pits will be located away from any rivers, streams and watercourses including the 1:100 year / 100m buffer zone except in cases where applications are successful to mine or conduct activities within these areas under NEMA and NWA.

The existing stream crossing of the northern farm road across the Sandloop River will need to be upgraded into a proper stream crossing to provide access to the eastern workings and magazine. These will need to be designed and applied for as a water use within the IWULA.

As stipulated above, surface water management will take into account GN704 guidelines relating to water management on mines. Clean and dirty water will be separated and dirty water contained and recycled on site. All storm water drainage and containment infrastructure will accommodate 1:50 year storm event as required by legislation.

Berms will be erected around areas of activity to divert upstream clean water runoff around the activity footprint into natural drainage lines (Plan 6). Also included is a berm placed

between the wetlands associated with the Sandloop River and active mining areas (outside wetland buffer zones) to serve as demarcation of wetland buffer zones and as added protective measure for the wetland areas. Flow dissipaters will be constructed where this water flows into wetlands or streams if it is deemed necessary.

Water within the opencast pits will be channelled to sumps, where the water will be pumped for reuse, prioritised for in-pit requirements and dust suppression.

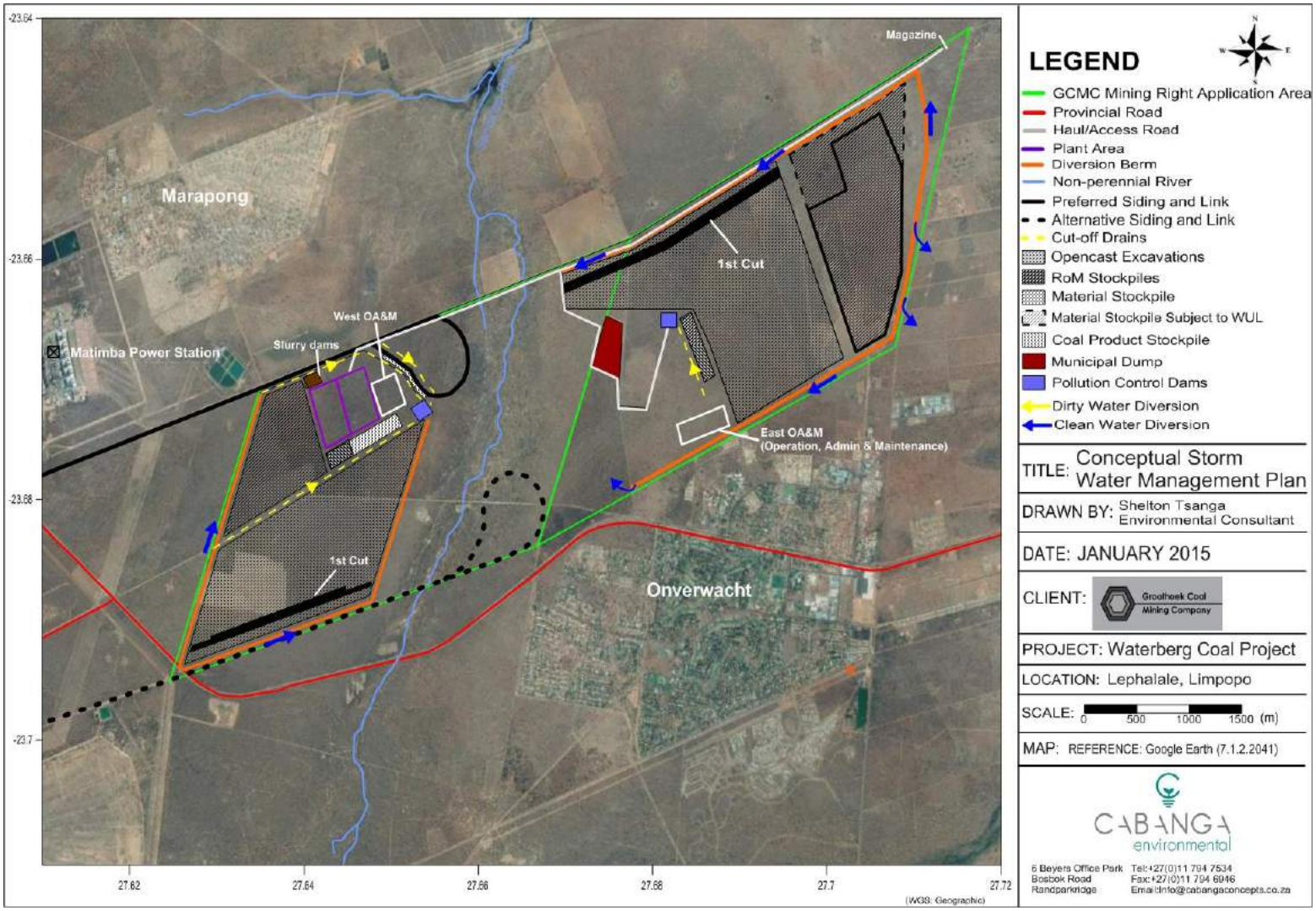
Dirty or recycled water on surface will be diverted to PCDs on the surface through trenches to prevent discharge (Plan 6).

All the storm water runoff from the infrastructure and mining areas will be diverted via silt traps or oil trap systems, as needed, to the PCDs.

The conceptual sizing of the PCDs and storm water design was conducted by the LWES (2015). The following will be required:

- Western mine area will have 3 channels in total (Plan 6), all draining into the western PCD:
    - Channel located between the West Pit and the West Material Stockpile to collect dirty water from the West Material Stockpile (which will have carbonaceous material), Processing Area, RoM and Product Stockpile Area.
    - Part of the runoff from the Processing Area will drain north and will be collected in the northern channel.
    - Trapezoidal channels with a bottom width of 2m and top width of 3.1m will be sufficient to collect 13.244m^3/s from these areas (2 dirty water channels indicated in yellow on Plan 6).
    - During the loading of coal at the siding, spillages may occur. Therefore runoff from this area will drain east towards the channel just inside the siding loop. This channel must be able to hold a peak flow of 0.172m^3/s. A trapezoidal channel with a bottom width of 0.5m and a top width of 1m will be sufficient to collect runoff from this area.
    - The western PCD will be constructed into two compartments with upslope silt traps (conceptual design indicated in Figure 5) and be designed with a minimum of 33 020m^3 capacity to allow for the necessary 0.8m freeboard to manage storm water runoff (capacity does not allow for mine water ingress).
- Eastern Mine area will have a single channel (Plan 6), which will drain to the eastern PCD:
    - A dirty water channel will be located on the western side of the RoM and will drain north westerly towards the eastern PCD.
    - The channel should have a bottom width of 1m and the top width of 2m to collect the peak flow of 1.759m^3/s.
    - The PCD will be constructed into two compartments with an upslope silt trap (Figure 6) and be designed with a minimum 42067m^3 capacity to allow for the necessary 0.8m freeboard (capacity does not allow for mine water ingress).

- If carbonaceous material needs to be stored at the Eastern Material Stockpile, then a similar sized channel will be constructed downslope of the stockpile with a sump and pump system. Water within this sump will be prioritised for dust suppression before water in the PCD.



Plan 6: Conceptual storm water management plan for the western workings (LWES, 2015)

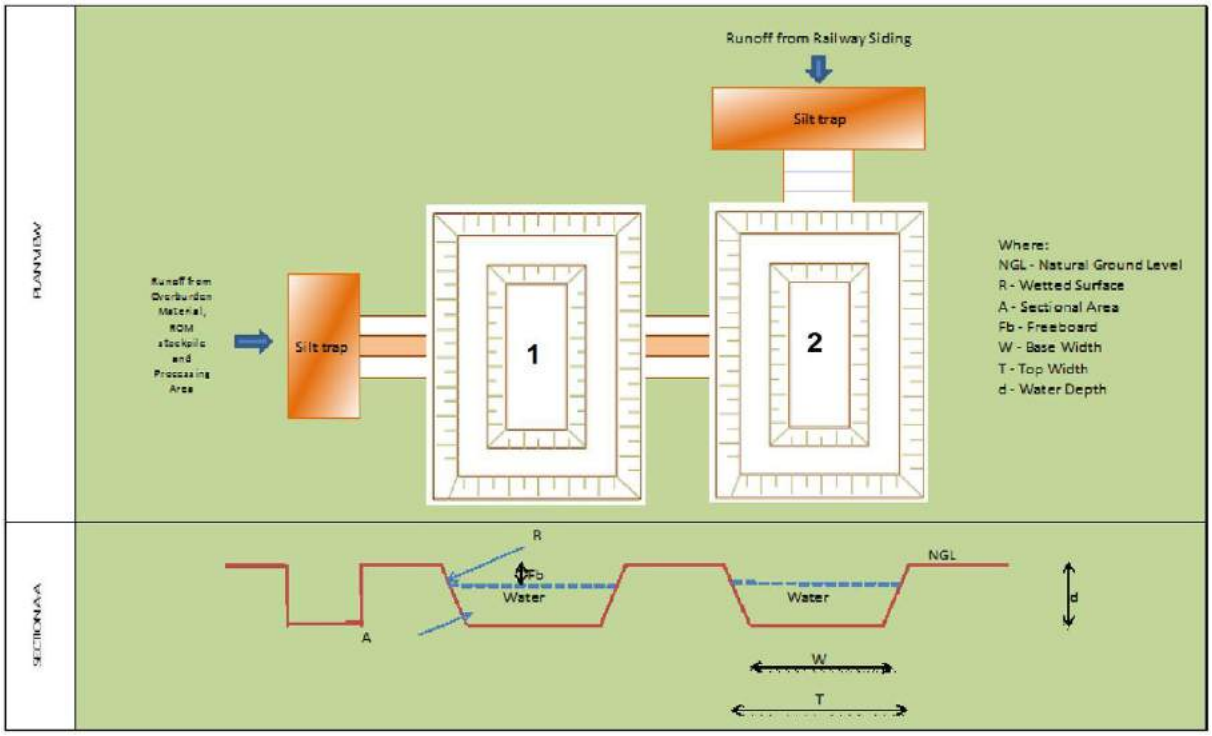


Figure 5: Conceptual design for PCD A (LWES, 2015)

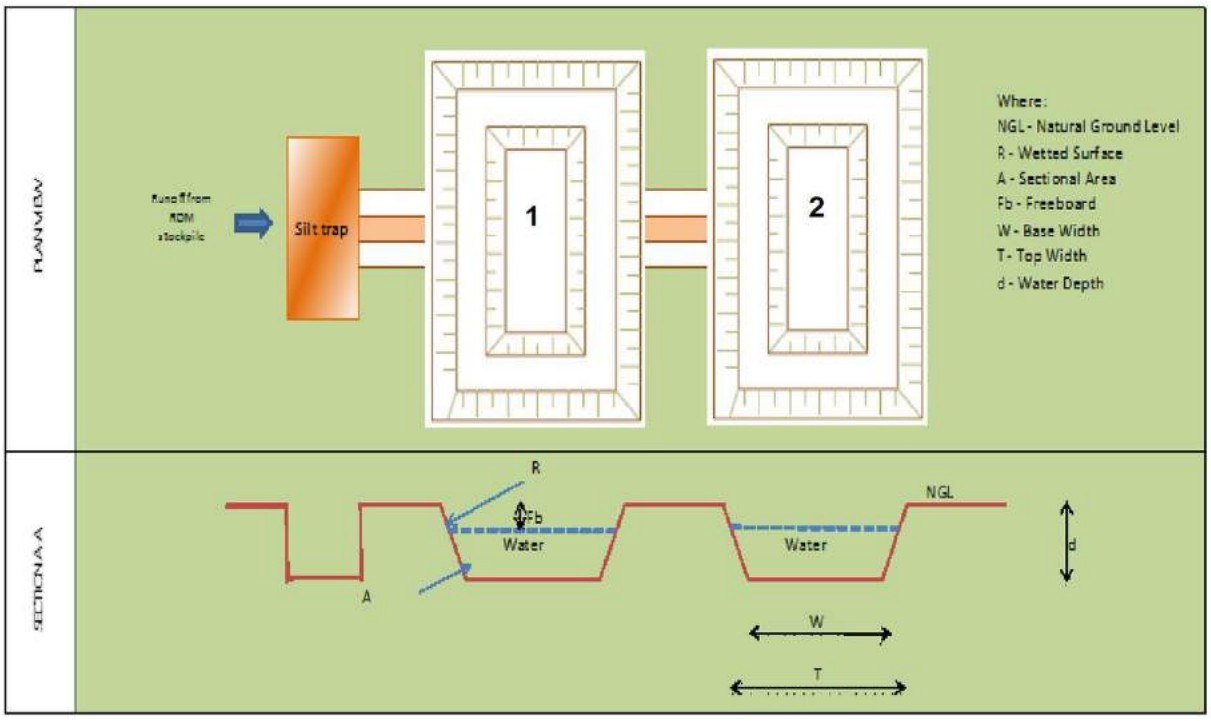


Figure 6: Conceptual design for PCD B (LWES, 2015)

3.1.7.2 Process Water Supply

Water is planned to be sourced from phase II of the Mokolo Crocodile West Augmentation Project (MCWAPII II). Should water not be available from MCWAPII other alternatives will be

considered. Water balance requirements for a 2 Mtpm open pit operation delivered to an onsite surface preparation plant have been considered. Total water requirements will be in the region of 345 ℓ/plant feed tonne for the coal preparation plant and surface requirements. Water requirements will include:

- Open pit dust control.
- Plant tip, crush and screening.
- Wash plant prep screens - after recoveries.
- Dense medium separating units - after recoveries.
- Drain and rinse - after recoveries.
- Retention on products and discards.
- Fines to ponds after spirals (up to 15 %).
- Dust suppression load out section and product roads.
- Industrial water use at 50m^3 /month for machinery washdays.

Water within the in-pit sumps and PCDs will be recycled for process water (drilling, crushing and screening, process) and for dust suppression within the mine footprint area only. To prevent the need for water transfer between the eastern and western PCDs (which would require a pipeline and river crossing), water from the eastern PCD will be prioritised for dust suppression over the western and eastern workings, while water from the western PCD will be prioritised for process water requirements.

It is currently anticipated that around 15 000 m^3/month will be required for on-site dust suppression. Due to the restricted availability of water at site, alternatives to dust suppression will be investigated. This figure will therefore be finalised upon completion of the water balance as part of the IWULA.

The wash plant will require 690 000 m^3/month for the full 2Mtpm production.

An additional 50m^3 will be required for other operational processes such as use of water at wash bays.

3.1.7.3 Potable Water Supply

A water tank will be established at the administrative area to store and supply potable water from a nearby borehole.

Initial volumes for potable water requirements suggest that around 1000 m^3 per month will be required for potable and domestic use. This figure will be finalised on completion of the final water balance.

3.1.8 Waste Handling

The waste classification as defined in GN 635 (2013) was undertaken for the waste rock samples by Future Flow (2015), and the details of the assessment is included in Appendix 7. The coal, shale, weathered sandstone and mudstone from all the different sites classified as Type 3 Waste following the GN 635 classification system.

Following the GN 636 (2013) guideline, the material may only be disposed of at a Class C landfill designed in accordance with Section 1(1) and (2) of the GN 636 (2013) Norms and Standards, or, subject to Section 3(4) it may be disposed of at a landfill site designed in accordance with the requirements for a GLB+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).

A Class C landfill design is represented in Figure 7 and all stockpile areas for the coal, shale, weathered sandstone and mudstone must be designed accordingly.

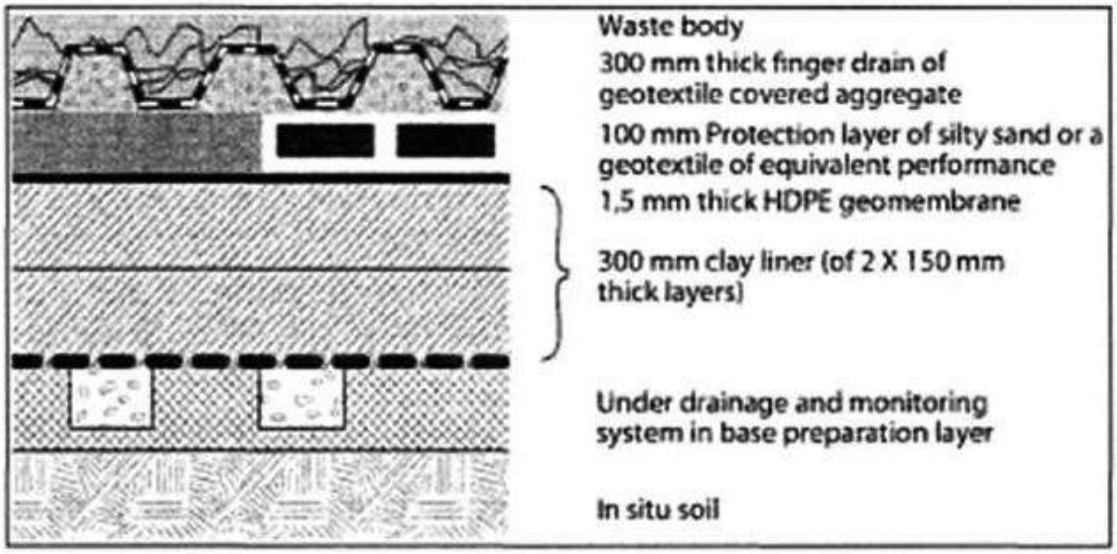


Figure 7: Diagrammatic representation of a class C landfill barrier design

A small fenced off area adjacent to the workshop will be allocated as a salvage area for temporary storage of recyclable waste further described below under waste handling.

Skips will be provided for different waste types. It is advisable that these have lids or be stored under a roofed area. A concrete pad with bunding will be constructed for skips.

The GCMC Waterberg Colliery will register on the SAWIS (South African Waste Information System) if required and complete the necessary waste manifest reporting.

3.1.8.1 Gaseous Emission

No scheduled gaseous emissions will take place on site.

Vehicles and machinery will emit fumes, but will be serviced and maintained regularly to keep these emissions within the relevant vehicle/machine's specifications.

Dust will be monitored and managed on site to ensure these are within the standards set by the Department of Environmental Affairs (DEA).

The Waterberg Project's Groothoek Colliery will register on the NAEIS (National Atmospheric Emissions Inventory System) as a Group C emitter and lodge the annual reports as required under regulation GNR283 of NEM:AQA (National Environmental Management: Air Quality Act).

3.1.8.2 Solid and Liquid Waste

Other than mine residue, solid waste will be limited to domestic waste, construction and building waste, old machinery, old tyres and conveyor belts, scrap metal and wood. Table 5 indicates the proposed waste disposal of various wastes on site during the various mine phases.

Other than liquid mine residue (slurry and mine water), liquid waste will be limited to used hydrocarbons and chemicals associated with the laboratory and cleaning.

Proposed waste management strategy on site is detailed in the Table 5.

Table 5: Proposed waste management

Waste type	Waste treatment
Construction waste & Building rubble	Construction waste will be removed from site by contractors. All building rubble will be removed from site and disposed of by the contractor. Where the material is safe to use for filling of final voids, then this will be done.
Domestic and office waste	Locally collected in bins and transferred to skips for disposal at the municipal waste site by registered contractor. Recycling will be done as far as possible with regards to paper, glass, tins/cans, plastics, batteries and computer equipment, and inflorescent lights which will be placed in specific skips/drums at the waste and salvage yard.
Sewage	Portable toilets will be established at the various mine sites. Sewage generated on site will be managed and treated at the onsite treatment facility where a component of the sludge generated will be disposed to an approved disposal site and the bulk of the sludge will be returned to the treatment plant.
Mine water & slurry	Will be contained and managed on site as discussed above.
Used hydrocarbon waste	These will be collected in drums and stored within an adequately sized bunded area, constructed to SABS standards. The waste will be collected and removed from site by a reputable contractor.
Old tyres, conveyor belts	These will be collected and temporarily stored in an allotted area in the scrap / salvage yard for recycling by a reputable contractor.
Scrap metal	This will be collected and temporarily stored in an allocated area in the scrap / salvage yard for recycling by a reputable contractor.
Old machinery	Due to the short duration of the project, old machinery waste is not expected to be generated on site. Any old machinery will be collected and temporarily stored in an allocated area in the scrap / salvage yard for recycling by a reputable contractor.

3.1.9 Services

Table 6 summarises the services that will be required on site.

Table 6: Services required on site

Services	On-site requirement	Contract in place
Water & Sewage	Borehole for water provision; sewage treatment plant for sewage treatment	None required
Waste Removal	Waste removal as stipulated above	To be negotiated
Electricity	Sourced from national grid	To be negotiated

3.1.10 Project Phases

Depending on the outcome of the Environmental Authorisation (EA) and Integrated Water Use License Application (IWULA), it is proposed that construction will commence in the first half of 2017. Construction includes box cut development and exposure of the first mineable coal seam and will take approximately 18-24 months, meaning that mining operation will commence in the early 2019. The operational phase is 20 years ending in early 2039 should no additional reserves be identified. Decommission is anticipated to take 18-24 months and closure will require an additional 3 years monitoring.

4 POLICY AND LEGISLATIVE CONTEXT

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
Acts and Associated Regulations Pertaining to Mining and Environment		
The Constitution of South Africa, 1996 (Act 108 of 1996): Section 24: Everyone has the right to an environment that is not harmful to their health or well-being; to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development.	Section 6, 11, 26 and 29	Alternative activities have been considered that are less taxing on the environment, and resources where possible. Furthermore, due to the proximity of site to various I&APs, additional mitigation measures are considered within appropriate buffer zones to these I&APs.
Section 32: Every person has a right to information held by the State and to information held by other people that is required in the exercise or protection of a right.	Section 7 and 9.4	The EIA/EMP Report & all other reports have been made available for public review as per the PPP section of this report. I&AP issues have been considered
Section 33: Everyone has a right to just and procedurally fair administrative action.	The Appeal Process will be described to all I&APs through the RoD notification as per Section 7.1.3	The Appeal Process will be described to all I&APs through the RoD notification described in the PPP section of this report.
Minerals and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002 as amended and associated regulations: The MPRDA and its Regulations (MPRDA Regulation GNR527, 23 April 2004 as amended by: GNR R1288 dated 29 October 2004; GNR1203 dated 30 November 2006; and GNR349 dated 18 April 2011) were followed in terms of	This EIA / EMP report have been compiled as per the DMR templates.	The process on SAMRAD is being followed & submission is being made online.

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
the mining right application process. The Act and Regulations will further be adopted in future for any amendments, transfers, renewals, etc. as may be needed with regards to the mining right. The Act and Regulations will further be adopted during application for a closure certificate on completion of mining activities at site. All requirements in terms of submission of documents to authorities as stipulated in the Act and its Regulations, or as stipulated in the Mining Right issued by the Department of Mineral Resources (DMR) will be adhered to in future. Due to the proximity of the mine to urban areas, it is expected that staff and contractors will have accommodations and no permanent living areas will be provided on site. Where relevant Regulations pertaining to living conditions of employees and contractors (Government Notice 445 in Government Gazette 32166 dated 29 April 2009) will be adhered to. Regulations pertaining to codes of conduct (Government Notice No. 446 in Government Gazette 32167 dated 29 April 2009) will be applied on site.	Section 26.1 Section 30 Not applicable at this stage. Not specified directly in EIA/EMPr.	Closure objectives reported in the EMPr must be considered during application for closure certificate. Addressed in the monitoring section of the EMPr. Not applicable at this stage. This will be worked into the mine's Code of Practice (COP) and Standard Operating Procedures (SOPs)
Mine Health and Safety Act (MHSA), Act 29 of 1996 as amended and its associated regulations: The mine will operate in accordance to the MHSA and associated regulations. This includes creating a safe and healthy work environment and providing the necessary protection and training to staff to ensure their health and safety is not compromised. Hazardous substances will be adequately stored and labelled. All regulations pertaining to safe use, handling, processing, storage, transport and disposal of hazardous substances; explosives and mixing substances to make explosives; protection of equipment, structures and water sources and the surface of land; the making safe of undermined ground and dangerous	Not specified directly in EIA/EMPr. Section 27, 28 and 29 Not specified directly in EIA/EMPr.	Although not strictly addressed in the EMPr, protecting the environment contributes to a safe working environment. Materials will be labelled and MSDSs will be available on site. MHSA regulations will be worked into the mine's Code of Practice (COP) and Standard Operating Procedures (SOPs).

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
excavations, tailings, dumps and structures connected to mining operations; the monitoring and control of those environmental aspects which may affect the health and safety of persons will be applied on site. Regulations pertaining to provision of water, ablution facilities and staff health and safety will be applied on site. Regulations pertaining to explosives, GNR584 (2015). Blast specialist / contractor must be fully conversant with and ensure compliance on site to the regulation, including the necessary approval from the Principal Inspector of Mines to blast within 500m of structures.	Sections 26-29	
National Environmental Management Act (NEMA), Act 107 of 1998 as amended and its associated regulations: NEMA and its Regulations (GNR982 – EIA Regulations; NEMA Regulation GNR983 – Listing Notice 1; NEMA Regulation GNR984 – Listing Notice 2; and NEMA Regulation GNR985 – Listing Notice 3) were followed in terms of identifying activities for which an Environmental Authorisation (EA) is required and for compiling the S&EIR reports (as per the template provided by the DMR) and the closure plan, which should be considered a draft plan. The closure plan will be finalised and submitted once application for a closure certificate is made on completion of mining.	Section 3, Table 1	Regulations utilised to determine the listed scheduled activities requiring environmental authorisation.
NEMA and its Regulations (GNR807 – PPP guideline) were followed in terms of Public Participation Process (PPP).	Section 7, Table 7	PPP completed in terms of the NEMA PPP regulations and guidelines
NEMA principals were/will be considered in the compilation of the various environmental reports (incl. specialist studies) and have been considered in the overall environmental objectives.	Various Appendices	On-going consideration through EIA and EMPr.
The financial provision has been compiled in terms of NEMA Regulation (Regulation GNR1147, November 2015).	Section 28.1	The itemised financial provision has been completed in terms of the NEMA regulations.

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
The Act and Regulations will further be adopted during application for a closure certificate on completion of mining activities at site.	Section 26.1	Closure objectives reported in the EMPr must be considered during application for closure certificate.
All requirements in terms of submission of documents to authorities (including but not limited to updated financial provision, and reports on monitoring and compliance of the EMPr and conditions of the EA) as stipulated in the Act and its Regulations, or as stipulated in the EA issued by the DMR will be adhered to in future.	Section 30	Addressed in the monitoring section of the EMPr.
National Environmental Management: Waste Act (NEM:WA), Act 59 of 2008 as amended and its associated regulations:		
In terms of the Act, all mine residues are listed under the hazardous category in schedule 3 of NEM:WA. In terms of this application, non-carbonaceous rock and soils are considered inert as stipulated in Annexure 1 of the National Waste Information Regulation (GNR625, August 2012) as these materials contain no hazardous substances that will impair the environment.	Mine residue handling described in Section 3.1.4	Mine residue handling and management described throughout the EIA/EMPr as specific listed activity.
The regulations and various addendums pertaining to scheduled waste activities (GNR921, November 2013) were consulted to determine the applicable waste activities that have been included in a combined application with the NEMA activities in terms of a Waste Management License (WML) application. Mine residue was very recently included (under GNR633 in GG 39020, July 2015).	Section 3, Table 1	Regulations utilised to determine the scheduled activities requiring licencing.
The regulation on planning and management of residue stockpiles (GNR632, July 2015) will be incorporated into the management plan for mine residue stockpiles.	Section 3.1.8	Mine residues handling and management described throughout the EIA/EMPr as specific listed activity.
The National Waste Information Regulation (GNR625, August 2012) will be complied with once construction commences in terms of registering and	Sections 27-29	GCMC will register and report on SAWIS.

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
reporting to the South African Waste Information System (SAWIS).		
The Waste Classification and Management Regulations (GNR634, August 2013) will be complied with in terms of classification of relevant waste (excavated non-carbonaceous and non-hazardous earth material and domestic waste collected by the municipality is excluded) and record keeping and waste manifest systems.	Sections 27-29	Included in the management tables.
The discard and coal and carbonaceous overburden will be assessed in terms of GNR635, August 2013 for Assessment of Waste for Landfill. The assessment completed with regards to this regulation will determine the type of barrier system that would be required for coal stockpiling areas, slurry dams, carbonaceous material stockpiles and PCDs as stipulated in GNR636, August 2013.	Section 3.1.8	Included in the EMPr and incorporated into the project description.
The waste management plan has considered the norms and standards for the storage of waste on site as per GNR926, November 2013.	Sections 27-29	Incorporated, where relevant, into the management plan as a specific activity.
National Water Act (NWA), Act 36 of 1998 as amended and its associated regulations:		
The water use licence application (IWULA) will be completed for all water uses as per Section 21 of the NWA. The associated Integrated Water and Waste Management Plan (IWWMP) will be compiled as per the 2010 IWWMP guidelines and any other instruction received from the DWS during the pre-consultation process.	Still to be completed. Reference to need for IWULA is included in Section 26.8.	GCMC has contracted consultants to complete the IWULA and IWWMP.
GNR704 has been utilised to develop the storm water management plan and where needed, the relevant exemptions will be applied for with the IWULA.	Section 3.1.7	Incorporated into the project description and management plan of the EMPr.
National Environmental Management: Biodiversity Act (NEM:BA), Act 10 of 2004 as amended and its regulations, including various regulations pertaining		

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
to protected species and to alien and invasive species: SANBI website and GIS tools were utilised to determine that no nationally protected and threatened ecosystems occur on site. Therefore NEMA Listing Notice 3 activities specifically dealing with threatened ecosystems were not applicable to the EA application. Protected trees occur on site and the relevant applications, as needed under NEM:BA, will be made for the removal of such species in areas targeted for surface disturbance. The alien invasive management system has/will consider the listed alien and invasive species published under NEM:BA as well as CARA.	Addressed during Scoping Phase Reference to need for permits is included in Sections 26-29. Incorporated in Sections 26-29	Regulations utilised to determine the need for any listed scheduled activities under GNR 985 (Section 2d). GCMC to contract the necessary specialist to obtain permits prior to removing or damaging such trees. An initial management plan incorporated into the EMPr.
National Environmental Management: Air Quality Act (NEM:AQA), Act 39 of 2004 as amended and its associated regulations: GNR893, November 2013 was consulted regarding Scheduled Listed Activities. No listed activities are relevant to the proposed mine and therefore no application for an Atmospheric Emissions Licence (AEL) is required. The Air quality dispersion modelling will be conducted as part of the application process as the site falls within the Waterberg Air Quality Priority Area. The dispersion modelling will take into account any requirements listed in Regulation GNR533, July 2014. Dust monitoring will be included in the EMPr commitments due to the fact that mines are listed as Group C emitters (GNR283, April 2015) and the site falls within the Waterberg Air Quality Priority Area. The dust monitoring will be conducted and measured against the dust fallout rates published in GNR827, November 2013.	No applicable Appendix 3, Sections 9.1. Sections 29.1.7 and tables in Sections 27-29	No AEL is required for the proposed project. Completed and included in the EIA and EMPr phase. Dust monitoring will be incorporated into the monitoring plan of the EMPr report. It must be stipulated that background dust, PM10 and PM2.5 limits already exceed air quality limits and comparison to standards will not be possible. Instead, it is proposed that the mine commence dust

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
		monitoring before construction commences to obtain background levels and future comparisons should be made to these levels.
As a Group C controlled emitter, the mine will be required to register and report to the National Atmospheric Emissions Inventory System (NAEIS) as per GNR283 and GNR284, April 2015.	Sections 26-29	GCMC will register and report on NAEIS.
The Municipality charged with the enforcement of NEM:AQA, will be included as an I&AP through the PPP. Any requirements made by the Air Quality Control Officer will be incorporated into the EMPr. If any additional monitoring is requested, such as PM10 or CO, then these will be measured against the National Ambient Air Quality Standards, published in Regulation GN1210, December 2009.	All municipal correspondence included in the PPP report - Appendix 15.	Any comments have been incorporated into the PPP sections of this EIA / EMPr.
Draft regulations (GN541, July 2015) pertaining to greenhouse gas emissions reporting will be applied on site, if relevant, once the regulations are promulgated.	Not included at this stage.	Draft regulation which will be applied if relevant.
National Environmental Management: Protected Areas Act (NEMPAA), Act 57 of 2003 as amended and its associated regulations:		
SANBI website and GIS tools were utilised to determine that no protected areas occur on site. Therefore there is no restriction on mining in terms of protected areas.	Addressed during Scoping Phase	Regulations utilised to determine the need for any listed scheduled activities under GNR 985 (Section 2d).
A formal protected area, the D'Nyala Nature Reserve, is approximately 6.5km southeast of the proposed development boundary. There are also areas targeted for the National Protected Area Expansion Strategy (NPAES 2010) around the D'Nyala Nature Reserve. Therefore the applicable NEMA Listing Notice 3 activities specifically dealing with activities within 10km of a protected	Section 3, Table 1	Regulations utilised to determine the need for any listed scheduled activities under GNR 985 (Section 2d).

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
area are applicable to the EA application.		
Conservation Of Agricultural Resources Act (CARA), Act 43 of 1983 and Regulation GNR 1048 relating to alien and invasive species: The alien invasive management system has/will consider the listed alien and invasive species published under CARA as well as NEM:BA.	Flora Report Appendix 9; Sections 26-29	An initial management plan incorporated into the EMPr.
Environment Conservation Act (ECA), Act 73 of 1989 as amended and its associated regulations. Much of the Act has been repealed by the various Specific Environmental Management Acts (SEMAs). The following is still relevant: A noise impact assessment will be included in the EIA and EMPr as is necessary due to the change in land use. Noise management will consider ECA requirements.	Section 9.1 & Sections 26-29	Baseline readings were taken and management measures incorporated into the EMPr.
National Heritage Resources Act (NHRA), Act No. 25 of 1999: A heritage impact assessment has been completed in terms of the prescribed requirements as the proposed project has a linear activity associated with the railway link of more than 300m, affects more than 5 000m^2; and requires re-zoning of a site of more than 10 00m^2.	Appendices 12 & 13; Section 12.1.2	Characterisation, impact assessment and management plan incorporated into the relevant sections of the EIA/EMPr report
Legislation not listed as a Specific Environmental Management Act (SEMA): May have implications on the environment		
Spatial Planning and Land Use Management Act (SPLUMA), Act No.16 of 2013, Promulgated 1 July 2015: The Act and Regulations feed into the DRAFT Listing Notice 4 (GN737, August 2014) activities under NEMA and may result in amendment to application process depending on the transitional arrangements provided for in the notice once promulgated. Land use schemes must be implemented within 5 years of the promulgation of the Act and will stipulate land use and development rights over targeted land. Until such time that land use schemes are developed, town planning schemes	All municipal correspondence included in the PPP report – Appendix 15.	Draft regulation which will be applied depending on final requirements.

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
will determine land use and development rights. Where no town plan exists, only purposes listed in Schedule 2 of the Act can be carried out on the land, which includes mining purposes.		
Hazardous Substances Act, Act No. 15 of 1973: Hazardous substances handling on site will comply with the prescription of the Act.	Incorporated in Sections 26-29	Materials will be labelled and MSDSs will be available on site.
Explosives Act, Act 15 of 2003: The relevant permits will be obtained for storage of explosives as is necessary. Magazine sites will be inspected and approved by Chief Inspectorate as is necessary.	Explosives handling is generally discussed in Incorporated in Sections 26-29	Included in the management plan of the EMPr as a specific activity.
Guidelines and Standards		
South African National Standard: SANS 10234:2008 - Globally Harmonized System of classification and labelling of chemicals (GHS): The SANS standard is specifically referred to in GNR634, August 2013 for waste classification and forms the basis for classification of relevant waste on site.	Not specifically referenced	Used to determine thresholds and guide the management plan.
ASTM D1739, 1970 or equivalent approved protocol for dust monitoring: Sets the requirements for dust monitoring as specifically stipulated in GNR827 of November 2013.	Sections 29.1.7 and tables in Sections 27-29	Dust monitoring has been incorporated into the monitoring plan of the EMPr report. It must be stipulated that background dust, PM10 and PM2.5 limits already exceed air quality limits and comparison to standards will not be possible. Instead, it is proposed that the mine commence dust monitoring before construction commences to obtain background

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
		levels and future comparisons should be made to these levels.
South African National Standard: SANS 10228:2006 - The identification and classification of dangerous goods for transport: The standard was consulted to determine which substances on site classified as dangerous goods in terms of the specific NEMA activities relating to storage of dangerous goods on site.	Applicable to hydrocarbons and Addressed in Sections 27-29	Handling and management discussed in the EIA / EMPr as a specific activity.
South African National Standard: SANS 241-1:2011 – Drinking Water Specification: Physical, aesthetic, operational and chemical & microbial determinants: SANS standard will be utilised for comparative purposes to determine the quality of water at site. Where Resource Water Quality Objectives (RWQOs) are provided by DWS, then these will also be utilised for comparative purposes to determine water acceptability for drinking, domestic, livestock watering and irrigation purposes. Bacterial counts will in future also be compared to SANS standards.	Section 8.1.1.7	Used to determine thresholds and guide the management plan for water quality. It must be stressed that baseline groundwater quality already exceeds SANS standards for certain elements. Surface water quality was within standards except for sample in Sandspruit downstream of Eskom Matimba PowerStation.
South African National Standard: SANS 10103:2004: The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication.	Section 8.1.1.12	Used as guide to manage noise levels. Baseline noise levels already exceed SANS standards and thresholds and therefore it cannot be expected for the mine to operate within these parameters.

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
		Additional baseline measurements are proposed for future comparisons for noise level readings.
The Waterberg District and Lephalale Local Municipalities Spatial Development and Economic Development Plans: These have been incorporated primarily into the Social and Labour Plan.	Addressed in S&LP.	Addressed in S&LP.
South African Biodiversity Institute website for various GIS tools including: NFEPA – National freshwater ecology priority areas regarding rivers, wetlands, wetland clusters and fish and water management areas. Provincial Biodiversity Maps are currently not available for Limpopo, nor are land use development maps. Land cover maps were utilised for guidance. National protected areas and threatened ecosystems.	Addressed during Scoping Phase	Used to guide the application requirements and provide desktop information (section h(iv)(1))

5 NEED AND DESIRABILITY OF THE PROPOSED PROJECT

The project is situated in the Lephalale Municipality. The unemployment situation in the municipality makes the need for economic activities in the area a priority. The Lephalale CBD Development Plan states that:

> *"The local economy is essentially built on the coal supply agreement between the Exxaro coal mine (Grootegeluk [Colliery west of the proposed Waterberg Project]) and the Eskom power station. Other business relationships are relatively weak due to the concentration of demand from these two organisations, and because of the nature and volumes of other inputs that are required. According to the Lephalale IDP, the Waterberg coal fields contain an estimated 50 billion tons of coal of which 12.5 billion tons (25%) could be mined by the opencast method."*

The Lephalale CBD development plan, goes on to specifically mention GCMC's proposed Waterberg Project, has acknowledged the mining and energy sectors as one of the developments that will contribute to socio-economic development within the area. The following motivation for the project is provided:

- The project will create direct employment of staff and indirect employment through the use of contractors and service providers. This will be primarily sought locally if the skills and suppliers are available.
- The mine is situated in close proximity to two coal-fired power stations and will provide coal for power generation, currently a critical socio-economic issue in South Africa.
- The mine is situated in an area that is being rapidly developed into a coal mining and power generating centre and is therefore a developed and developing area.
- The operation of the mine will result in the implementation of the Social and Labour Plan compiled in association with the municipality and its Local Economic Development Plan resulting in social improvement in the area in general.
- The implementation of the S&LP will also benefit staff through training and bursary programmes.
- The project will provide for funds via the S&LP initiatives to various social development projects.
- The mine will also contribute locally, regionally and nationally to funding through taxes and contribution to GDP through coal sales locally and internationally.
- The proposed project will make a significant contribution to the inland coal market as well as the export markets.

6 ALTERNATIVES ASSESSMENT

6.1 Details of the Development Footprint Alternatives Considered

Please refer to Appendix 4 where the final layout plan is provided in terms of the motivation provided below.

6.1.1 The Property or Location

Site alternatives are limited by the extent of the prospecting right boundaries and the extent of the mineral reserve. Therefore, no site alternatives were considered in terms of the properties regarding mining.

With regards to coal conveyance off-site, the Northern siding option is preferred due to the fact that:

- Less Sensitive and less unique habitat will be disturbed.
- Less wetland areas and associated buffer zones will be disturbed.
- No river crossings are required and therefore less physical disturbance to the Sandloop River.
- Due to the proximity of the Northern siding option to the processing plant, the cost of transport to the siding is reduced which has obvious economic benefits.
- Furthermore, as the siding is closer to the processing plant, the impacted footprint is more localised and therefore can be managed as a single mine footprint area rather than two separate sites.
- Due to the fact that the siding and processing sites can be managed as a single dirty footprint rather than two isolated sites there will be less cumulative edge effects.
- In general specialist studies indicated that the Northern Siding will impact on less sensitive features.

6.1.2 The Type of Activity to be Undertaken

Application is specifically for extraction of mineral reserves, and the associated railway siding. Land use alternatives that were considered in the Scoping Report included agriculture (crop farming and stock farming), residential & industrial development and tourism. As much as mining has the greatest impact on the environment in terms of the other land uses, it has the greatest positive contribution to socio-economics in the area. It also prevents sterilisation of coal resources in line with the MPRDA targets and secures feedstocks for energy production in terms of the National Energy Act. Furthermore, if mining and rehabilitation is conducted in accordance with the EMP, other alternative land uses can be considered post mining.

6.1.3 The Design or Layout of the Activity

Infrastructure site is limited due to the extent of the coal resource as infrastructure cannot be erected on sites targeted for mining, nor can the sites be erected on rehabilitated ground. Site layout and associated design is therefore limited. Changes in layout that have come to light during the EIA phase and represented in the final mine plan in Appendix 2 are discussed and motivated below:

- Northern siding and railway option is considered the preferred option as detailed in Section 6.1.1.
- A temporary discard dump facility will need to be established on site due to the fact that it will take some years before backfilling can commence. A discard dump area has been designated at the western material stockpile area, near the processing facility, to allow the site to drain into the proposed dirty water channel which drains to the western PCD. Engineered designs will need to be compiled for this temporary facility to ensure adequate sub-drainage, barrier lining and water management.
- The eastern material stockpile area will only cover the full extent of the proposed site if water use licenses are obtained to disturb the northern pans. The pans will be preserved in situ with 100m buffers until such time that the water use license is obtained.
- The magazine has been relocated approximately 250m west of its original location to ensure the magazine is outside identified 100m buffer zones of pans and drainage area identified in the area.
- The eastern boundary of the West Pit has been moved, and the overall pit size reduced to protect the riverine wetland and 100m buffer and to allow for the placement of a protective topsoil berm between the pit and wetland (berm will also be outside the 100m buffer of the wetland).

6.1.4 The Technology to be Used in the Activity

Best practices as utilised in the industry have been selected and, where applicable, SANS standards and legislative requirements will be followed in design, construction and management of infrastructure and activities on site.

As per the Scoping Report, the coal beneficiation process from the Bradford Breaker section through to coal wash plant is designed to reduce the detrimental effects of crushing stone and coal simultaneously which creates the undesirable water retaining < 1 mm material in any coal processing facility. This reduces loss of water through the process and therefore assists in water-saving initiatives on site.

Other alternative technologies that have been finalised through the EIA/EMP phase include:

- Slurry dam will be constructed on site and a filter press will be used for drying of slurry to blend into product coal. This will also maximise water recycling on site.
- Discard will be temporarily stockpiled in a designated and designed area within the western material stockpile area until such time that the first cut is completely mined

and backfilling with discard can resume. In future an IPP may be considered and discard may then also feed this facility.

- Sumps will manage mine water in the West Pit. Excess water will be recycled to the western PCD for use in the wash plant.
- Sumps will be used to manage runoff from the eastern material stockpile area if carbonaceous materials need to be stored at this site. Water within this sump will be prioritised for dust suppression before the eastern PCD to ensure sump remains dry.
- Sumps will manage mine water in the East Pit which will be recycled to the eastern PCD. This water will be prioritised for dust suppression over east and west workings to prevent the need for a pipeline river crossing to transfer water to west workings.

6.1.5 The Operational Aspects of the Activity

In all instances, common practices as utilised in the industry have been selected. Operational alternatives that are being considered or have been finalised during the EIA/EMP include:

- Water supply: The project is currently relying on Phase II of the MCWAP. As per DWS, the mine needs to source alternative water supply. This is still being investigated and will be reported in the IWULA and associated IWWMP. I&APs and the DMR will be provided these documents for review once they are completed. Alternatives could include potential borehole water or any unallocated water from MCWAPI/II.
- Co-disposal versus separate discard and slurry handling: The separation of discard and slurry handling was opted for, as the slurry will be of adequate quality to blend into the product, meaning that financial benefits will be obtained from removal of mine residue.
- Discard dump versus discard backfilling: These two options both have potential for long term environmental impact, specifically ground water contamination. Through responsible backfilling of discard, such as placing discard at the base of the mined-out pits and compacting into thin layers within the pits, these impacts can to some extent be mitigated as the pyritic material is flooded first and the acidic conditions arising through contact with the oxygen in the atmosphere is curbed. Furthermore, other environmental impacts associated with discard dumps, such as spontaneous combustion and associated emissions (raised by I&APs as environmental impacts), permanent topographic and visual impacts are prevented through backfilling of discard. Backfilling will however need to be approved by DWS as an exemption activity to GN704, which stipulates that no contaminating material may be placed in mined out workings and therefore this activity is reliant on approval from DWS. As stipulated under Section 6.1.3/4 above, even if backfilling is granted under the NWA, temporary discard disposal on surface will be required before backfilling can commence as detailed.

- Truck and shovel opencast versus dragline: The pits are too small for optimal dragline operations. Dragline is also not an adequate option for multiple seam mining as is the case with the Waterberg Project.

6.1.6 The Option of Not Implementing the Activity

The no-go option will result in the protection of the environment in situ and the continued use of the land for game farming and hunting. It must be stressed that the Lephalale Local Municipality has designated development over some parts of the site which will result in environmental impact resulting from these activities, which must be fully assessed before any development commences. The details of the proposed developments are detailed in Section

As stated above the site is between the power-generating and mining area and some residential areas. The surrounding land uses have already created impact on the property boundaries through edge effects. The western part of the site would have limited aesthetic appeal due to proximity to Matimba power station and related infrastructure and therefore alternative economic land uses will be further limited in future. The proposed land use of mining for the site is therefore reasonable within the future context of the immediate region.

Developing the area in a manner that excludes mining will result in the sterilisation of the coal resource. This would reduce coal resources for power generation which is currently a major issue in South Africa, which currently has no viable baseload power generation alternatives. The no-go option would also prevent the socio-economic benefits, including the need for job creation, increased socio-economic activity and social upliftment.

Furthermore, not mining the area and developing the area in a manner that sterilises the coal resources will require approval from the DMR as such activity would be in contravention of the targets of the MPRDA. The sterilisation of coal resources also prevents securing feedstock for energy production in line with the National Energy Act. As much as there are other coal resources in the area, coal is a non-renewable resource and South Africa currently relies almost entirely on coal for power generation. One therefore needs to look at securing coal resources into the future.

If GCMC does not proceed with the Mining Right Application, another company is almost certain to apply for the rights.

7 PUBLIC PARTICIPATION PROCESS (PPP)

7.1 Details of the Public Participation Process Followed

Table 7 highlights the requirements for a public participation process as per NEMA.

The PPP aims to involve the authorities and I&APs in the project process, and determines their needs, expectations and perceptions which in turn ensures a complete and comprehensive environmental study. An open and transparent process has and will be followed at all times and will be based on reciprocal dissemination of information.

Table 7: NEMA minimum PPP requirements

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
1	This regulation only applies in instances where adherence to the provisions of this regulation is specifically required
Noted	
2	The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation b:
NEMA PPP Guidelines have been followed.	
a	fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of:
i	the site where the activity to which the application or proposed application relates is or is to be undertaken
ii	An alternative site
Notices were compiled in English & Afrikaans and erected (20-07-2015) on the site boundary fence as well as other public locations, namely: 3 x Posters on Farm Groothoek 504 LQ; 2 x Posters on Farm Eendracht 505 LQ; Lephalale Post Office; Lephalale Shoprite Centre; Marula Mile Shopping Centre; NTK / TLU SA Centre; Onverwacht Checkers Centre; Lephalale Local Municipality; Lephalale Local Library; Onverwacht Post Office; Mogol Golf Club; Mogol Club Function Hall (Meeting Venue); Marapong Public Library; and Marapong Post Office.	

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
These posters informed the public of the proposed activities, invited (I&APs) to attend the scoping phase public meeting and requested people to register as I&APs for the project. Copies of the Posters and a plan indicating the location of the posters and photographic evidence thereof have been included in the relevant Annexure of the PPP Report attached as Appendix 5.	
b	giving written notice, in any of the manners provided for in section 47D of the Act, to:
i	the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
ii	owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
iii	the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
iv	the municipality which has jurisdiction in the area;
v	any organ of state having jurisdiction in respect of any aspect of the activity; and
vi	any other party as required by the Competent Authority.
A comprehensive database / I&AP register was compiled, this included various stakeholders, authorities, land owners, land users and associations within the area. Background Information Documents (BIDs) detailing the project were compiled in English and Afrikaans. These were hand delivered to land owners / users and adjacent land owners / users on the 20-07-2015. In addition, copies were distributed to all I&APs on the database via e-mail, post and fax. Persons who did not have access to a computer, fax machine or postal service were notified via hand delivered documents, where possible, and/or SMS. The purpose of the BID was to: Invite members of the public to register as I&APs; Introduce the proposed project, and inform the public on the application / environmental process and their involvement; Provide information on the proposed impacts the development may have on the environment which will be investigated further; Initiate a process of public consultation to record perceptions and issues; and Invite I&APs to attend the Scoping Phase Public Meeting. A copy of the BID and proof of delivery thereof is attached in the relevant Annexure of the PPP Report included as Appendix 5. Telephonic conversations were conducted with Lephalale Local Municipality Councillor for Wards 1 and 5 on 05 November 2015. As GCMC had already sent the BID and project information to them as part of the initial PPP, the purpose of the conversations were to remind them of GCMC's applications and to arrange meetings with them. Of particular interest to GCMC is Councillor Motlokwa of Ward 1 under whose jurisdiction Marapong Township lies. He indicated that he is willing to meet with GCMC if the meeting request first comes through the Local Municipality. GCMC has since then been trying to arrange this meeting through the Local Municipality and will submit the records of this meeting once it takes place.	
c	Placing an advertisement in:

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
i	One local newspaper; or
ii	Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations.
d	placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii)
Advertisements were placed in one (1) local newspaper and one (1) national newspaper, in both English and Afrikaans: The Northern News, publication date 24th July 2015 The Times, publication date 27th July 2015 Copies of the Adverts are attached in the relevant Annexure of the PPP Report included as Appendix 5.	
e	Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to- (i) illiteracy; (ii) disability; or (iii) any other disadvantage.
No issues in information dissemination have been noted to date. Any additional requirements made by the authorities will be applied during the PPP process.	
3	A notice, notice board or advertisement referred to in sub regulation (2) must –
a	Give details of the application which is subject to public participation
b	State -
i	whether basic assessment or S&EIR procedures are being applied to the application
ii	Whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation
iii	The nature and location of the activity to which the application relates
iv	Where further information on the application or activity can be obtained
v	The manner in which and the person to whom representations in respect of the application may be made
These aspects were addressed in the BIDs, Notices and Adverts. Please see the relevant appendices in the PPP report included as Appendix 5.	
4	A notice board referred to in sub regulation (2) must -
a	be of a size at least 60cm by 42 cm
b	Display the required information in lettering and in a format as may be determined by the Competent Authority
Notices were A2 in size (42 x 60 cm).	
5	Where public participation is conducted in terms of this regulation for an application or proposed application, sub regulation (2)(a), (b), (c) and (d) need not be complied with again during the additional public participation process contemplated in regulations 19(1)(b) or 23(1)(b) or the public participation process contemplated in regulation 21(2)(d), on condition that : -
a	such process has been preceded by a public participation process which included compliance with sub regulation (2)(a), (b), (c) and (d); and

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
b	written notice is given to registered interested and affected parties regarding where the: -
i	revised basic assessment report or, EMPr or closure plan, as contemplated in regulation 19(1)(b) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due;
ii	revised environmental impact report or EMPr as contemplated in regulation 23(1)(b) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due; or
iii	environmental impact report and EMPr as contemplated in regulation 21(2)(d) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due;
Noted. No deviation required.	
6	When complying with this regulation, the person conducting the public participation process must ensure that:
a	Information containing all the relevant facts in respect of the application is made available to potential interested and affected parties; and
b	Participation by potential interested and affected parties is facilitated in such a manner that all potential interested and affected parties are provided with a reasonable opportunity to comment on the application.
Noted. All environmental reports were and will be made available for public review. The Scoping Report was circulated to all I&AP's as an initial draft report for a 30 day public review period, and the final report was circulated to all I&AP's for another 30 day public review period. It is envisaged that the EIA/EMP will be made available for public review for 45 days.	
7	Where an environmental authorisation is required in terms of these Regulations and an authorisation, permit or licence is required in terms of a specific environmental management Act, the public participation process contemplated in this Chapter may be combined with any public participation processes prescribed in terms of a specific environmental management Act, on condition that all relevant authorities agree to such combination of processes.
The PPP has been combined for all the authorisations required from the DMR in terms of the MPRDA, NEMA and NEM:WA. The notices have also included information on the water use license application process through the DWS under the NWA.	

7.1.1 Scoping Phase (Completed)

7.1.1.1 I&AP Consultation

As summarised in Table 7 above, Interested and Affected Parties (I&APs) for the project were identified using information from similar projects in the past, as well as from information and responses received from the press advertisements, notices and the BID's sent out. The I&APs include a broad database of landowners, adjacent landowners, land users, communities, local authorities, ward councillors and other interest groups. A copy of the I&APS register and copies of the various notifications (BIDs, notices, advertisements etc.) is included in the PPP report, attached as Appendix 5.

All comments, questions and/or concerns received in response to the various notices to date, have been summarised in the issues and response table below.

A Scoping Phase Public Meeting was held on the 12th August 2015 at the Mogol Club. The purpose of the meeting was to introduce the project to the I&APs; explain the application process to be followed; and to discuss the contents of the draft Scoping Report which was at that time out for public review. All registered I&APs were notified of the meeting's date through the BIDs, posters and adverts. In addition, a reminder SMS was sent to all registered I&APs prior to the meeting. Copies of the minutes were sent to all I&APs for review and comment. Copies were sent via e-mail and people who did not have access to e-mail were sent an SMS informing them that the minutes were available and advising them where to find copies. In addition, the minutes were uploaded onto the Cabanga website for download.

All comments and / or issues raised during this meeting as well as during the review period of the draft Scoping Report were included in the final Scoping Report submitted to the DMR for approval. The Final Scoping Report also went out for a 30 day public review period, concurrently to the DMR review period; providing I&APs 60 days in total to review the report.

The Draft Scoping Report was made available to the public for review and comment over a period of thirty (30) days (11th August – 09th September 2015), and the Final Scoping Report from the 11th September – 10th October 2015 at the following locations:

- Online at www.cabangaconcepts.co.za;
- The Lephalale Local Library; and
- The Marapong Public Library.

All registered I&APs were informed of the report's availability via e-mail, fax, post and SMS. In addition electronic copies (Adobe PDF and CD) were made available to I&APs upon written request.

7.1.1.2 Authorities Consultation

Local and Regional authorities were identified and included in the I&AP register. Identified authorities were notified of the proposed project by means of the BID.

Pre-application meetings were held with the DMR as well as the DWS on the 30th June 2015, to discuss the proposed project and to clarify the way forward with regards to the content and submission of the various applications. Copies of these minutes are included in the PPP Report attached as Appendix 5.

In addition, copies of the draft Scoping Report were circulated to the following authorities for review and comment:

- DMR;
- Limpopo Department of Economic Development, Environment and Tourism (LDEDET);
- DWS;

- Lephalale Local Municipality;
- Waterberg District Municipality;
- South African Heritage Resource Agency (SAHRA); and
- Waterberg Tourism and Parks Board.

Comments have been included in the I&AP issues and response table and also in the PPP Report (Appendix 5).

The Land Claims Commissioner was contacted to determine whether any land claims have been registered over the affected properties. To date no response has been forthcoming.

7.1.2 EIA and EMPr Phase

During the EIA and EMPr phase of the project the following PPP was completed:

7.1.2.1 Follow-Up Public Meeting

An EIA and EMPr Phase Public Meeting is scheduled for the beginning of February 2016 to present the public with the findings of the specialist reports; discuss the impacts identified, with a focus on highly significant impacts or impacts to any sensitive features identified on site; detail the main mitigation measures proposed for the site; and cover feedback on comments and queries received through the PPP to date.

All registered I&APs will be invited to attend this meeting by fax, e-mail, SMS and post. Minutes will be taken at the meeting and comments will be included in the Issues and Response table in the final EIA and EMPr for submission to the DMR. The minutes of the meeting will also be forwarded to all registered I&APs for review and comment.

7.1.2.2 Micro-Consultation Meetings

Individual meetings will be scheduled with the relevant land owners/lawful occupiers or any I&AP should they be requested.

7.1.2.3 Document Review

The EIA and EMPr will be made available for a minimum period of forty five (45) days for review and comment. Following which comments received will be incorporated into the final report for submission to the DMR.

7.1.3 Objections received

To date three formal objections have been received from Ms. B.A Stolp, Eskom Regional Land Portfolio Manager on the 03-08-2015, Ms. Makoma Lekalakala, Earthlife Africa on the 08-09-2015 and Ms. A. Basson, DA Ward Councillor on the 08-09-2015.

In addition, a petition from a local DA Councillor (Mrs. Astrid Basson) including 635 signatures was received objecting to the proposed mine under the basis that residents will be subjected to unacceptable levels of pollution, property values in the vicinity will be negatively affected and that mining should not be allowed in close proximity to a residential

area if other suitable locations are available. All of these I&APs have been added to the database and will continue to be kept informed of the project during the PPP.

The objections and responses have been included in the Issues and Response Table above. Any objections raised after the submission of this report will be forwarded to the Department for consideration. (Please see Appendix 15 for all proof of correspondence including objection and petition).

7.1.4 Outstanding PPP

Notification of the RoD will be completed in terms of NEMA requirements as soon as any decision is received from authorities.

This will include a note describing the outcome of the RoD and the appeal process that I&APs can follow should they wish to appeal the decision. This will be sent to all I&APs via e-mail / fax / SMS / post.

Additionally, adverts will be placed in local Newspapers to inform the public of the outcome of the RoD.

A copy of the RoD will be made available to any I&AP requesting such.

7.2 Summary of Issues Raised by I&APs

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
AFFECTED PARTY					
Landowner/s	X				
Exxaro Resources Contact person: Frans de Lange Farm Groothoek 504 LQ Farm Grootestryd 459 LQ RE	X	20-07-2015 Hand Delivered	Granted the various specialists access to site to complete the various studies. Advised that he will notify the farmer currently leasing the property.	Noted.	Completed as part of the specialist studies. Not referenced further in the EIA/EMPr.
JJ Lamprecht Farm Eendracht 505 LQ	X	20-07-2015 Hand Delivered	Agreed to grant the various specialists access to site. Due to safety reasons all site visits are to be pre-arranged.	Noted.	Completed as part of the specialist studies. Not referenced further in the EIA/EMPr.
Waterkloof Familie Trust – Hendrik Pieterse Farm Hanglip 508 LQ Portion 1 & 3	X	21-07-2015 Hand Delivered	Have the specialist studies been undertaken?	The specialist studies have been completed as part of the EIA / EMP phase of the project.	Specialist studies completed and included as appendices.
Eskom Holding Ltd – Christopher Mamabolo Farm Hanglip 508 LQ Portion RE Farm Naauw Ontkomen 509 LQ	X	22-07-2015 Hand Delivered	Agreed to assist the groundwater specialist in locating several boreholes on site. Advised that he will attend the public meeting. The mine may cause disturbance in the operation of the Matimba power station. Stated that sensitive areas such as the Sandloop River and trees like the Marula and Baobab must be noted. GCMC must take into account the structural stability of Matimba power station's air cooling fans. The proposed West Pit will affect the ACC fans. What will happen to effluent produced by the mine? Are you going to pollute the river?	Noted. The impacts on fauna and flora will be assessed as part of the EIA/EMPr phase of the project. Where applicable mitigation measures will be proposed in the EMPr. The EIA will note the impacts around the proposed mine and the Environmental Management Programme (EMPr) will propose mitigation measures. GCMC has discussed effluent with the Department of Water and Sanitation and this will be highlighted in the EIA/EMPr. GCMC has no intension of polluting the river. Specialist studies will be undertaken and mitigation measures highlighted. This will be discussed at the next meeting.	Groundwater Report – Appendix 7. Flora Report – Appendices 9 & 10. Incorporated into Section 9 & Sections 26-29. Air Quality Assessment & Dispersion Modelling – Appendix 2. Incorporated into Section 9.1.7. & Sections 26 – 29. Section 3.1.7. & Section 3.1.6.5.
Bronwyn Stolp Eskom Regional Land Portfolio Manager Farm Hanglip 508 LQ Portion RE Farm Naauw Ontkomen 509 LQ	X	03-08-2015 E-mailed	Eskom objects to any mining on Groothoek 504 LQ and Eendracht 505 LQ, as this will negatively impact the air flow of the power stations air cooling condensers (ACC) and consequently the power stations performance. The power station has six air cooled condensers, cleanliness of the finned tubes is important for performance. The ACC intake was deliberately positioned to take advantage of prevailing easterly winds. Any activity that generates significant amounts of dust within a few kilometres will aggravate the ACC. Furthermore, the project directly affects Eskom's 22kV power line traversing the properties. Therefore Eskom strongly objects to this application. Advised that GCMC set up a meeting with Mr. Wikus Jansen van Rensburg to discuss further. Mrs Stolp downloaded the BID from the Cabanga website for review and comment.	Objection noted. The plan of study for the EIA includes specialist studies with regards to air quality and dust. GCMC will schedule a meeting with Eskom to discuss their concerns. GCMC has no intention of adversely affecting Eskom's existing infrastructure and are committed to following all relevant regulations to ensure that a thorough assessment of potential impacts and mitigation measures is addressed. GCMC would appreciate the opportunity to meet with Eskom and discuss these concerns further. GCMC will contact Mr. Jansen van Rensburg and arrange a meeting. Noted.	Appendix 2. Incorporated into Section 9.1.7. & Sections 26 – 29. Winds are north-easterly Lines indicated in Plan 2. Not identified as sensitive site as per the blast impact assessment – Appendix 14. To-date GCMC has not been able to meet with Eskom.
Lawful occupier/s of the land	X				

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
Hannes Lamprecht Farm Eendracht 505 LQ	X	20-07-2015 Hand Delivered	Agreed to grant the various specialists access to site. Due to safety reasons all site visits are to be pre-arranged.	Noted.	Completed as part of the specialist studies. Not referenced further in the EIA/EMPr.
Rudi van der Neut Horse Farm Chairman on Groothoek 504 LQ	X	27-07-2015 E-mailed	Asked that Exxaro be notified of the application.	Exxaro has already been notified of the application and have granted access to site.	PPP Report (Appendix 15) includes proof of notification
Landowners or lawful occupiers on adjacent properties	X				
Ampie de Beer Farm Grootfontein 501 LQ Portion 2	X	20-07-2015 Hand Delivered	Asked that the Grootfontein Farm Chairman be consulted.	Noted. Mr. Hendrik Strydom was contacted with regards to the project.	PPP Report (Appendix 15) includes proof of notification
Hendrik Strydom Farm Grootfontein 501 LQ Portion 2	X	20-07-2015 Hand Delivered	What is the proposed life of mine? Advised that he will attend the public meeting.	The mine will be operational for a maximum period of 34 years (if the pits have to be mined separately) with a further 5 years for post closure monitoring.	Table 3. If the pits are mined simultaneously, the LoM is reduced to 20 years.
Thomas Pavier Farm Grootfontein 501 LQ Portion 2	X	20-07-2015 Hand Delivered	No concerns. Not going to fight with the mines and development in the area.	Noted.	N/A
Nicolene Gouws RIP van Winkle Guesthouse Farm Grootfontein 501 LQ Portion 2	X	20-07-2015 Hand Delivered	Asked if the road past her guest house will be upgraded if used by the mine?	At this stage it is not anticipated that this road will be affected. Access to the mine will be via existing roads located near Onverwacht. Siding options are being investigated as an alternative to transporting coal via trucks.	Mine Plan in Appendix 2 indicates roads and preferred siding that will be used during operations. No roads on Grootfontein 501 LQ.
Wally Ross Farm Grootfontein 501 LQ Portion 2	X	20-07-2015 Hand Delivered	Asked if trucks would be using the road past his farm for access?	At this stage it is not anticipated that this road will be affected. Access to the mine will be via existing roads located near Onverwacht. Siding options are being investigated as an alternative to transporting coal via trucks.	
Mariet van Jaarsveld Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	20-07-2015 Hand Delivered	Will pass on the information to the body corporate.	Noted.	N/A
Mavuto Beaton Farm Grootfontein 501 LQ Portion 17	X	20-07-2015 Hand Delivered	Asked that Mr. Kruger be consulted.	Noted, Mr Kruger was contacted with regards to the project.	PPP Report (Appendix 15) includes proof of notification
Frank Banda Farm Grootfontein 501 LQ Portion 17	X	20-07-2015 Hand Delivered	Asked that Mr. Kruger be consulted.	Noted, Mr Kruger was contacted with regards to the project.	
Paul Kruger Farm Grootfontein 501 LQ Portion 17	X	20-07-2015 Hand Delivered	Was not interested in the project. Did not want a copy of the BID. Will not be attending the meeting.	Noted.	N/A
J.S van Zyl Grootfontein Hoewers Farm Grootfontein 501 LQ Portion 17	X	20-07-2015 Hand Delivered	Advised that the chairman of body corporate will attend the meeting.	Noted	N/A
Koos Roos Farm Grootfontein 501 LQ Portion 7	X	20-07-2015 Hand Delivered	Stated that borehole water in the area is bad and water is abstracted from the river.	Noted. A hydrocensus will be completed.	Section 8.1.1.7. Groundwater quality exceeds SANS for some measured constituents.
Luis Kruger	X	21-07-2015	Advised that he will attend the meeting.	Noted.	N/A

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
Farm Grootfontein 501 LQ Portion 17		Hand Delivered			
Thys Eloff Farm Grootfontein 501 LQ Portions 7 & 14	X	21-07-2015 Hand Delivered	Stated that borehole water in the area is bad and water is abstracted from the river.	Noted. A hydrocensus will be completed.	Section 8.1.1.7. Groundwater quality exceeds SANS for some measured constituents.
Maans Oberholzer Farm Grootfontein 501 LQ Portion 6	X	21-07-2015 Hand Delivered	Stated that he is currently trying to lease some ground from Exxaro on Groothoek but has not been successful.	Noted. Mr Oberholzer will be updated on the projects progress to align with his potential lease agreement with Exxaro.	I&AP notified of project progress - PPP Report (Appendix 15)
Neels Benadie Farm Vogelstruisfontein 644 LQ	X	21-07-2015 Hand Delivered	Feels that the proposed project will impact on his business.	The plan of study for the EIA/EMPr phase of the project includes a specialist socio-economic impact assessment. Where applicable mitigation measures will be proposed in the EMPr.	Socio-economic assessment – Appendix 10. Section 9.1.12
Wanita Wilmans Lephalale SPCA	X	21-07-2015 Hand Delivered	Runs the Lephalale SPCA, what will the impacts be on the animals? Advised that she will be attending the public meeting.	The impacts on fauna and flora will be assessed as part of the EIA/EMPr phase of the project. Where applicable mitigation measures will be proposed in the EMPr.	Blast study – Appendix 14; Section 11.1. Fauna – Section 9.1.5.
Vusi Msimango Farm Peerboom 466 LQ	X	22-07-2015 Hand Delivered	Advised that the property belongs to Eskom so they must be consulted. Is happy with the new mine and potential jobs.	Noted. Eskom has been contacted with regards to the project.	Eskom is I&AP for project - PPP Report (Appendix 15)
Mike Matthee Afrimat Constructing Farm Kuiperbult 511 LQ	X	22-07-2015 Hand Delivered	Advised that the property belongs to Eskom so they must be consulted.	Noted. Eskom has been contacted with regards to the project.	
Stephan van Wyk Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with the depreciation in the value of his property. Blasting and dust will also change the peace and tranquillity of the area. Stated that the project should be advertised in the paper for everyone to see.	The plan of study for the EIA/EMPr phase of the project includes specialist studies with regards to blasting and vibration; socio-economic and air quality. In addition the EIA will assess the impacts associated with noise and visual aspects of the project. Adverts have been placed in two newspapers; in addition posters have been placed throughout the town.	Socio-economic assessment – Appendix 10. Section 9.1.12 Blast study – Appendix 14; Section 11.1. Adverts included in PPP report (Appendix 15)
Pierre Jordan Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with the depreciation of his property. Potential impacts on the Mogol river and the water of residents. Suggests that we also consult LDEDET. Doubts that the developer was ever engaged about the mine in the past. There was only one real estate developer in that area in 2008 when GCMC began prospecting and he owned the land. That developer should have been consulted. When the developer was engaged in 2008 there were less than 12000 people in Lephalale now there are 85-90 000 people in Lephalale. Camelot Game Reserve is very close to the East Pit. The noise from the running machines will not be welcomed. The proposed dumps on Groothoek are right on the Mogol Perdery	The plan of study for the EIA/EMPr phase of the project includes specialist studies on the surface and groundwater resources; as well as a socio-economic assessment. LDEDET have been consulted as part of the process. Proof of previous correspondence between GCMC and various stakeholders has been included in Appendix VII of the PPP report. A radius for the houses will be assessed and impact mitigation proposed, we will then propose a radius in the EIA/EMPr and get feedback from the public on that at the next meeting. Comments noted. The specialist studies will address all of these	Socio-economic assessment – Appendix 10. Section 9.1.12 LEDET is I&AP (PPP Report – Appendix 15). PPP Report (Appendix 15). Proximity Plans (Plan 3 and Plan 4) to mineral boundary and pits included. East material stockpile (Mine plan – Appendix 2) will provide air blast and noise buffer for Camelot. Exxaro plans to move the

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			Klub. How will you manage that? There is only one way to mine the Waterberg "Bar-Code" coal and that is by Open-Cast. You cannot go underground.	concerns including noise and potential impacts to the club and they will be highlighted at the next meeting as well as in the EIA / EMPr. Opencast mining is proposed.	Equestrian Club. No further reference in EIA/EMPr. Mine plan – Appendix 2.
Johan van der Westhuizen Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with dust, noise, spontaneous combustion and potential impacts to fauna and flora. Will GCMC fly employees and contractors in or will the roads be used? You plan to mine strip and rollover. To what depth is GCMC planning to mine? After 9 years working on coal mines in Mpumalanga with cowboy miners on mickey mouse mines; there has been a lot of bad pollution and cases in which mining companies lie to the DMR to get away with it. You can't sweet talk the DMR with numbers like 7.4km from the town. How close are you to town? GCMC has left out a lot of important issues such as the hospital and other facilities. Suggest GCMC hire microphones for the next meeting.	The plan of study for the EIA/EMPr includes specialist studies with regards to air quality; flora; blasting and vibrations. In addition, the EIA will assess potential impacts associated with fauna; noise; visual and the possibility of spontaneous combustion. No. Employees and contractors will come to site via car and / or bus. The concern about the mine's traffic impact has been noted, this will be discussed with GCMC. GCMC is considering a traffic impact assessment. The proposal in GCMC' s BID presents the worst case scenario in terms of impacts. The actual impacts determined by the EIA will in turn determine operational parameters such as depths, buffers, the possible use of compartmentalised mining methods and backfilling. The Scoping Report is a foundational document and the BID is not going to be assessed by the DMR for approval but rather it is for information purposes. The final Scoping Report will note these issues. Noted.	Specialist Studies: Appendices 3 – 14. Applying to backfill with discard which will curb spontaneous combustion – Section 3.1.4. Impact assessment – Section 9. Traffic assessment is being undertaken but has not been completed to date. Not referenced – Existing access from Onverwacht will be utilised. Maximum 130m –Section 4.2.1. Sites indicated on Proximity Plans – Plan 3 and Plan 4. N/A
Benja Coetzee Farm Grootfontein 501 LQ Plot 133	X	27-07-2015 E-mailed	Is against the project due to close proximity to his property. Is concerned with stockpiles, dust, gasses and road access. Asked that Just Property Group be included in the consultation process.	The plan of study for the EIA/EMPr phase of the project includes specialist studies with regards to blasting and air quality. Access to the mine will be via existing roads located near Onverwacht. Siding options are being investigated as an alternative to transporting coal via trucks. Just Property Group was contacted in regards to the project.	Just Property notified of project - PPP Report (Appendix 15) Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Specialist Studies: Appendices 3 – 14. Nelson's Kop (bushman paintings) indicated on proximity plans (Plan 3 and Plan 4). East material stockpile (Mine plan – Appendix 2) will provide air blast and noise buffer for Camelot.
Werner Malan Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with dust, smoke, blasting and property value. Is concerned for potential impacts on the school and hospital. Does not want the mine to go ahead.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment. In addition the EIA will assess the impacts associated with noise and visual aspects of the project.	
Melanie Malan Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with the depreciation of her property, impacts from dust and impacts on the fauna and flora. Suggests we contact the Just Property Group and Maans Oberholzer.	The plan of study for the EIA/EMPr phase of the project includes specialist studies with regards to blast and vibrations; air quality; and flora. In addition the EIA will assess the impacts associated with fauna in the area. The Just Property group and Mr. Oberholzer have been contacted with regards to the project.	
Paul Johann Grobler Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with the negative impact on his investment, potential impacts on farm animals, burning dumps. Does not want the mine to go ahead.	The plan of study for the EIA/EMPr phase of the project includes specialist studies with regards to blast and vibrations; air quality; and flora. In addition the EIA will assess the impacts on fauna in the area.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water, social).

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			As per the new promulgated legislation Regulation 4.16(2) "No Blasting within a Horizontal Distance of 500m of Structures to be protected." As per your Final Scope document is it clear that on the Southern side the mine is contravening the 500m as per the Regulation. The feedback from the DMR also notes that: "As blasting may affect persons "who are not employees" as contemplated by Section 5 of the Mine Health and Safety Act, Act 29 of 1996, the applications for permission must be accompanied by proof of consultation of the affected parties. Please ensure that such consultation takes place as per legal requirement. Also update the final Scoping Report to make provision for the new Regulation that will come into force 10 Oct 2015.	Noted, this will be taken into consideration when finalizing the mine plan. In addition, the EIA will be updated with the new Regulations once promulgated. The EIA will also incorporate the findings and recommendations from the blasting specialist assessment.	Specialist Studies: Appendices 3 – 14. East material stockpile (Mine plan – Appendix 2) will provide air blast and noise buffer for Camelot. PPP Report (Appendix 15) details all the consultation regarding the mine plans. Requirements for the blast contractor to comply with GNR584 (2015, only promulgated in October 2015) has been clarified in sections 26-29.
Wilma Malan Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with the potential impact on the wildlife on the farm, dust and spontaneous combustion. Does not want the mine to go ahead.	The plan of study for the EIA/EMPr includes specialist studies with regards to air quality; flora; blasting and vibrations. In addition, the EIA will assess potential impacts on fauna; as well as spontaneous combustion.	
Elma Burger Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with property development, the value of her property and pollution.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment. Where applicable mitigation measures will be proposed in the EMPr.	
Andre Fouche Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with potential impacts to his farm, impacts from blasting, dump and pollution. Noted that there are bushman drawings in the area but did not list the locations. The dump and noise will have a negative impact on the environment. Stated that we must consult the Hospital and residents in a one kilometre radius.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, heritage, noise and visual assessments. Where applicable mitigation measures will be proposed in the EMPr. The Lephalale Hospital has been notified of the project and all adjacent farms and residents have been notified.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Specialist Studies: Appendices 3 – 14. Nelson's Kop (bushman paintings) indicated on proximity plans (Plan 3 and Plan 4). Nelsons Kop heritage site is outside the area of influence and as such these will not be affected. East material stockpile (Mine plan – Appendix 2) will provide air blast and noise buffer for Camelot. Hospitals included as I&APs – PPP Report (Appendix 15) and indicated on proximity plans (Plan 3 and Plan 4).
Sonet Fouche Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with pollution on the sensitive environment at the game lodge as they are the closest to the mine area. Is concerned that her land value will be affected. Stated that there are cave paintings in the klip koppie.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, heritage, noise and visual assessments. Where applicable mitigation measures will be proposed in the EMPr.	
Hennie Vermaak Farm Grootfontein Plot 44	X	27-07-2015 E-mailed	Is concerned with potential dust, noise and impacts to the ecology and the disturbance of the peace. Does not want the mine to go ahead.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, socio-economic assessment dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr. Noted. A "no go" option will be assessed as part of the process and included in the EIA/EMPr.	
Elize Bouwer Farm Groothoek 504 LQ – Renting	X	27-07-2015 E-mailed	Explained that they are renting parts of Groothoek for farming. They are concerned with the impacts on their farming. Sensitive areas include the town and graveyard. Is concerned with future water supply and water licenses and requests a copy of GCMC' s company profile.	Noted. The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, heritage, noise, groundwater, surface water and visual assessments. Where applicable mitigation measures will be proposed in the EMPr. Project details can be found on www.umbono.com under the Africa-Portfolio item.	Heritage study (Appendices 12 & 13) includes for management of cemetery & implementation of heritage conservation plan. Discussions will be held with land users before mining commences. IWULA will be submitted in

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
					due course.
Frikkie van Jaarsveld Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with the depreciation of his property value.	The plan of study for the EIA/EMPr includes a specialist socio-economic assessment.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Specialist Studies: Appendices 3 – 14. Town is upwind of mine. East material stockpile (Mine plan – Appendix 2) will provide air blast and noise buffer for Grootfontein. Riverine area and buffer will be avoided and Pans will be affected only if IWUL is granted – Mine Plan (Appendix 2). Hospitals indicated on proximity plans – Plan 3 and Plan 4.
Burger du Plessis Farm Grootfontein 501 LQ Portion 30	X	27-07-2015 E-mailed	Blasting can damage my house and the dust will be bad for our health.	The plan of study for the EIA/EMPr phase of the project includes a specialist blast and vibration study to assess the impacts thereof.	
Lourens Le Roux Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with potential decreases to his property value, property impacts due to blasting and environmental impacts. In concerned with possible dust, noise, shock waves and blasting. Why develop a mine in a town area? The Grootfontein farms are zoned for low density residential and now it faces potential mining areas.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, heritage, noise, blasting and visual assessments. In addition the EIA will assess the impacts associated with noise and visual aspects of the project. Please note that none of the Grootfontein farms are included in the mining application.	
Frikkie Snyman Farm Grootfontein 501 LQ Portion 55	X	27-07-2015 E-mailed	Is concerned with pollution, noise, decrease to property value and sensitive areas around the mine.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, health, noise and visual assessments. Where applicable mitigation measures will be proposed in the EMPr.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Specialist Studies: Appendices 3 – 14. Town is upwind of mine. East material stockpile (Mine plan – Appendix 2) will provide air blast and noise buffer for Grootfontein. Hospitals indicated on proximity plans – Plan 3 and Plan 4.
Jolandie Sadie Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with blasting, dust, noise and impacts on property value and foundations. Potential impacts to the town and hospital. The wind direction will make the town full of dust.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, dust and blasting. Where applicable mitigation measures will be proposed in the EMPr.	
Chris Sadie Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	27-07-2015 E-mailed	Is concerned with blasting, dust, noise and impacts on property value and foundations. Potential impacts to the town and hospital. The wind direction will make the town full of dust.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, dust and blasting. Where applicable mitigation measures will be proposed in the EMPr.	
Kate Grieshaber Farm Grootfontein 501 LQ Plot 120	X	27-07-2015 E-mailed	Too close to the town and my property. Is concerned with dust, noise, stockpiles, industrial vehicles in town and blasting. The graveyard must be identified as a sensate area. The map of the area is outdated. Suggests that we also contact the Grootfontein Home Owners Association.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, traffic study, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr. The graveyard has been identified as a sensitive area and the maps have been updated. All maps and plans have been updated and included in the Final Scoping Report. The home owners association has been consulted.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Specialist Studies: Appendices 3 – 14. Town is upwind of mine. East material stockpile (Mine plan – Appendix 2) will provide air blast and noise buffer for Grootfontein. All plans have updated maps. Heritage study (Appendices 12 & 13) includes for
Grootfontein Home Owners Association	X	21-07-2015 Hand Delivered	Refusal due to the fact that it is too close to the town. Is concerned with dust, noise, stockpiles, industrial vehicles in town and blasting. The map of the area is outdated.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, traffic study, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr. The	

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			Suggests that we contact Waterberg Security Villas and Bateleur Flats.	maps have been updated. Both the Waterberg and Bateleur complexes have been consulted.	management of cemetery & implementation of heritage conservation plan. Waterberg Security Villas and Bateleur Flats included as I&APs – PPP Report (Appendix 15).
Anton Joubert Farm Grootfontein 501 LQ Plot 101	X	21-07-2015 Hand Delivered	Is concerned with coal dust.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, dust, blasting and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	
Micha Burger Camelot Game Lodge Farm Grootfontein 501 LQ Portions 2 & 3	X	21-07-2015 Hand Delivered	Is concerned as the project is very close to her home. Concerned with ground, air and noise pollution.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Specialist Studies: Appendices 3 – 14. Management detailed in Section 26-30. Section 8.1.1.7 indicates groundwater quality exceeds SANS for some measured constituents.
Willem van Schalkwyk Exxaro Coal	X	27-07-2015 E-mailed	Is concerned with possible noise, dust, ground vibration and groundwater pollution. States that the environment must remain unchanged through effective control measures.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, groundwater, blasting, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	
Annerine van Schalkwyk Exxaro Coal	X	27-07-2015 E-mailed	Explained that she lives right next to the project and she will no longer be able to own her land and will have to relocate. Added that the impact is so severe that the whole town will have to move. Sensitive areas such as the graveyard and bushveld must be identified. What is the projects timeline? There is no slimes dam on the map in GCMC' s BID.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr. These sensitive areas have been identified during the specialist assessments. The timeline is subject to the mine receiving all of the necessary authorizations. Thereafter the mine will be operational for a maximum period of 20 years with a further 5 years for post closure monitoring. The initial site layout plan in the presentation indicates the proposed position of the slurry dam. However, this may still change following the specialist studies completion.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Specialist Studies: Appendices 3 – 14. Almost all residential areas will be unaffected by dust – section 11.1 Town is upwind of mine. Riverine area and buffer will be avoided and Pans will be affected only if IWUL is granted – Mine Plan (Appendix 2). Table 3 Mine Plan – Appendix 2. Section 3.1.4 for Slurry handling.
Filomaine Swanepoel Exxaro Coal Environmental Specialist	X	28-08-2015 E-mailed	Mrs Swanepoel downloaded the Draft Scoping Report from the Cabanga Website for review and comment. Exxaro owns the surface rights to Groothoek 504 LQ and there are various entities that have contracts for use of this property. Exxaro has indicated that it is against selling the farm as the proximity	Noted. Mrs Swanepoel was already registered as an I&AP and will continue to be kept informed throughout the project through the PPP. GCMC are aware that Exxaro owns the farms and are also aware of the other entities. GCMC have been in consultation with Exxaro for years regarding this project.	PPP Report in Appendix 15. Discussions will be held with land users before mining commences as legally

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			of the town is our main concern.		required.
			Is concerned with vibration, dust and noise which has the potential to cause health risks as well as a drop in property values. Potential impacts to the Sandloop river and pans on site.	Noted. The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, socio-economic assessment, groundwater, blasting, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Specialist Studies: Appendices 3 – 14.
			Is concerned with impacts on the waste dump on site which is planned to be expanded by an additional 12ha. This area is also earmarked for development under the SDF and falls out of the EMF area earmarked for mining.	GCMC has been in consultation with the Municipality for many years and are aware of the dumps expansion. GCMC have formed part of the SDF, IDP and LED committees and have kept the Municipality updated on this project.	Noted. Will not impact proposed mine development.
			Suggested that we contact the SPCA, Perdekamp, farmers renting the property and Municipality.	All of the entities listed have been consulted.	SPCA included as I&AP. Blast and noise impacts need to be mitigated (Section 11.1).
			GCMC must include the Lephalale SDF in its Scoping Report and must show the proposed layout plan overlain on the SDF. In 2010 and 2012 the Waterberg District Municipality zoned the proposed mine site for (Zone 7) urbanisation.	The SDF has been included in the Final Scoping Report and will be incorporated into the EIA EMPr.	All municipal development plans discussed in Section 8.1.1.14.4.
			Are you aware that Exxaro is selling 12.5 Ha of land around the Groothoek Landfill Site to the Lephalale Local Municipality?	Yes GCMC is aware of the sale and the expansion of the Municipal dump; this will not be affected by the proposed operations.	Not referenced.
			Letter Received on the 28-08-2015: The Scope is very vague when indicating the proposed mines proximity to the town of Onverwacht and Marapong.	Refer to Annexure V for a copy of the letter and response: It is accepted that this may not have been clearly verbally expressed in the Scoping Report and both Onverwacht and Marapong have now also been specifically included in the "Distance and direction from nearest town" section of the tables describing the properties.	Proximity clarified in proximity plans – Plan 3 and Plan 4.
			An updated plan of the current town layout indicating all the infrastructure and houses needs to be included in the Scoping Report. The Camelot development also needs to be indicated.	The plan has been updated and is included into the final Scoping Report.	
			The Spatial Development plan for Lephalale must be overlaid on the proposed mining area, thus indicating the future intent of the town development is to decrease the gap between Marapong and Onverwacht buy developing the area in between as residential area.	A plan has been compiled and is included in the final Scoping Report. It must be stressed that development of the property for residential purposes, or any other purpose that could result in the mining of mineral resources being detrimentally affected, would be in contradiction of Section 53 of the MPRDA. Please see attached letter received from the Regional Manager on 29 November 2011 that refers to this Section of the MPRDA. The renewal of the prospecting right by the DMR in 2012 (attached) provides further support for GCMC' s proposed plans to develop the resource.	Proximity clarified in proximity plans – Plan 3 and Plan 4. All municipal development plans discussed in Section 8.1.1.14.4.
			The Mine Development must be overlaid on the Waterberg District Environmental Management Framework (EMF) for this area. It is very obvious that the entire Eendracht and a large portion of Groothoek is earmarked for urban development (Zone 7) and not Mining. Only a very small portion of the Groothoek farm falls into the Mining Zone (Zone 4).	There is some contradiction between various documents available. We agree that the properties fall largely within Zone 7 (Urbanization Focus area) of the EMF. Undesirable activities for this zone simply state "any activity that hinders the towns to fulfil their urban densification functions" (p84 of the Waterberg EMF Report). Although mining would to a large extent reduce urban densification, it does provide an important employment opportunity for the "additional" population and cannot be excluded as an activity that would contribute to such development.	Section 8.1.1.14.4 discusses the Waterberg Environmental Management Framework and Limpopo Conservation Plan.
			The document does not list the possible impacts on the town or the town residents. In the portion under the social risk assessment the proximity to the residential area needs to be indicated as a risk and the various issues that will need to be investigated to quantify the	It is unclear to which "social risk assessment" section is being referred to exactly. The Scoping Report is dominated by the alternatives assessment and more so the Public Participation	Socio-economic assessment Appendix 10.

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			possible impacts needs to be included.	Process (PPP) feedback. Considering that blasting and associated concerns for property, land and life around potential blasting impacts has been one of the greater and more frequent concerns raised through the PPP, the Scoping Report has made several references to blasting impact in the social context. The issues are adequately addressed in the Scoping Report. Through completion of the various specialists' studies, these issues can be further discussed and assessed.	
			The draft document also does not indicate that the property rights for both farms have not been attained.	The MPRDA template did not specifically request the farmer details. The Final Scoping Report has included all the details for the farmers under section 2(b): Description of property. It is not a legal requirement that the property be bought, although GCMC has made provision to purchase the properties.	Farm owners indicated in Section 2.
			The last communication from Exxaro regarding the Groothoek farm was in December 2013, and indicated that Exxaro retains the option to object to the Mining Right application due to the adverse effect this development will have on the Exxaro employees and property, since the intent is to develop this property for other purposes including residential.	Noted. It must be stressed that development of the property for residential purposes, or any other purpose that could result in the mining of mineral resources being detrimentally affected, would be in contradiction of Section 53 of the MPRDA. As per the CBD Plan, long term residential development is targeted for areas south of Onverwacht and Altoostyd and not north across Groothoek. GCMC takes the PPP very seriously and will accept and respond to any issues made by Exxaro employees.	Contradictions in various municipal plans in Section 8.1.1.14.4. Legal procedure has been followed regarding MRA.
			Regarding the option to purchase this property Exxaro indicated that a comprehensive EIA will be required so as to better understand the impacts on the environmental and the occupants of Onverwacht and Marapong. Only once received will a decision be made taking into account the best interest of the company and its employees.	Noted.	This report is the comprehensive EIA/EMPr. NOTE: Although objections have been received from residents of Onverwacht and Camelot, no objections to the mine development have been received from Marapong community members to date (PPP Report – Appendix 15).
Astrid Basson DA Councillor Lephalale Municipality	X	12-08-2015 Public Meeting	Is concerned that pollution will affect the whole town and Marapong. Potential impacts to the residential buildings have not been addressed. Is opposed to the mine going ahead.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, socio-economic assessment, groundwater, blasting, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	This report is the comprehensive EIA/EMPr, Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water).
			Included a petition with 272 signatures to the proposed mine under the basis that residents will be subjected to unacceptable levels of pollution, property values in the vicinity will be negatively affected and that mining should not be allowed in close proximity to a residential area if other suitable locations are available.	Noted. A "no go" option will be assessed as part of the process and included in the EIA/EMPr. All of these I&APs have been added to the database and will be kept informed throughout the project.	
			Have you gone to site to seen how close it is to residential areas?	GCMC first visited the site back in 2008 and are well aware of its proximity to the surrounding residential areas.	N/A
			The map in GCMC' s BID is wrong and needs updating.	We will make sure the distance comes through clearer in the Final Scoping Report and subsequent reports.	Proximity clarified in proximity plans – Plans 3 & 4.
			We do not want the mine as it is too close to Lephalale town. Prefer not to talk mitigation measures at all as the mine itself is undesirable.	Noted.	Noted in PPP Report (Appendix 15).
			The BID talks about "structures on site" and "damages to structures on site" but there are currently no structures on site. There are however many structures and buildings very close to the site.	A blasting assessment will be done as part of the specialist studies and management and mitigation measures will be assessed as part of the EIA/EMPr, these will be discussed at the next public meeting. The Land Developer, the Municipality and Eskom were engaged by	Blast study – Section 9.1.10.

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
				GCMC at the start of the project.	
			The BID quotes 7.4km from town but it is closer than that and the BID does not show how close it is to residential areas. No matter what mitigating measures are implemented we will feel the impact and the closer we are the more we will feel.	The distances to Lephalale, Onverwacht and Marapong have been updated in the Final Scoping Report.	Proximity clarified in proximity plans, Plans 3 & 4.
			GCMC' s BID does not talk about the radius which will be affected by the proposed mine. We need a radius within which GCMC will take responsibility for damage to structures.	Proximity plans have been created and included in the Final Scoping Report.	Proximity clarified in proximity plans – Plan 3 and Plan 4. Blast radii where mitigation must be applied, Section 9.1.10.
			Sent an Objection Letter on the 08-09-2015:	Refer to Annexure V for a copy of the Objection:	
			Our objection is to the close proximity to the town and the effects on the community. Residents will be subject to pollution and blasting will affect buildings. Attached a petition with an additional 363 signatures.	Noted. The plan of study for the EIA/EMP phase of the project includes specialist air quality assessment, socio-economic assessment dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	Socio-economic assessment – Appendix 10. Social ills will be felt with Western Coalfield Development and is not an isolated impact from GCMC' s proposed mine.
			Lephalale has one of the highest rates of HIV/Aids affected in South Africa and it is immoral and unacceptable to expose vulnerable people to the additional pollution.	Noted. As above.	
			The Scoping Report is very vague about distances from Onverwacht and Marapong and this is to say the least misleading and must be rectified before the public participation process continues.	All distances have been amended in the Final Scoping Report, including to Marapong, Onverwacht and Lephalale.	Proximity clarified in proximity plans – Plan 3 and Plan 4.
			The Scoping Report must make mention of buildings such as the Technical College and State Hospital in the vicinity of the proposed mine.	These have been included in the Scoping Report as well as in the proximity plans.	Proximity clarified in proximity plans – Plan 3 and Plan 4.
			We are not against job creation or mines in Lephalale. Our people need the work opportunities but we have a vast area that can be used for coal mining, we do not want a coal mine in close proximity to our residential areas.	Noted.	
			Sent an Objection Letter on the 07-10-2015:	Annexure V has a copy of the letter and response:	
			The area may in fact be required for future development as it is directly across the road from the proposed Altoostyd development but our point is the impact it will have on the CURRENT residents.	This section deals with the alternatives assessment, specifically land use alternatives and is not an impact assessment; although impacts of alternative land uses need to be considered. Residential and industrial development over the properties was identified as a potential alternative land use for the site. Therefore the impact on current residents is not relevant to this section.	Alternatives are discussed in Section 6. A full assessment of municipality plans is provided in Section 8.1.1.14.4. Most proposed uses can still proceed but may need some diversion.
			There is a huge area with coal reserves and no need for development adjacent to town. What about the positive effect of the no-go option. What about the positive effects of not mining near a residential area.	Coal may be available in other areas, but it is a non-renewable resource and one needs to consider securing resources for future use. The potential one (1) billion tons of coal that occur over the properties in the area is seen to be a significant feedstock (SDF, 2012). Therefore the sterilization of the coal will result in infringement of two acts, regardless of other resources elsewhere or sizes of resources elsewhere; availability of other nearby resources is not addressed in either of the acts. Therefore the application to develop the land as a mine is reasonable and, in the context of the MPRDA, legal.	Not further referenced. Alternatives are discussed in Section 6.
			All residents living in the area will be affected. How feasible is it to	It is completely feasible to undertake the photographic study. The number of houses that would need to be visited and photographed would determine the time that the study would take to be	Included in the blast management plan (Sections

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			take baseline photos of every structure in the 2km radius? How will residents with cracked foundations etc. be able to prove that the cracks were in fact as a result of blasting activities of the mine?	completed. For the mine it would be critical to complete so that they are not held liable for existing damage to houses in the future after they have commenced with blasting.	26 to 29). As per blast study only a 1500m radius from mine pits needs to be photographed.
			The proposed Altoostyd development will be largely and directly affected. Who will want to buy property directly across the road from an open cast coal mine? This development has been planned for a long time and is meant to be the answer to Lephalale housing needs. I cannot see this happening if the mine goes ahead.	GCMC intends to commence mining the West Pit in the south and progress northwards, which means that the area nearest to Altoostyd will be mined and eventually rehabilitated first and mining will then progressively move away from the area. The life of mine is 20 years, after which the land will be rehabilitated, where grasses will form the initial basis for rehabilitation but through succession the local species will move onto the site and slowly establish. Considering that the Altoostyd development has been planned for a long time and is in proximity to existing permanent structures with permanent potential impact on the proposed residential area and was planned adjacent to land (Eendracht) targeted for mining, GCMC feels that singling out the proposed mine development as an impacting feature on the proposed development is not entirely objective.	See Plan 2 indicating the proximity of the Eskom ash dump to Altoostyd.
			The Councillor of Ward 4 (Onverwacht), the most directly affected area has been excluded from your data base. Why did this occur?	Please note that the Ward Councillor for Ward 4 was included in the public participation and has been contacted as part of the process, Cllr Sybil Nieuwoudt is included in the I&AP data base.	See PPP Report in Appendix 15.
Walter Makgothi Eskom Holdings	X	27-07-2015 E-mailed	Is concerned with potential environmental issues that may degrade the area such as air, water and noise pollution. Traffic impacts and a general change to the aesthetics of the area. Biodiversity studies must be conducted.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, socio-economic assessment, fauna and flora, water, biodiversity, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	This report is the comprehensive EIA/EMPr, Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Traffic Assessment is still outstanding.
			Suggests that only rail should be used for transportation and strict regulations on water use must be adhered to.	GCMC are considering railway options as part of the project and a traffic impact study may be undertaken.	Northern Siding and railway link are preferred transportation option for coal – Section 6.1.1.
Tienie Loots Farm Kalkfontein 468 LQ	X	12-08-2015 Public Meeting	You are not 7.4 km from the town as stated in the BID; you are 4m from the buildings. None of the buildings in the area were built to handle blasting/mining nearby.	Noted. This has been changed in the Final Scoping Report. There will be specialist studies done which will address all of these issues and these will be included in the various reports.	Proximity clarified in proximity plans – Plan 3 and Plan 4.
			Do you know that there are hospitals, schools, black schools, technical training colleges in the area? None of the roads have been built to accommodate mine traffic and trucks. You will block the roads.	Yes, we are aware of these entities and this will be noted in the studies. These findings will be presented at the next public meeting.	Locations indicated in proximity plans – Plan 3 and Plan 4.
			The mine is not in the Lephalale Municipality's Spatial Development Plan (SDF). You are building a mine in an area that has been planned for a town.	GCMC has been in consultation with the Municipality for many years, they have formed part of the SDF and IDP, so the Municipality is well aware of the mines involvement.	Synopsis on municipal plans and contradictions in these plans – Section 8.1.1.14.
			Water is not available. The Sandloop River goes through my property. You will do the same to the water as the coal mines have done in Witbank. You will drain the water from the Municipal Boreholes.	As above, these issues are noted and will be addressed in the various reports. These will be highlighted at the next meeting.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water).
			You will not be able to control the dust. The dust will go over the town and over the schools. The noise from the blasts will impact the town.	As above.	Specialist Studies: Appendices 3 – 14.
			There is a municipal graveyard right next to the site that will be affected.	As above.	Heritage study (Appendices 12 & 13) includes for

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			I requested to see who the Directors were at the time of exploration. I am still waiting for this information. Who are the Directors of the company?	Project details can be found on www.umbono.com under the Africa-Portfolio item.	management of cemetery & implementation of heritage conservation plan.
			What will happen to the road to his farm? Will it be diverted?	As above, this will be assessed during the specialist studies and will be highlighted in the reports and at the next meeting.	Kalkfontein will not be directly affected; access gravel road will be affected but appropriate diversion will be provided around the mine – Mine Plan (Appendix 2)
			Mr Loots downloaded the BID and Final Scoping Report from the Cabanga Website for review and comment.	Noted	
Koetie Steyn Grootfontein Holdings	X	12-08-2015 Public Meeting	GCMC just wanted to do this public participation process quickly and get it over with. There was no invitation to the meeting. The timing of the meeting gives the impression that GCMC just wanted to get a few people to come.	It is not GCMC' s intention to get this process over with quickly. Both Cabanga and GCMC are committed to working with the public to ensure this project is done correctly from the start. An extensive public participation process has been conducted to date and will continue throughout the process. GCMC placed newspaper adverts in the Times and the Northern News inviting I&APs to attend the public meeting. In addition, numerous notices/posters were placed all over Lephalale, Onverwacht and Marapong. BIDs were hand delivered to neighbouring landowners, users as well as ward councillors and various other stakeholders.	Legal procedure and PPP guidelines have been followed regarding the MRA. Furthermore additional time has been provided for review of documents. Section 7.1.
			Marapong has a big community that will be affected and a meeting should be done there as well.	The next meeting will also be held in Marapong, if there is a suitable venue.	Next meeting was initially proposed for Marapong however, locating a suitable venue is proving difficult following recent protest action and vandalism. Will be referenced in final EIA/EMPr.
Marolle Steyn Grootfontein Holdings	X	12-08-2015 Public Meeting	The Town Council sewage plant is a mess. Who will manage the mine's sewage treatment plant?	The intention of the Department of Water and Sanitation is that GCMC will manage their own sewage treatment plant. Currently there are no detailed specifications for the plant. This will be highlighted at the next meeting.	Section 3.1.6.5.
Assis Pontes Farm Pontes Estate / Pam Golding	X	12-08-2015 Public Meeting	Given that the Municipality's aim is to join Marapong and Onverwacht, a mine in the middle of town is a complete disaster and weird. What is going to happen with the Road to Marapong?	Noted, GCMC will include the SDF in the Final Scoping Report. The specialist studies will identify the potential impacts to residents in the area. The project is subject to various authorisations as detailed in the presentation. The new road will be included in the assessment and management and mitigation will be discussed in the EIA/EMPr.	Synopsis on municipal plans and contradictions in these plans – Section 8.1.1.14. The road link can still be established but will need to be diverted.
			The Waterberg coalfield is huge. Why are you choosing to mine here?	GCMC does not hold any rights further west of Lephalale, but they have applied for the rights to these farms. Other companies holding rights to the west of Lephalale are not selling their rights.	N/A
			GCMC has not mentioned the number of residents within a 5km radius of the proposed mine site and these will be the most affected by the proposed mine.	The socio-economic assessment will address this and it will then be presented at the next public meeting.	Proximity clarified in proximity plans – Plan 3 and Plan 4.
Koos Roestoff Eskom Holdings	X	12-08-2015 Public Meeting	There is no mention of new substations and power lines for the mine in the BID. Will the mine be self-sufficient in terms of power?	It probably will not be self-sufficient. Sub stations are however easy to relocate if the EIA/EMPr requires a change in the current conceptual layout. It would not be a major add-on.	Power sought from grid – Section 3.1.6.8.
Wasini Nkabiti Eskom Holdings	X	16-08-2015 Cabanga	Mrs Nkabiti downloaded the BID and the Draft Scoping Report from the Cabanga Website for review and comment.	Noted. Mrs. Nkabiti was already registered as an I&AP and will be kept informed throughout the project.	PPP Report – Appendix 15.

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
		Website			
Jan Albert van Niekerk Eskom Holdings	X	12-08-2015 Cabanga Website	Mr van Niekerk downloaded the Draft Scoping Report from the Cabanga Website for review and comment.	Noted. Mr van Niekerk was already registered as an I&AP and will be kept informed throughout the project.	PPP Report – Appendix 15.
Municipal councillor	X				
Herman Mpete Ward 5 Committee	X	21-07-2015 Hand Delivered	Please contact Cllr M.J Mojela. There is a community currently settled in an area called Steinop, who have won a land claim some 2 to 3 km north of GCMC' s proposed mine site. They will be returning to settle on their land within the next two years and GCMC must engage them as I&APs. GCMC must also contact Councillor M.J. Mojela of Lephalale Ward 5 in order to consult the traditional leadership through her as she is the Vice Chairperson of SANCO.	Noted. Cllr M.J Mojela was contacted with regards to the project. GCMC has noted this. GCMC has notified the Land Claims department. Once the community has returned they will be consulted. Ward 5 Councillor has already been consulted as part of the process.	N/A Not further referenced. Ward councillor has been notified (PPP Report – Appendix 15)
Cllr. M.J Mojela Ward 5	X	21-07-2015 Hand Delivered	Wants the mine to make a donation towards some land for a community outside town.	Explained that the mine has been in negotiations with the Municipality as part of the S&LP. All S&LP work will be in line with the LED and IDP. Will not make any additional donations.	Not further referenced.
Municipality	X				
Mr. M.J Maeko Mayor EM Tukakgomo (Municipal Manager)	X	27-07-2015 Hand Delivered	Letter sent on the 06-10-2015: According to the IDP Groothoek falls within the SDA1 collector route. Eendracht is a potential integrator between Marapong and other nodes; however a full environmental investigation is required prior to any development on this farm. Lephalale has been selected as a distressed mining town and forms park of the Special Presidential Package, a Human Settlement Transformation Plan was commissioned and it highlighted air pollution as a concern in Marapong due to existing mines and power stations. This mine will alienate Marapong from the special plan. Is concerned with negative effects from dust, noise pollution, health concerns due to coal dust, hazardous materials, acid mine drainage, decrease in the buffer zones between residential and industrial areas. In addition, the Municipality does not have a licensed hazardous landfill. With the above considered, the model of the city would be affected should the mine go ahead.	Annexure V has a copy of the letter and response: The latest IDP therefore does not seem to be aligned with the SDF (2012), nor the CBD plan (2013). We therefore respectfully request that the Municipality please provide GCMC with the motivation, consultation, research and other recommendations (as stipulated in the SDF, 2012 on pages 202-203) completed in terms of this sudden change in proposed land use development over the properties of relevance. No SDAs have been targeted over the GCMC's mineral boundary, which has been specifically designated as a Potential Development Area (PDA) in the SDF report. GCMC respectfully requests a copy of the drafted HSTP report from the Municipality. The various specialist studies will shed light on these issues once completed. These will be presented at the next public meeting and will be incorporated into the EIA / EMP report for consideration. The hazardous waste generated at the proposed mine will be disposed of at a registered disposal facility and GCMC accepts the additional costs that may be associated with transportation of such waste to the relevant facility.	A full assessment of municipality plans is provided in Section 8.1.1.14.4. Most proposed uses can still proceed but may need some diversion. As above. Please note that the link can still be established but may need to be diverted slightly. Specialist studied included as appendices and impact assessment in Section 9. Waste management discussed in Section 3.1.8.
Riekie Coetzee Secretary of MM	X	21-07-2015 Hand Delivered	Will forward to the MM.		
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA	X				
DMR	X	30-06-2015 Hand	Indicated that three hardcopies and one soft copy must be delivered to DMR including uploading onto SAMRAD.	Noted. Applications will be made to both departments (DWS & DMR).	Activity B11 has been applied for as per the Schedule I of

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
		Delivered	No additional specialist studies are required at this stage. Slurry dam is listed in terms of National Water Act as well as the Waste Act therefore you must apply to both DWS and DMR and activity B 7 is also applicable to discard.	The Waste Management Activities List was amended on 24 July 2015 to include activities specific to mine residue, thus Activity B11 is relevant to the application and not B7.	NEM:WA as amended – Section 3.1.
DWS	X	30-06-2015 Hand Delivered	DWS cannot commit to MCWAPII at this stage; alternative water supply must be investigated. DWS will draft a letter for GCMC to continue with MRA, to this effect. 21(g) for french drains and septic tanks are no longer accepted only closed systems are accepted. No additional water uses and specialist studies are expected at this stage. Please submit three hard copies and one soft copy of IWWMP to DWS.	Noted. Alternative water supply will be investigated.	Alternative water supply is still to be determined. French drains are omitted and septic tanks and onsite sewage treatment proposed – Section 3.1.6.5.
Deirdre Strydom Transnet Corporate JHB	X	29-07-2015 E-mailed	Please note that Sifiso Nzimande has taken over the Waterberg portfolio in TFR and you can contact him in future.	Noted. Mrs. Deirdre Strydom was removed from the database and Mr. Sifiso Nzimande has been added and will be contacted in future.	Was contacted (PPP Report – Appendix 15)
Communities	X				
Marapong Community	X	22-07-2015 Various	Various applications for jobs have been received.	These have been forwarded to GCMC for future consideration.	PPP Report (Appendix 15)
Isaac Mohaule Marapong Resident	X	12-08-2015 Public Meeting	Cabanga must not chair the next meeting because they are confusing the audience. Grootegeluk mine moved people off their land in 1982. GCMC is bringing jobs and the community wants jobs. But GCMC must implement better communication processes and not just use newspaper adverts and communication with the DMR. GCMC must ensure it is communicating with all the right stakeholders. The Ward Councillors should be used for communication. Attendees must leave now as this meeting was not properly coordinated.	The purpose of the scoping phase is to identify concerns and this meeting's audience is diverse enough to bring up all the relevant issues around the proposed mine. Noted. GCMC are committed to communicating with all stakeholders. GCMC' s database has over 600 I&APs which are consulted. All I&APs will be notified of the reports for review and comment and will be invited to attend the next meeting. All the necessary ward councillors have been consulted as part of the process. The attendance has been fantastic and the critical issues have been raised by the audience. It is therefore unfair to say the meeting has not been coordinated properly as an extensive public participation process was undertaken and based on the attendance it was well advertised.	Next meeting was initially proposed for Marapong however, locating a suitable venue is proving difficult following recent protest action and vandalism. Will be referenced in final EIA/EMPr.
George Mofomme Marapong Community Forum	X	12-08-2015 Public Meeting	The proposed mine site is not 7.4 km from Marapong as stated in the BID. That distance was correct in the past but not anymore now that Marapong has grown. As stated by President Zuma, South Africa is not a water rich country; in fact Marapong is currently fighting with the Lephalale Local Municipality for cutting water supply so GCMC must consider the health of the elderly, children and minors. How is GCMC planning to rehabilitate the mine?	Comments noted. This will be amended in the final Scoping Report and EIA / EMPr. The EIA will note the impacts around the proposed mine and the Environmental Management Programme (EMPr) will propose mitigation measures. This will then be discussed at the next public meeting. This will be considered as part of the EIA process and will be presented at the next meeting.	Proximity clarified in proximity plans – Plan 3 and Plan 4. EIA/EMPr details that few direct environmental impacts on Marapong - Section 11.1. Social ills will be felt with Western Coalfield Development and is not an isolated impact from GCMC' s proposed mine. Rehabilitation is detailed in Section 28.1.1.3.
Avhatakali Mulovhedzi Marapong Resident	X	20-08-2015 Cabanga Website	Mr Mulovhedzi downloaded the BID document from the Cabanga Website for review and comment.	Noted. Mr Mulovhedzi has been registered as an I&AP and will be kept informed throughout the project.	Not further referenced.

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
Dept. Land Affairs	X				
No comments received to date.					
Traditional Leaders	X				
No comments received to date.					
Dept. Environmental Affairs	X				
No Comment from National Department					
Manager – Environmental Impact Management Department of Economic Development, Environment & Tourism	X	01-09-2015 Faxed	Letter received on the 01-09-2015: The proposed development falls within the (Zone 7) Environmental Management Framework (EMF) for urbanisation and nodes. The main water utilisation is for human consumption and water quality should not be allowed to deteriorate. The proposed site falls within a critical biodiversity area 1, ecological support area 1 & 2 and other natural areas (C-Plan Version 2). Appropriate mitigation or offset measures must be used to compensate for the loss of biodiversity and must be submitted as part of the EIAr. Ground-truthing of the environmental attributes must be undertaken and appropriate mitigation and / or biodiversity offset measures that can be used to compensate for the loss of biodiversity as a result of the proposed development must be submitted as part of the EIA/EMPr. The mining and biodiversity guidelines must be considered for this application. A traffic impact assessment must be undertaken for both the construction and operational phases. All requirements of the DMR must be adhered to. According to section 24F(1) of NEMA, no person may commence with a listed activity until the necessary environmental authorisation has been granted or refused. Commencing prior to authorisation being granted is strictly prohibited.	Refer to Annexure V for a copy of the letter and response: Agreed; the success of the mining right would result in the rezoning of the properties to mining land, which would alter compatible water uses. In terms of the water use, GCMC intend to apply for a water use license to conduct the necessary water uses required for mining and will apply necessary GN704 principals which guide mine water management to prevent degradation to water quality in nearby water resources. In the absence of the Conservation Plan, the mine plan was approached with the intent to maintain the river and 1:100 year floodline and the associated wetlands and 100m buffer zones. Therefore large areas of the CBA1 associated with the Sandloop River have not been targeted for any development. This will also maintain this area as an ecological corridor. According to the proposed mine plan, only mining and infrastructure (other than the stockpile area) on Groothoek would be “appropriate” land uses in terms of the C-Plan. GCMC requests some guidance from The Department on the way forward regarding the proposed development in terms of the CDB Plan, EMF and the C-Plan (version 2). Noted. As per the Scoping Report, the numerous ecological studies will be undertaken for the proposed project during the EIA Phase of the project; Aquatic ecology associated with local water bodies completed by an accredited SASS5 practitioner. Due to the fact that flow in the local streams is only expected during the wet season, this study will be conducted once during the wet season only. Findings and recommendations will be incorporated into the EIA/EMPr. The guidelines will be considered in terms of the activity and will be incorporated into the ecological management plan where relevant. This will be reported in the EIA/EMPr. Noted. The specialist study will be completed and incorporated into the EIA/EMPr. Noted. The application to date is proceeding in line with DMR requirements. Noted. The activity will not commence before an EA is issued. To our knowledge the DMR is the competent authority for the proposed development (being a mining operation) in terms of scheduled activities published under NEMA and NEM:WA. It is therefore unclear as to why the DEA is referred to in the above	EMF is discussed in Section 8.1.1.14. IWULA will be drafted as soon as alternative water supply is determined. C-Plan is discussed in Section 8.1.1.14. Flora, fauna, wetland studies completed and attached as appendices 3 - 14. Aquatic / biomonitoring studies are still outstanding. These have been consulted and have been incorporated by way of the flora report into Sections 26-30. Traffic study is underway, but not yet completed. DMR scoping report comments have been addressed in the EIA/EMPr. N/A.

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
				comment as the relevant competent authority. We therefore respectfully request clarity from The Department regarding this comment.	
Other Competent Authorities affected	X				
Please see I&AP data base for full list of competent authorities consulted.	X	29-07-2015 Various	No other comments received to date besides the comments listed above.		
OTHER AFFECTED PARTIES	X				
Peter Britz Affected Party	X	29-07-2015 E-mailed	Requested a copy of the Background Information Document for review.	Copies of the English and Afrikaans BIDs were forwarded to Mr. Britz.	N/A
Cor Vos Affected Party	X	29-07-2015 E-mailed	Is concerned that there are many houses within 500 meters from the mine.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment and blasting buffer zones. Where applicable mitigation measures will be proposed in the EMPr.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Specialist studies included as Appendices 3 – 14. Social impact summary – Section 11.1.
Andries Mocheko Waterberg Environmental Justice Forum	X	12-08-2015 Public Meeting	Maybe GCMC can hold two public meetings, one in Marapong and another one in Onverwacht. People in Marapong want to be part of this meeting but cannot make it as they do not have transport. A lot of people were not available to attend today's meeting. The co-ordination of the meeting was not good.	Cabanga will discuss this with GCMC. Two meetings will be considered for the EIA/EMPr phase. One in Onverwacht and one in Marapong to accommodate everyone. The purpose of the scoping phase is to identify concerns and this meeting's audience is diverse enough to bring up all the relevant issues around the proposed mine. The attendance has been fantastic and the critical issues have been raised. It is therefore unfair to say the meeting has not been coordinated properly as an extensive public participation process was undertaken and based on the attendance it was well advertised.	Next meeting was initially proposed for Marapong however, locating a suitable venue is proving difficult following recent protest action and vandalism. Will be referenced in final EIA/EMPr. Attendance was excellent (PPP Report, Appendix 15).
Lucky Hlabiwa Letlhaka Waterberg Environmental Justice Forum	X	12-08-2015 Public Meeting	The Draft Scoping Report was made available for public review on 11 August 2015 but this public meeting is being held on the 12th of August. There was not enough time to review it before this meeting. Can GCMC provide relevant documents of its past public consultation activities? Paragraph 4 on page 7 of the Draft Scoping Report proposes responsible blasting techniques as a mitigation measure. Can you please explain what those methods are and what GCMC is really committing itself to there?	This is a Scoping phase meeting and highlights what is in the report. The Act specifies that a Scoping Report must be submitted within 44 days from the submission of an application. Of which this 44 days must include a 30 day public review and comment period. Hence the meeting had to take place at this stage. Proof of previous correspondence between GCMC and various stakeholders has been included in Appendix VII in the PPP Report. The blasting report is still being conducted, this will specify the impacts and only then can specific commitments be made. These will be in the EMPr and at the next meeting. We are currently still in the Scoping phase.	Extended review period provided – Section 7.1. PPP Report, Appendix 15. Blast study Appendix 14, Impacts summary Section 9.1.
Makoma Lekalakala Earthlife Africa	X	12-08-2015 Public Meeting	All people must be consulted and this is not happening. She only got the BID late yesterday so how can we comment today? GCMC must ask the DMR to extend the deadline for the Scoping Report beyond 09 September.	Explained that an extensive PPP was conducted and many I&APs have been consulted. The specialist studies will highlight potential impacts to health and water. These will be included in the EIA/EMPr and will be discussed at the next public meeting.	Extended review period provided – Section 7.1. Impacts summary Section 9.1. Town is upwind of mine.

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			GCMC must ask people to stock up on asthma pumps, gas masks and bottled water. Letter received on the 08-09-2015: During the public meeting on the 12-08-2015 it was raised that numerous I&APs were unable to attend due to the inaccessibility of the venue and time being during working hours. We therefore demand that the meeting be reconvened so as to afford the I&APs appropriate time to be involved in the Scoping Phase. This meeting should be at a suitable venue and time. This failure to include the people of the Marapong community in the public participation meeting is inconsistent with the administrative justice principles set out in the constitution of South Africa, the Promotion of Administrative Justice, the MPRDA and the NEMA Act Chapter 2. Not only does your client's failure to properly consult interested and affected parties result in injustice, it may well be a deciding factor in a decision to refuse a mining right and associated environmental authorisations by the relevant authorities.	Refer to Annexure V for a copy of the letter: The public meeting held on the 12-08-2015 had in excess of 150 people in attendance which we feel was a good representation of the convening of the meeting. It was stated in the meeting that the next meeting would be held in Marapong to accommodate those residents. A time of 17:00pm is proposed to accommodate workers. However, please can you provide us with a suitable time to accommodate everyone? Please note that Marapong was included in the PPP process. Posters were erected at the post office and the library. Our data base included 617 I&APs and these included Marapong Residents, Marapong Community Forum, Municipal Ward Councillors and Traditional Leaders. In addition adverts were placed in two newspapers notifying I&APs of the application. Please refer to the PPP report for full details of the PPP process. As above.	Attendance was excellent (PPP Report, Appendix 15). Next meeting was initially proposed for Marapong however, locating a suitable venue is proving difficult following recent protest action and vandalism. Will be referenced in final EIA/EMPr. Marapong community members' responses in this table under community section above. No objections have been received from the Marapong residents to date. Legal procedure and PPP guidelines have been followed regarding the MRA. Furthermore additional time has been provided for review of documents. Section 7.1.
INTERESTED PARTIES	X				
Nicolene Venter Zithole Consulting	X	29-07-2015 E-mailed	Requested maps indicating the mining right area and proposed layout of the project.	Copies of the various maps have been forwarded to Miss Venter.	Final Mine plan in Appendix 2.
Mary Sefole Actom Boiler and Environmental Division	X	29-07-2015 E-mailed	Requested an employment application form for GCMC. Sent her CV and is looking for employment.	Explained that she can forward her CV and this will be forwarded to GCMC for future consideration, subject to the necessary authorizations. The CV was forwarded to GCMC and will be considered in the future subject to the various authorizations.	N/A
Charl & Amanda Vermaak 14 Blourand Street	X	29-07-2015 E-mailed	Are concerned with potential health risks as the operation is too close to the town. Also highlight the increase in industrial traffic in residential areas.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, health, traffic, noise and visual assessments. Where applicable mitigation measures will be proposed in the EMPr.	Socio-economic assessment – Appendix 10 & Section 9.1. Social impact summary in Section 11.1. Traffic assessment will be submitted as soon as it is completed.
Susan Slabbert NCC-Group	X	29-07-2015 E-mailed	Mining on the edge of town will definitely impact everyone. Does not want a mine to open so close to the town. Will the mine fix all of the houses in town which are affected by blasting? Will the next meeting be held at a more appropriate time to allow	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, blasting buffers, health, traffic, noise and visual assessments. Where applicable mitigation measures will be proposed in the EMPr. This has been discussed with GCMC and the next meeting will be	Blast study – Appendix 14 and Section 9.1. Next meeting was initially proposed for Marapong

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			those who are currently at work to attend?	held at a more suitable time. The suggestion is to hold the next meeting from 17:00pm to accommodate people after work.	however, locating a suitable venue is proving difficult following recent protest action and vandalism. Will be referenced in final EIA/EMPr.
Johanna Elizabeth Joubert 13 Bosveld Street	X	29-07-2015 Posted	Is concerned with health and property impacts, is also concerned with potential impacts to the school, hospital, households and technical college. Will the mine buy her property at current value or better?	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, dust and blasting. Where applicable mitigation measures will be proposed in the EMPr. The mine will not be purchasing any property.	Socio-economic assessment – Appendix 10. Impacts in Section 9.1. Social impact summary in Section 11.1.
Johannes Nicolaas Joubert 13 Bosveld Street	X	29-07-2015 Posted	Is concerned with health and property impacts, is also concerned with potential impacts to the school, hospital, households and technical college. Will the mine buy her property at current value or better?	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, dust and blasting. Where applicable mitigation measures will be proposed in the EMPr. The mine will not be purchasing any property.	Socio-economic assessment – Appendix 10. Impacts in Section 9.1. Social impact summary in Section 11.1.
Monica Campher 72 Blinkkool Street	X	29-07-2015 SMS'd	Is concerned with health risks and industrial traffic in residential areas.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment and traffic study. Where applicable mitigation measures will be proposed in the EMPr.	Socio-economic assessment – Appendix 10. Impacts in Section 9.1. Social impact summary in Section 11.1. Traffic assessment will be submitted as soon as it is completed.
Louis & Mandie Snyman 4 Bosveld Street	X	29-07-2015 E-mailed	Are concerned with health risks as it is too close to the town and industrial traffic in residential areas.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment and traffic study. Where applicable mitigation measures will be proposed in the EMPr.	
Werner Putuscoo 72 Blinkkool Street	X	29-07-2015 Posted	Is concerned with pollution, health risks and traffic increases.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment and traffic study. Where applicable mitigation measures will be proposed in the EMPr.	Socio-economic assessment – Appendix 10. Impacts in Section 9.1. Social impact summary in Section 11.1. Traffic assessment will be submitted as soon as it is Specialist studies included as Appendices 3 – 14.
Lana van Rensburg 8 Bosveld Street	X	29-07-2015 Posted	Too close to residential area will affect us, health risks, dust and noise pollution. Is also concerned with industrial traffic in a residential area.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, traffic study, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	
Christo & Francien Ackerman 11 Bosveld Street	X	29-07-2015 Posted	Are concerned that it is too close to the residential areas and heavy vehicles in residential areas.	The plan of study for the EIA/EMPr phase of the project includes specialist socio-economic assessment, traffic study, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	Socio-economic assessment – Appendix 10. Impacts in Section 9.1. Social impact summary in Section 11.1. Traffic assessment will be submitted as soon as it is
Pieta van Rensburg 8 Bosveld Street	X	29-07-2015 Posted	Too close to residential area will affect us, health risks, dust and noise pollution. Is also concerned with industrial traffic in a residential area.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, traffic study, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	
Andries & Yolandie Kruger 11 Bosveld Street	X	29-07-2015 Posted	Too close to residential area will affect us, health risks, dust and noise pollution. Is also concerned with industrial traffic in a residential area.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, traffic study, dust and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	
Ilse Lombard NCC-Group	X	29-07-2015 E-mailed	Is interested possibly working as an ECO at the mine and job creation in Onverwacht. Is concerned about dust in the town and on sensitive areas like the cemetery. Is also concerned with vibration from blasting.	Noted. The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment; as well as socio-economic assessment, traffic study, dust and noise assessments. Where applicable mitigation measures will be proposed in the	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			The mine must do an EMP and adhere to best practice guidelines.	EMPr.	water).
Albertus Bezuidenhout Interested Party	X	29-07-2015 E-mailed	Is concerned with dust and blasting.	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, dust, blasting and noise assessments. Where applicable mitigation measures will be proposed in the EMPr.	Specialist studies included as Appendices 3 – 14. Heritage study (Appendices 12 & 13) includes for management of cemetery & implementation of heritage conservation plan.
Cadvest Trust	X	N/A	Are concerned with noise and pollution. What is the expected life of mine?	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, dust, blasting and noise assessments. Where applicable mitigation measures will be proposed in the EMPr. The mine will be operational for a maximum period of 20 years with a further 5 years for post closure monitoring.	Impact assessment – Section 9 (air, noise, flora, fauna, blast, groundwater, surface water). Specialist studies included as Appendices 3 – 14. Life of mine – Table 3.
Claris Dreyer Local Geologist and Resident	X	12-08-2015 Public Meeting	The settlement of a mine in this area will have negative impacts on the town. Onverwacht is a sensitive area. Added that there is a potential for SponCom (spontaneous combustion) from the product and the product waste. The topographical map in GCMC' s BID and in the presentation needs to be updated to show the current extent of urban development around the proposed mine site. Onverwacht and Marapong are much closer to the mine than is shown on the topographical map. The BID states that rollover rehabilitation of mining cuts will be done. The overburden is 30 – 50m thick and 50% will be discards and 50% will be product. The coal must be extracted before it can be back-filled. It will take a few years before you can backfill the discard into the pit. How will you do the backfill? There is fine material that cannot be used. Vast amount of fines will be produced. How will these be handled? How will discard be stored when they are prone to SOx and NOx emissions? Plant discard dumps are needed to accommodate its discard. Dumps must be controlled to ensure there is no spontaneous combustion. Waterberg coal is prone to Spon-Com. How will you control Spon Com? You will not be able to double handle plant discards. We have determined that it is a "no-go". The only way to handle the slimes is with a briquetting plant. This will cost money. If one drives along the R2001 Stockpoort road it is easy to see these issues at Grootegeluk. In the Waterberg, we cannot seal the fractures. Do you have groundwater monitoring as part of your Draft Scoping Report?	The plan of study for the EIA/EMPr phase of the project includes specialist air quality assessment, groundwater, blasting, dust, SponCom and noise assessments. Where applicable mitigation measures will be proposed in the EMPr. The plans have been updated and included in the Final Scoping Report as well as future reports. Comments are noted. It is very important for GCMC to take them into consideration. They however cannot make the decisions until the EIA/EMPr has been completed. The draft Scoping Report does highlight the need for groundwater monitoring. This will be highlighted in more detail in the EIA/EMPr.	Plans to backfill with discard and thus curb spontaneous combustion. Maintain moisture content in coal. Section 3.1.4. All Plans updated. Allowance made for temporary stockpiling prior to backfilling – Section 3.1.4. Fines in slurry will report to slurry dam for future blending into product - Section 3.1.4. Groundwater monitoring – Section 29.1.5.
Johny Kuter Makgai Lephalale Resident	X	27-07-2015 Faxed	Sent his CV as he is looking for employment.	His CV was forwarded to GCMC and will be considered in the future subject to the various authorizations being approved.	N/A
Stephen Manamela Interested Party	X	12-08-2015 Public Meeting	Marapong is made up of 90% RDP houses and their foundations are weak so this needs to be considered during blasting. What will GCMC do to prevent damage to these houses?	Various specialist studies will be undertaken including blasting and groundwater assessments. The EMPr mitigation measures will provide the answers to these questions as highlighted. Feedback	No impact to these structures identified through the blast study – Section 9.1.

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
			Marapong extension 4 has no water. How will GCMC get water?	on the specialist studies will be highlighted at the EIA / EMPr phase public meeting.	Hoping to source water from MCWAPII II. Currently investigating alternative water sources.
Bernadine Stafford (B's Place)	X	12-08-2015 Public Meeting	Who will take out insurance cover and responsibility for damage to buildings? How long will it take for GCMC to repair potential damaged buildings?	Blasting studies will be done as part of the EIA/EMPr and will note the impacts around the proposed mine and the EMPr will propose mitigation measures.	Blast study – Appendix 14 and impacts discussed in Section 9.1.
			The main road is already overused and busy. Will GCMC address the increased road use around the mine?	The impacts in terms of an increase in traffic will be included in the EIA; however no traffic study was identified due to the proposed siding. The coal will be transported via rail, no coal will be trucked. GCMC is has approved a traffic impact assessment and it will be included in the EMPr.	Traffic assessment will be submitted as soon as it is completed.
			Why didn't GCMC do a public participation exercise 3 years ago? Why has Groothoek been fenced?	GCMC' s prospecting right was expiring and thus they applied for a mining right. Thus the mining right application process is now underway. Exxaro owns the surface rights on Groothoek and they put up the new fence, not GCMC.	N/A
			Medupi power station has delayed the installation of a flue gas desulphurisation plant even though they had previously committed to it. What guarantee do we have that GCMC will not go back on its EMPr commitments? Medupi relies on clean air to operate.	Noted. GCMC and the Medupi power station are not comparable. Exxaro and GCMC are not state-owned entities. If GCMC go back on their EMPr commitments they are liable to fines and imprisonment. GCMC are subject to the laws and regulations of the state.	N/A
Gideon van Niekerk Interested Party	X	12-08-2015 Public Meeting	Why is GCMC mining here and not further to the west of Lephalale? The mine must just go purchase other rights somewhere else. There is a lot of coal west of the town.	The MPRDA makes the State the custodian of all minerals in South Africa. Companies must then apply for the right to mine these. You may only apply for a right on areas where this does not overlap someone else's right / application. GCMC does not hold any rights further west of Lephalale, but they have applied for the rights to these farms. Other companies holding rights to the west of Lephalale are not selling their rights.	N/A
Kantshi Makubelo (Interested Party)	X	12-08-2015 Public Meeting	We need more time to participate in the process. The proposed mine will be close to the community so the community would want to participate in it.	This is not the end of the stakeholder engagement process. I&APs will be able to comment on the reports, there will be another EIA/EMPr meeting and I&APs will be notified of the RoD.	PPP on-going – Section 7.2 & 7.3
			GCMC must check the impact radius of their blasting activities. It will affect the shacks and RDP houses in Marapong.	Blasting studies will be done as part of the EIA/EMPr and will note the impacts around the proposed mine and the EMPr will propose mitigation measures.	No impact to RDP houses in Marapong identified through the blast study – Appendix 14 and Section 9.1.
			The proposed mine will be in the way of the proposed road linking Lephalale and Marapong which was meant to ease traffic congestion.	GCMC has been engaging the Lephalale Municipality about its SDF and discussions are on-going. The mine development is subject to GCMC getting their application approved.	Synopsis on municipal plans and contradictions in these plans – Section 81.1.14. The road link can still be established but will need to be slightly diverted.
Lungani Zwane NCC-Group	X	12-08-2015 Public Meeting	Worried that there was no advert in the Mogol Post. GCMC could have advertised via announcements on Lephalale FM or posts on Lephalale FM's Facebook page. You should use social media to advertise. Not everyone attending can speak English.	The suggested advertising mediums have been noted and will be considered in the future. A decision was made that the public meeting be held in English to accommodate everyone; however we do have interpreters available should anyone not understand we can meet with them after the meeting to discuss.	PPP on-going – Section 7.2 & 7.3
			What will the impact of GCMC' s sewage plant be on the Mokolo River and on the community? GCMC must do extensive socio-economic impact assessments and weigh the impacts of their proposed mine.	The EIA will note the impacts around the proposed mine and the EMPr will propose mitigation measures, these will then be presented at the next public meeting. A socio-economic	The sewage treatment plant will be a closed system with only clear water effluent which

I&APs	Date Comments Received		Issues raised	EAPs initial response to issues the applicant	Final status and Reference to EIA/EMP
				assessment will be done as part of the process.	will be recycled to the process plan – Section 3.1.6.5. Socio-economic assessment – Appendix 10.
			How will the mine affect the aesthetics of the area? GCMC are exploiting the town. People come to Lephalale for nature. Lodges and tourism will be affected by the proposed mine as it is closer to Lephalale than the Medupi power station.	The concerns have been noted. The EIA will note the impacts around the proposed mine and the Environmental Management Programme (EMPr) will propose mitigation measures. The next meeting will have more information as highlighted in the presentation.	Visual assessment – Section 8.1.1.13 and Section 9.1.9.
			GCMC must also consider the impact of the proposed mine on the health and safety of the community especially the impact of coal dust. GCMC must also consider the likelihood of cracked foundations in surrounding residential areas.	As above. These studies will be done and included in the various reports as well as being presented at the next meeting. As above. A blasting survey will be conducted.	Socio-economic assessment – Appendix 10. Blast study – Appendix 14. Impacts in Section 9.1. Social impact summary in Section 11.1.
			Mr Zwane downloaded the BID and Draft Scoping Report for review and comment.	Noted. Mr Zwane downloaded these reports.	Not referenced further.
Ilze-Mari Bouwer Interested Party	X	12-08-2015 Public Meeting	If the slimes dam fails it will leak into Marapong. We did not find GCMC on the internet so how do we know if they are legitimate? We need a company profile with the Directors of the company.	Comment Noted. The EIA/EMPr will note the impacts around the proposed mine and the EMPr will propose mitigation measures. This will then be discussed at the next public meeting. Project details can be found on www.umbono.com under the Africa-Portfolio item.	Slurry dam will be designed with adequate capacity. Dirty water trench will collect any slurry spills – Storm water management plan – Section 3.1.7.
Leon Roux Interested Party	X	12-08-2015 Public Meeting	The proposed mine site is in a declared urban zone, therefore the underlying coal reserves insofar opencast mining is concerned are theoretically/legally sterilized. Mr Roux downloaded the Final Scoping Report from the Cabanga Website for review and comment.	The EIA will note the impacts around the proposed mine and the Environmental Management Programme (EMPr) will propose mitigation measures. The SDF map will be included in the Final Scoping Report and overlaid with the mine plan. Noted. Mr Roux was already registered as an I&AP and will be kept informed throughout the project PPP.	Section 53 of the MPRDA is relevant regardless of existing land zoning. Synopsis on municipal plans and contradictions in these plans – Section 8.1.1.14. The road link can still be established but will need to be slightly diverted. Not referenced further.
Martin Roux Interested Party	X	12-08-2015 Public Meeting	Will the equestrian facility on Groothoek be moved as a result of GCMC' s mine?	GCMC have spoken to Rudi van Niekerk as well as Exxaro as part of the public consultation process. Exxaro will most likely look after the future of the equestrian facility.	N/A
Marcelle Diedericks; NCC-Group Rory Muldoon; Rory Muldoon Projects Andries Basson ; Lephalale Resident Dwayne Booth; IPS Lofty Fourie; Onverwacht Resident Matome Kapa; Centre for Environmental Rights	X	12-08-2015 to 14-09-2015	Downloaded the Final Scoping Report from the Cabanga Website for review and comment.	Noted. No additional comments received.	Not referenced further.

8 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES

8.1 Baseline Environment

During the pre-feasibility phase of the project, some specialist studies were completed by GCMC. As part of the EIA and EMPr phase, these specialist reports were updated where necessary; and supplemented with new studies / additional information where required. Below is a summary of the current baseline situation, including findings from the specialist studies completed during the EIA Phase. All specialist studies completed as part of this EIA/EMPr have been included in relevant Appendices. Prior studies conducted during the prefeasibility phase have only been included where they have been directly referred to. The prior studies not included can be provided to the DMR on request.

8.1.1 Type of Environment Affected by the Proposed Activity

8.1.1.1 Climate

The mean annual rainfall varies around 450mm. Rainfall occurs mostly in the summer from November to April, almost exclusively as showers (mild to heavy) and thunderstorms. The Design Rainfall Utility Program (DRUP) (Smithers & Shultze, 2002) estimates average annual rainfall in the area at around 428.2 mm. The DWS (Hydrological Information System) historic hydrological data for Mokolo Dam (A4E007) for a period starting on September 1977 and ending on April 2015 indicates annual average evaporation at 2 041.9mm.

The winter months are usually very dry; however periodic thundershowers may occur, but are generally rare. Minimum temperatures in winter rarely fall below 0ºC, and are usually between 5-7ºC for June and July. Summer maximum temperatures average at 33ºC during February.

The wind rose for Lephalale (Rayten, 2015) is provided in Figure 8 below. A high frequency of winds is observed from the north-eastern sector. The predominant wind direction for the period is east-north-easterly (17% of the time) and north-easterly (11% of the time). Wind speeds for the three year period are generally slow to moderate with calm conditions, defined as wind speeds less than 1 m/s, observed for 32.49% of the time. Additional information on diurnal and seasonal trends for wind speed and direction can be obtained in Appendix 3: Air Quality Impact Assessment Report (Rayten, 2015).

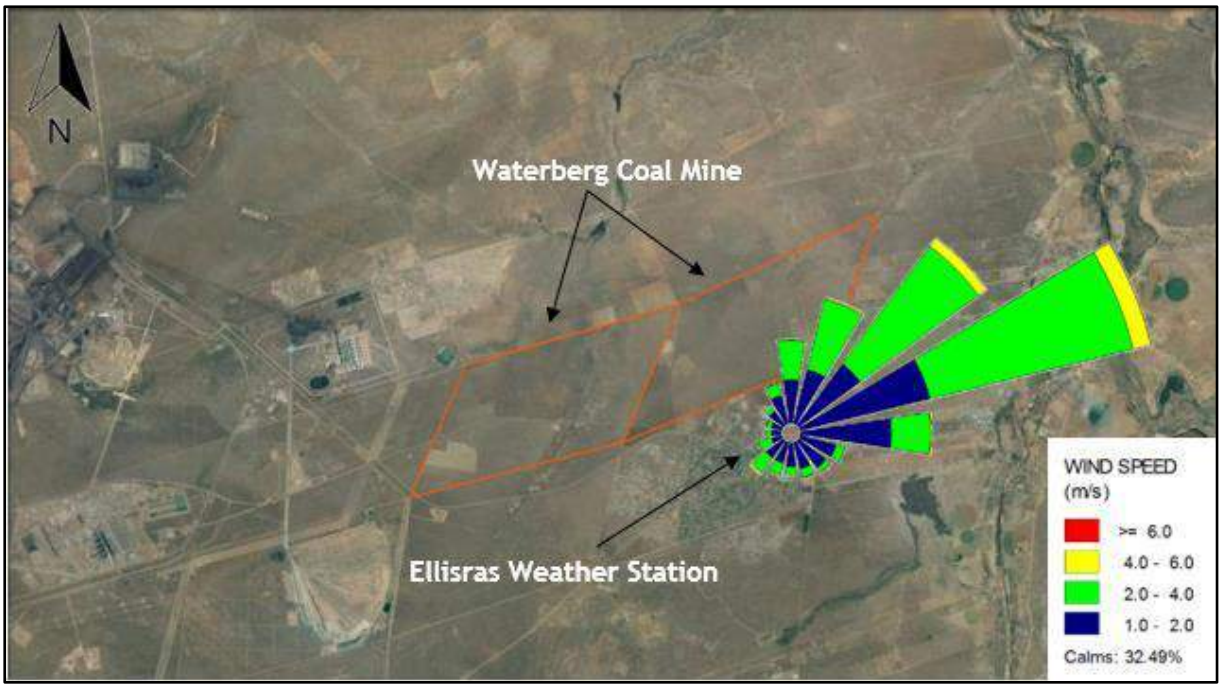


Figure 8: Wind rose for Lephalale (Rayten, 2015)

8.1.1.2 Topography

The area lies north of the Waterberg Mountain range which forms part of the escarpment along the south-western border. Despite the proximity to the mountain range, the site can be classified as flat to very gently sloped, where elevations range from 890 m above mean sea level (mamsl) in the south west to 846 mamsl in the north where the Sandloop River exits the properties. Overall drainage is therefore north and north-east.

8.1.1.3 Geology

The coal lies within the Waterberg Coalfield. The coal is hosted within the middle to upper Ecca Group in the Vryheid Formation (or Swartrant Formation) and the Grootegeluk Formation (Volksrust Formation equivalent).

Eleven coal zones have been identified across the Waterberg coalfield named from the top (eleven) to the bottom (one). On the two farms the lower coal zones [zones 1 to 4 (including Zone 4A)] are located in the Vryheid Formation, containing mainly dull coal with an average thickness of 2 – 7.3 m and with an ash content that increases upwards from about 20% to about 45%. Interlayered material is mainly sandstone with some shale and mudstone present. The upper coal zones, zones 5 to 10, are located in the Grootegeluk Formation, consisting of rapidly alternating bright coal and shale layers often referred to as “bar-code” coal. Coal ranges in ash content from 45% to 65%, and so requires beneficiation to produce a suitable coal product.

The coal resource for this project is dominated by coal Zones 1 to 7. Overlying the coal is 30 to 40m thick sequence of overburden, consisting of recent unconsolidated sand and

weathered mudstone. The top contact of the coal zone occurs as an eroded contact immediately below the overburden.

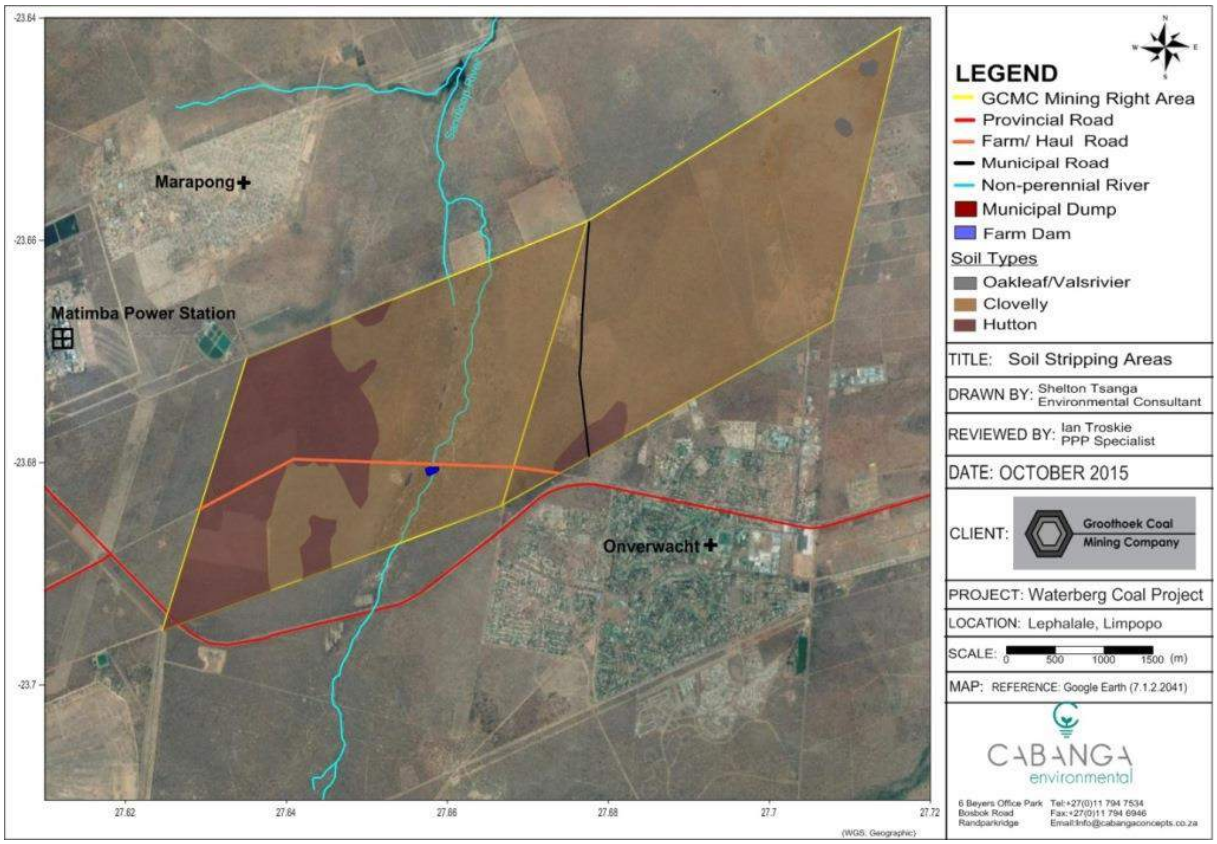
A number of faults have been identified on the property and these define the resource blocks. The western portion of the resource, found mainly on Eendracht farm appears to be a downthrown block of step faults and hosts all 10 zones, with the upper coal zones eroding away toward the north and west. The eastern portion of the resource, found exclusively on the farm Groothoek, is dominated by Zones 1 to 4, with the coal zones pinching out toward the basin edge to the north and east.

8.1.1.4 Soil

Cabanga Concepts completed a soil assessment for the project area; please refer to Appendix 4 for a copy of the full report. Only pertinent baseline findings are provided below.

The soils were classified into broad classes according to the dominant soil form and family (Plan 7 and Table 8) over the GCMC mining right area, and include:

- Red apedal soils of the Hutton soil form;
- Yellow-brown apedal soils of the Clovelly soil form;
- Black clayey or greyish soils associated with the drainage channels and pans of the Oakleaf/Valsrivier soil forms.



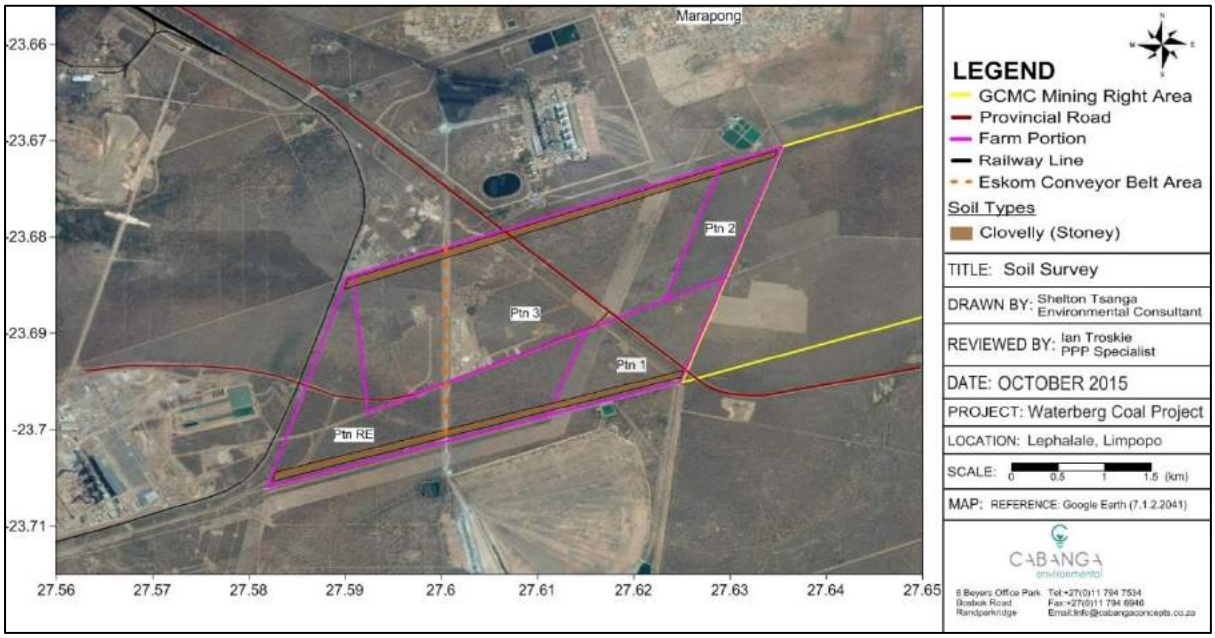
Plan 7: Soil profile layout of within the GCMC mining right application area

Table 8: Soil distribution within the GCMC mining right area

Portion	Soil name	Soil depth	Soil Code	Area (ha)	Area (%)
Groothoek 504LQ	Clovelly	900 -1200 mm	Av/Cv	1981.9	82.34
	Oakleaf/Valsrivier	600 mm	Oa/Va	5.8	0.24
	Hutton	900 – 1200 mm	Hu	13.5	17.42
Eendracht 505 LQ	Clovelly	900 -1200 mm	Av/Cv		
	Hutton	900 – 1200 mm	Hu	405.8	
Total				2407	100

The proposed rail line route(s), linking the siding alternatives to the existing railway line, were also assessed as part of the study. The linear nature of the railway line construction results in a small footprint area of impact.

Plan 8 and Table 9 show the soil distribution over the proposed railway links.



Plan 8: Soil profile layout within proposed railway link footprint area

Table 9: Soil distribution along the two railway siding options

Portion	Soil name	Soil depth	Soil Code	Area (ha)
Hanglip 508 LQ Ptn 1	Clovelly	900 -1200 mm	Cv	7
Hanglip 508 LQ Ptn 2	Clovelly	900 -1200 mm	Cv	2
Hanglip 508 LQ Ptn 3	Clovelly	900 -1200 mm	Cv	18
Hanglip 508 LQ Ptn RE	Clovelly	900 -1200 mm	Cv	23
Total				47

Hutton (Hu)

The soils in the area are of the Hutton type (Hu35) (ARC-GIS, 2004). They are sandy, with 70-90 % sand in the top layer and 50-90 % in the sub layer. The clay content ranges from 5% to 25 % in the top layer and 5% to 45 % in the sub-layer. This content puts the top layer in the sandy to sandy-clay-loam texture and the sub layer in the sandy to sandy-clay texture. Silt content is low in all the soils.

Clovelly (Cv)

The physical characteristics of the Clovelly soils mapped vary in nature from those with a very fine to medium grained sandy and/or silty loam texture, with pale grey brown to yellow brown colours and a single grained orthic topsoil ("A" horizon), on yellow to yellow/red dystrophic "B" horizons, to those with a more clay rich sandy clay loam texture, displaying much darker yellow reds and less leached colours. A few localised patches (of limited geographical extent) contain large amounts of pebbles intercepted at the surface by conglomerate rock outcrops.

Oakleaf/Valsrivier (Av)

The Oakleaf/Valsrivier soil forms are dominant within the depressions/pans in the landscape and exhibited high clay content. A more defined structure was observed as compared to the areas with the sandier Clovelly soils. The Valsrivier Orthic A horizon underlies a pedocutanic B horizon / unconsolidated material without signs of wetness. The Oakleaf Orthic A horizon underlies a neocutanic B horizon / unspecified material. The depression/pan areas are indicative of potential surface concentrations of water with a consequent accumulation of clay in the subsoils (TerraSoil 2014).

8.1.1.4.1 Soil Chemistry

The average clay content, based on the land type data and the survey results of the AGES 2012 study, was 4-6 % for the Hutton and Clovelly soil forms. The black or dark grey clayey soils associated with drainage channels/depression and pan of the Oakleaf/Valsrivier soil forms showed a clay content of 10-30%.

The natural soil organic carbon content lies below 1 mm (ARC-GIS, 2004). This is very low. Productive soils have an organic matter content of above 3 mm.

The natural soil pH lies between 5.5 – 6.4 (ARC-GIS, 2004). The soils mapped in the area are slightly acidic. A pH between 6 and 7 most readily promotes the availability of plant nutrients.

The potential of a soil to retain and supply nutrients can be assessed by measuring the Cation Exchange Capacity (CEC). The average CEC within soils mapped was 3.1 - 6.0 cmol/kg (ARC-GIS, 2004). This is relatively low. Low CEC values are an indication of soils lacking organic matter and clay minerals. Soils with high organic matter content will have a CEC of 300 cmol/kg and soils with low organic matter and clay content will have a CEC of 1-5 cmol/kg.

The low clay content puts the top layer in the sandy to sandy-clay-loam texture and the sub layer in the sandy to sandy-clay texture. Soil permeability is high within Clovelly and Hutton soil forms. Water movement through the soil is very fast, washing with it available nutrients thus rendering the soils unsuitable for crop cultivation (Savannah Environmental 2010).

The broad-based erodibility of the different forms, taking into account the organic matter and soil texture is tabulated in the Table 10. The erodibility of the dominant soil forms i.e. Hutton and Clovelly is classified as a moderate to high erodibility index. This is due to low clay content in the "A" horizons of the soils and the low organic carbon content. However the flat topography of the area will effectively reduce the erosion potential to low.

Table 10: Soil erodibility index

Soil Form	Erodibility Index
Hutton	Moderate - High
Clovelly	Low-Moderate - High
Oakleaf/Valsrivier	Low

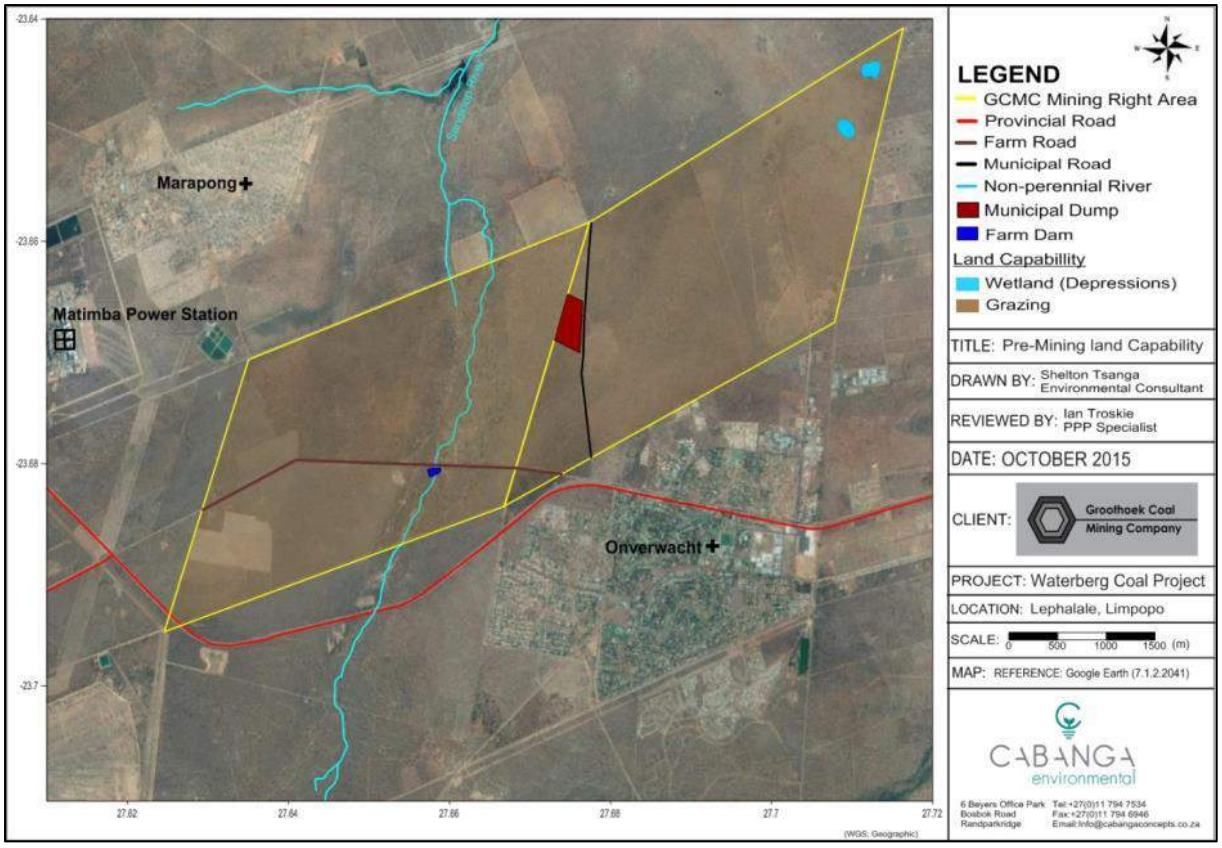
8.1.1.5 Land Capability

The extent of land capability classes is shown in the pre-mining capability map, Plan 9 for the mining right area. Table 11 shows the soil types grouped into each land capability class, a broad description of the soil group, the number of units per land capability class, and the area and percentage comprised by each land capability class.

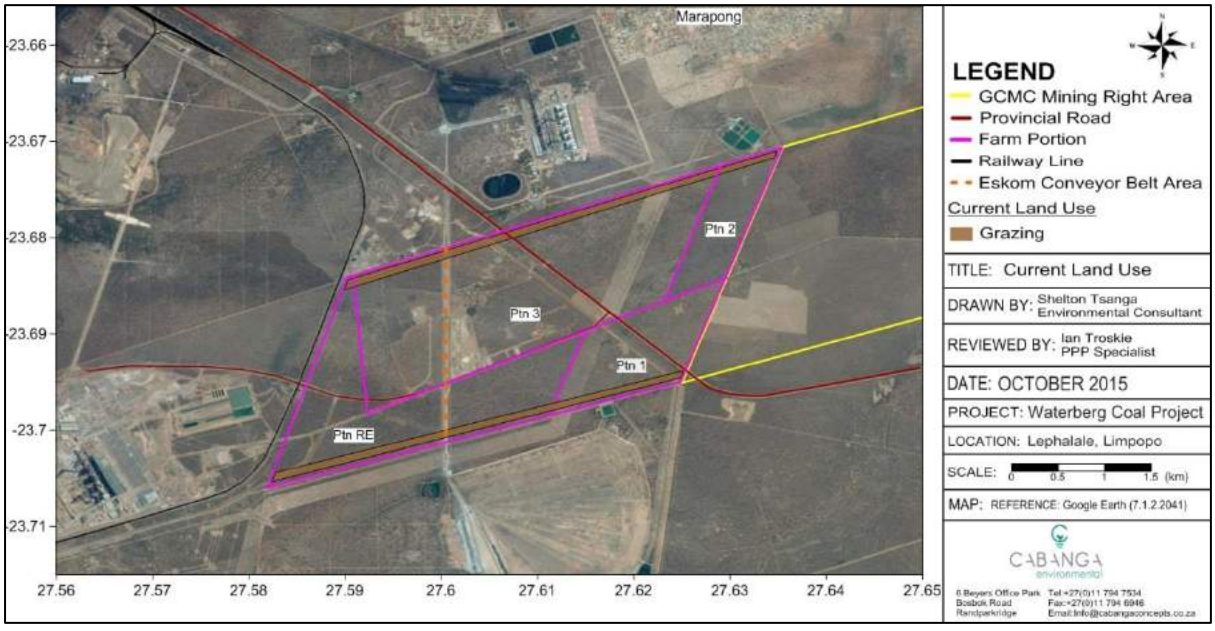
Land Capability within the railway link area is classified as grazing and is shown in Plan 10.

Table 11: Pre mining land capability classes

Land capability class	Land capability code	Soil type	Broad Soil Description	Area (ha)	Area (%)
Grazing	G	Hu	Shallow Orthic A-horizon, 100-150 mm	419.3	17.42
		Cv	Shallow Orthic A-horizon, 100-150 mm	1981.9	82.34
Wetland	We	Va/Oa	Grey, imperfectly to poorly drained, sandy soils mainly associated with leached E-horizons and percolating water tables in temporary, seasonal and permanent wetland zones.	5.8	0.24



Plan 9: Land capability map within the GCMC mining right application area



Plan 10: Land capability within proposed railway link footprint area

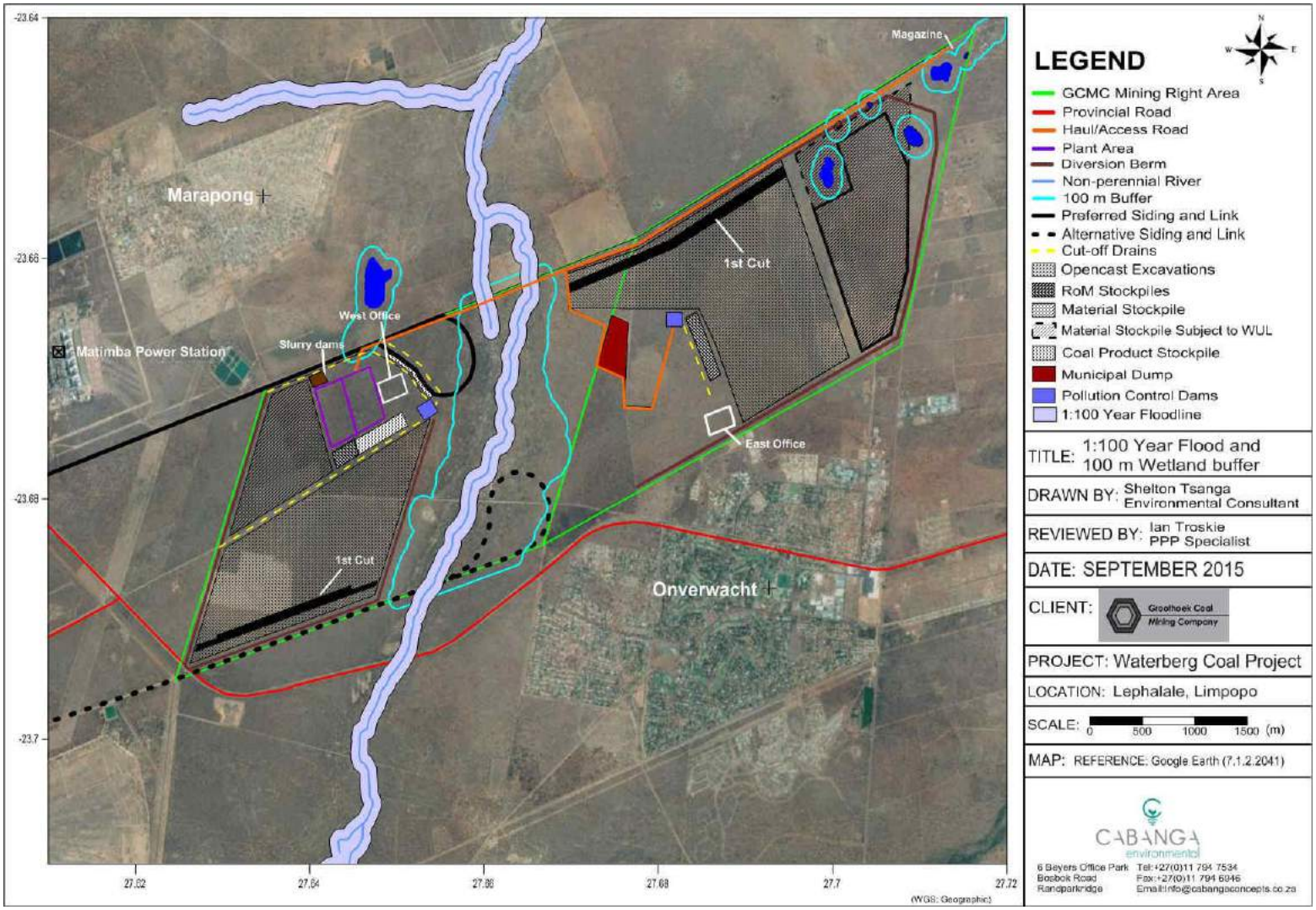
8.1.1.6 Surface Water

PG Consulting Engineers (Pty) Ltd (2013) completed a floodline assessment for the Sandloop River in 2013. Letsolo Water and Environmental Services (LWES, 2015) completed a hydrological assessment for the site in 2015. These reports are included as Appendix 5 and Appendix 6 respectively. The baseline conditions for the project area are summarised below.

The site is within the Mokolo Catchment of the Limpopo Water Management Area (WMA1 – 8 387 km²). The Mokolo River is the main river in the catchment and flows from south to north to confluence with the Limpopo River forming the northern South African Boundary. The Mokolo River lies east of Lephalale and was designated as a largely modified river with a 1999 Present Ecological Status (PES) of D and River Condition of D.

The site falls largely within quaternary catchment A42J. The south-eastern corner of the farm Groothoek 504LQ falls within catchment A42H. Quaternary catchment area A42J drains into the Sandloop River, which transects the mineral boundary area flowing south to north through the eastern half of the farm Eendracht 505LQ. The Sandloop River flows northwards and then north-east to confluence with the Mokolo River approximately 16km north-north-east from the proposed site. The Sandloop River was designated as moderately modified with a 1999 PES of C and River Condition of A/B, which is largely natural. Quaternary catchment area A42H drains into the Mokolo River via drainage areas and storm water drainage associated with the town of Lephalale.

The 1:100 year flood lines for the Sandloop River have been determined and indicate that the stream has a flood plain which extends further than 100m, in some areas more than 750m (Plan 11). This is typical for a stream with very shallow banks in a topographically flat area. The 1:100 year flood line will therefore be applied as the appropriate buffer zone for the stream regarding developmental boundaries. Plan 11 also indicates the 100m buffer areas from wetlands, including the riverine wetland associated with the Sandloop River. This buffer zone encompasses the 1:100 year floodline and will be utilised as the developmental limits for any water uses within 100m of surface water bodies.

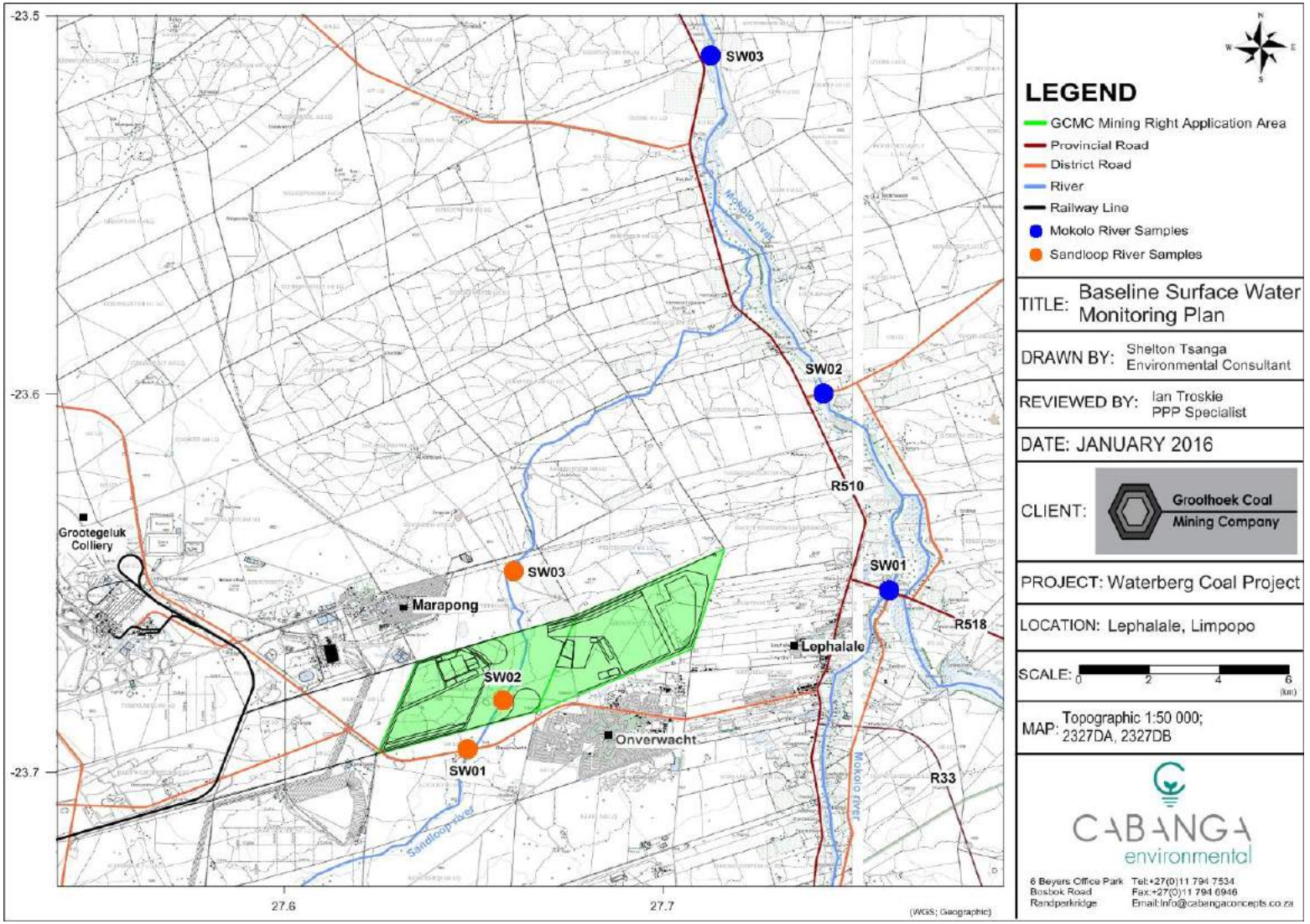


Plan 11: 1:100 year and 1:50 year flood lines for the Sandloop River

Due to the drought currently affecting South Africa, water samples were only taken in late November 2015, the first time water was available within the surface water resources on site since the project kick-off. The results are presented in Table 12 and the baseline sampling sites are indicated in Plan 12. Water quality was good at all sites with all parameters falling within SANS 241 (2011) guidelines, except for elevated iron at SW03 on the Sandspruit. This is most likely as a result of seepage from the Eskom dams as discussed in Section 8.1.3.2.

Table 12: Surface water baseline qualities (highlighted cells exceed SANS 241 guidelines)

Constituent	SANS 241:2011		SW01 Mokolo	SW02 Mokolo	SW03 Mokolo	SW01 Sandspruit	SW02 Sandspruit	SW03 Sandspruit
pH	5-9.7		7.75	7.67	7.53	7.46	7.31	7.69
EC	170	µS/cm	109	92.3	85.9	64.8	31.3	74
TDS	1200	mg/L	70.85	59.995	55.835	42.12	20.345	48.1
Calcium (Ca)		mg/L	6.342	5.596	4.947	9.485	2.522	2.05
Potassium (K)		mg/L	1.378	1.335	1.198	4.304	2.472	5.318
Magnesium (Mg)		mg/L	3.916	3.513	3.09	1.486	0.5841	0.6753
Sodium (Na)	200	mg/L	10.67	9.036	8.051	0.5986	1.505	9.977
Chloride (Cl)	300	mg/L	<0.75	<0.75	3.91	14.8	10.4	12.8
Fluoride (F)	1.5	mg/L	0.371	0.224	0.514	0.189	0.175	0.192
Nitrate (NO3)	11	mg/L	1.23	0.675	3.63	0.472	0.399	1.01
Nitrite (NO2)	0.9	mg/L	0.082	0.082	0.096	0.1	0.092	0.095
Sulphate (SO4)	500	mg/L	5.86	1.82	28.7	2.87	10.3	1.27
Aluminium (Al)	0.3	mg/L	<0.06	<0.06	<0.06	<0.06	<0.06	0.4708
Iron (Fe)	2	mg/L	0.0452	0.0628	0.0248	0.0141	<0.008	0.2277
Manganese (Mn)	0.5	mg/L	0.0199	<0.002	0.0147	<0.002	0.0036	0.0098
Lead (Pb)	0.01	mg/L	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Zinc (Zn)	5	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Calcium Hardness		mg/L $CaCO_3$	15.84	13.97	12.35	23.68	6.30	5.12
Magnesium Hardness		mg/L $CaCO_3$	16.13	14.47	12.72	6.12	2.41	2.78
Total Hardness		mg/L $CaCO_3$	31.96	28.44	25.08	29.80	8.70	7.90
Total Alkalinity		mg/L $CaCO_3$	18.00	6.87	52.60	22.90	21.60	18.60



Plan 12: Baseline water monitoring locations around the GCMC mining right application area

8.1.1.7 Groundwater

Geohydrology assessment was completed by Future Flow (2015) and the detailed report is attached as Appendix 7.

Two aquifers occur in the area, associated with a) the upper weathered (sandy) material, and b) the underlying competent and fractured rock material.

Upper weathered material aquifer

The thickness of the weathered material aquifer is unknown due to a lack of exploration and water borehole log information. An aquifer thickness of 15 m has been estimated from previous investigations conducted in the study area; note that this is not an absolute value for the entire study area.

It is considered that effectively 1 to 2 % of the mean annual rainfall eventually reaches the groundwater table after taking into account evaporation, transpiration and seasonal variance in rainfall. The evaporation in the area was measured during other studies in the vicinity and calculated to be around 3 000 mm/a. This is a very high value, especially compared to the average rainfall of 350 to 400 mm/a.

The borehole yields in this aquifer are seasonally variable due to the strong dependence on rainfall recharge. Generally, it can be said that the yields of this aquifer during the rainy season can be around 1 to 3 L/s while sustainable yields will decrease markedly during the dry season. In some areas this aquifer will be laid completely dry during the dry season.

The groundwater quality in undisturbed areas is good due to the dynamic recharge from rainfall. This aquifer is, however, more likely to be affected by contaminant sources situated on surface.

Lower fractured rock aquifer

The competent rock is subjected to fracturing associated with tectonic movements that created features such as the Eenzaamheid and Daarby faults and other secondary faults.

Groundwater flow in the lower aquifer is associated with the secondary fracturing in the competent rock and as such will be along discrete pathways associated with the fractures. Major faults such as the Eenzaamheid fault can be a major source of groundwater, depending on secondary mineralisation.

8.1.1.7.1 Groundwater depth

Depth to groundwater level ranges between 1.86 and 31.73 mbgl. The groundwater level in borehole BH10 is anomalously deep at 63.92 mbgl. This borehole is used for domestic and livestock purposes by Eskom; the dewatering of the borehole is the cause for the deep groundwater level. There is a slight distinction between groundwater levels associated with the upper weathered material aquifer and the fractured rock aquifer (Figure 9).

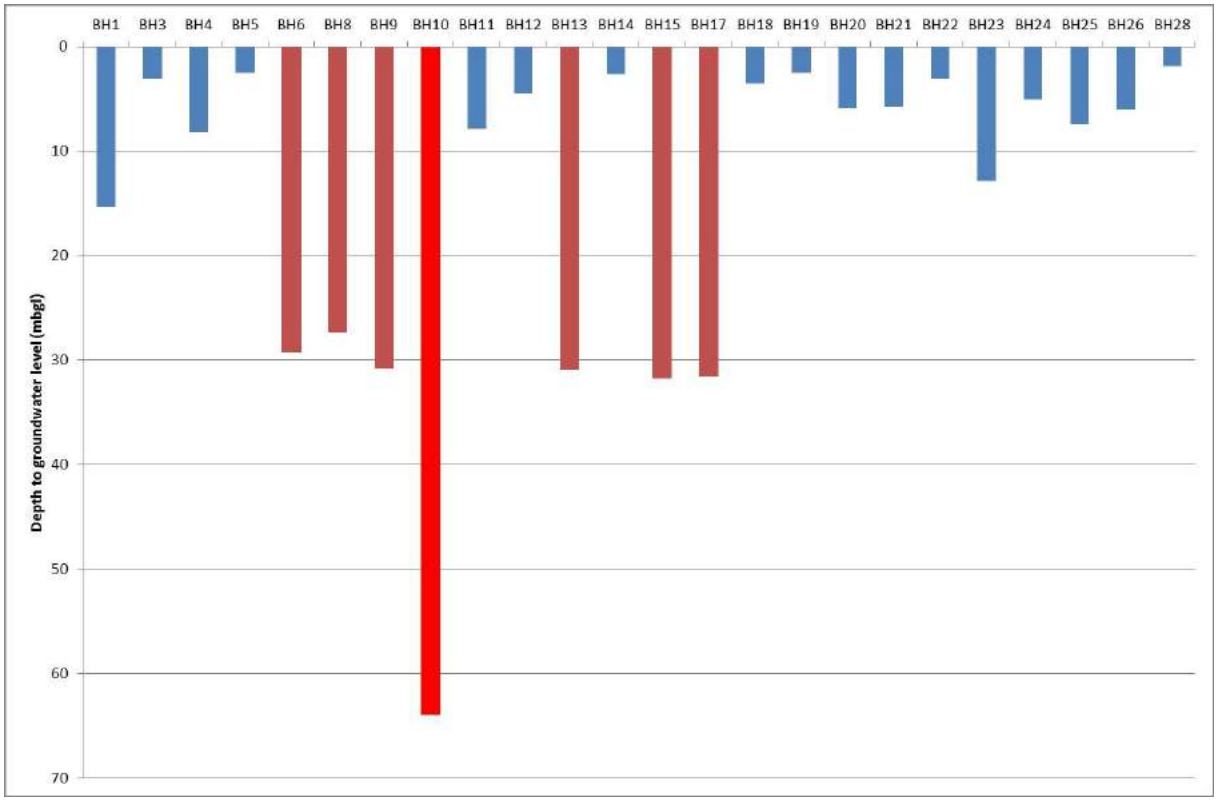
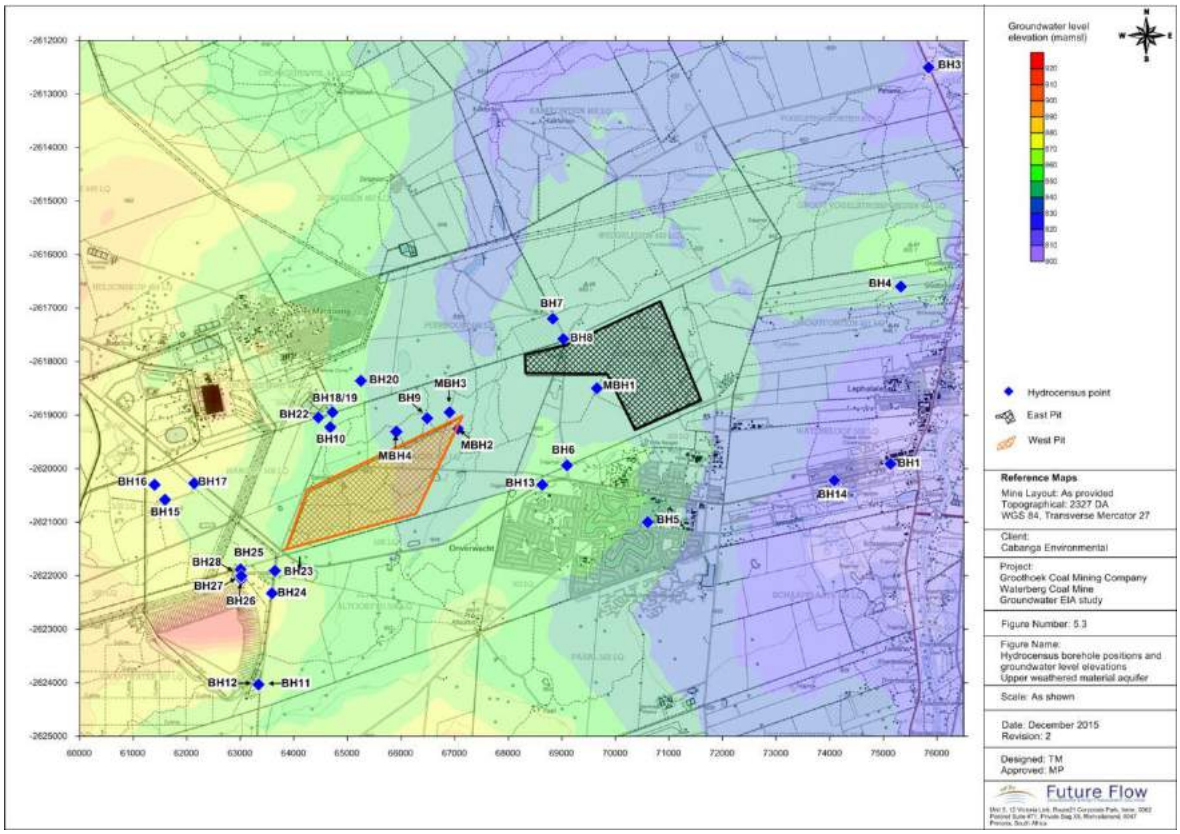


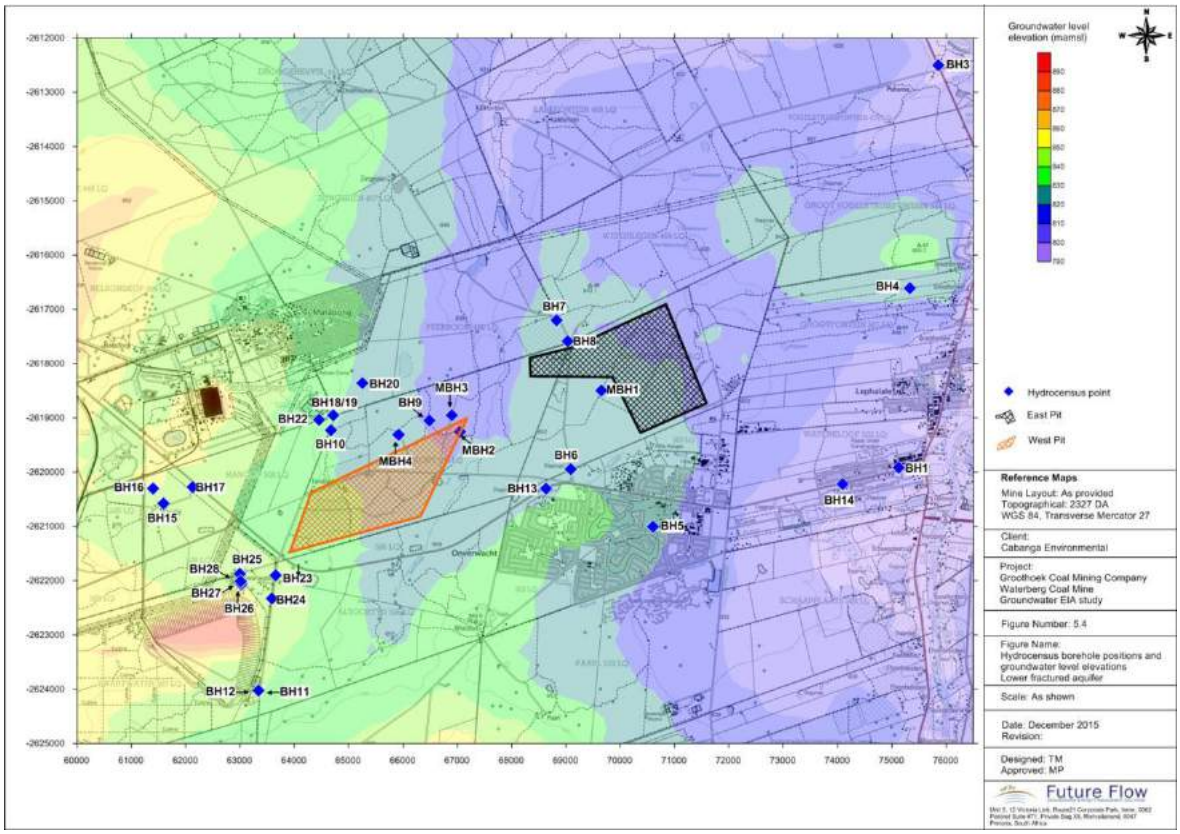
Figure 9: Depth to groundwater level

Based on the slight hydraulic disconnect between the upper weathered and underlying fractured rock aquifers it can be said that the depth to groundwater level in the upper weathered material aquifer ranges between 1.86 and 15.86 mbgl with an average of 5.78 mbgl (Plan 13 and Plan 14). The underlying fractured rock aquifer shows depth to groundwater level measurements ranging between 27.35 and 31.73 mbgl (the depth to groundwater level in BH10 is considered an outlier), with an average of 30.25 mbgl.

Plotting the groundwater level elevation against topographical elevation for the upper weathered material aquifer yields a 96.4 % correlation, while a similar plot for the fractured rock aquifer yields a 99.1 % correlation. From this it is concluded that the groundwater levels for both aquifers generally mimic topography in the areas where the boreholes are located, and that there are no obvious localised dewatering or flow effects in the study area.



Plan 13: Hydrocensus points & groundwater level in upper weathered material aquifer



Plan 14: Hydrocensus points & groundwater level in lower fractured aquifer

8.1.1.7.2 Groundwater quality

A total of six groundwater samples were taken from existing water boreholes around the project area during the hydrocensus and submitted to a SANAS accredited laboratory. The data is compared to the SANS 241:2011 drinking water standards (Table 13). The standard represents a numerical limit of the listed element concentrations that will protect the health of the consumer over a lifetime of consumption. All elements that exceed the guidelines are highlighted and their aesthetic and health impacts discussed below.

Elevated electrical conductivity (EC) measurements of between 207 mS/m and 792 mS/m are recorded in boreholes BH1, BH5, BH8, BH10 and BH15. Aesthetic effects are present at concentrations exceeding 170 mS/m; the water will have a marked salty taste that would not be well tolerated on aesthetic grounds. Plumbing and appliances could also be affected by increased corrosion and scaling. The consumption of water with an EC of below 300 mS/m does not appear to produce adverse health effects in the short term.

The chloride concentrations exceed the SANS 241:2011 guidelines (100 mg/L) in boreholes BH1, BH5, BH8, BH10 and BH15. The chloride concentrations range between 375 mg/L and 2 256 mg/L; human health effects such as nausea are observed at very high concentrations exceeding 2 000 mg/L. Dehydration and vomiting is induced at concentrations exceeding 10 000 mg/L.

Table 13: Hydrochemical results – Red cells exceed SANS 241:2011 drinking water standards

Analysis	Units	SANS 241:2011	BH1	BH4	BH5	BH8	BH10	BH15
pH		5-9.7	8.64	8.60	7.52	8.31	8.59	8.54
Electrical Conductivity (EC)	mS/m	<170	207	62.4	792	273	233	253
Total Dissolved Solids (TDS)	mg/L	<1 200	1 023	321	3 808	1 676	1 258	1 351
Alkalinity (Alk)	mg/L	N/L	133	283	284	300	207	211
Chloride (Cl)	mg/L	100	375	17.2	2 256	443	408	445
Sulphate (SO_4)	mg/L	240	190	<0.287	14.5	411	282	310
Nitrate (NO_3)	mg/L	11	0.368	0.395	0.365	20.8	0.541	0.402
Fluoride (F)	mg/L	1.5	5.21	0.330	0.683	0.448	4.34	4.13
Calcium (Ca)	mg/L	N/L	17.7	27.0	311	256	54.8	85.0
Magnesium (Mg)	mg/L	N/L	4.67	8.24	381	61.3	17.8	36.9
Sodium(Na)	mg/L	200	343	88.2	689	221	355	324
Potassium (K)	mg/L	N/L	5.16	6.16	30.7	7.92	7.12	16.0
Aluminium (Al)	mg/L	0.3	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron (Fe)	mg/L	0.3	<0.004	0.232	0.139	<0.004	<0.004	<0.004
Manganese (Mn)	mg/L	0.1	<0.002	0.352	0.087	<0.002	<0.002	0.117
Zinc (Zn)	mg/L	5	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Lead (Pb)	mg/L	0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003

The sulphate concentrations in boreholes BH8, BH10 and BH15 exceed the SANS 241:2011 guidelines of 240 mg/L with sulphate concentrations of 411 mg/L, 282 mg/L and 310 mg/L respectively. There is a tendency to develop diarrhoea in sensitive and non-adapted individuals. There is also a slight taste that would make the water undesirable.

The nitrate concentration in borehole BH8 (20.8 mg/L) exceeds the SANS 241 guideline of 11 mg/L. Nitrate in drinking water is primarily a health concern as there are no direct aesthetic impacts. Methaemoglobinaemia is a condition where nitrite combines with the oxygen carrying red blood pigment, haemoglobin, to form methaemoglobin, which is incapable of carrying oxygen. The condition is particularly hazardous in infants under three months of age. Nitrates are also known to react with secondary and tertiary amines and amides, commonly derived from food, to form nitrosamines which are known carcinogens. Nitrate concentrations exceeding 20 mg/L cause mucous membrane irritation in adults.

Monitoring boreholes BH1, BH10 and BH15 exceed the SANS241:2011 guideline for fluoride of 1.5 mg/L. The concentration ranges from 4.13 to 5.21 mg/L. Fluoride is necessary in water to meet requirements for healthy tooth structure, but the threshold for marked dental mottling with associated tooth damage due to softening of enamel is 1.5 mg/L. Above this concentration, mottling and tooth damage will probably be noticeable in continuous water users. No other health effects occur.

The sodium concentrations in boreholes BH1, BH5, BH8, BH10 and BH15 exceed the SANS241:2011 guidelines. The elevated concentrations present in the boreholes range from 221 mg/L to 689 mg/L, which exceed the SANS241:2011 domestic use concentration guideline of 200 mg/L. Sodium intake can exacerbate certain disease conditions. Persons suffering from hypertension, cardiovascular or renal diseases should restrict their sodium intake. In the case of bottle-fed infants, sodium intake should also be restricted. The groundwater would have a highly salty taste that would be undesirable.

The groundwater samples represent a groundwater chemistry that is brackish, dominated by chloride ions. The project area is situated in a low rainfall, high evaporation region; which leads to the concentration of salts in the soil resulting in the dominant sodium / potassium / calcium chloride type groundwater.

It can be concluded that the natural groundwater quality in the area is poor and, except for BH04, do not comply with the SANS241:2011 water quality guidelines. The main elements that are present in elevated concentrations (chloride, sodium,) are characteristic of arid areas, while the elevated sulphate is indicative of sulphate minerals present in the carbonaceous lithologies and coal seams.

8.1.1.7.3 Aquifer transmissivity

The general transmissivity of the surrounding aquifer as calculated from the pumping test performed on a borehole within the site ranges between 0.18 and 2.4 m^2/day. These values are typical of the area and general geology. The recovery phase pumping data exhibit a similar trend with a transmissivity around1.2 m^2/day.

The borehole recovered fully within less time than the constant rate test; this suggests that the aquifer consists of a well-connected fracture network and that there is sufficient water held in storage.

8.1.1.7.4 Geochemical analysis & waste assessment characteristics

It is likely that AMD conditions will form from the carbonaceous shale and coal seam material that will be handled in the area. The high Total – S percentage indicates that the acid conditions will be sustained in the long term in waste rock stockpiles.

In general it can be said that the long term quality of seepage from the mined-out area will not pose a significant risk to the surrounding aquifers in terms of human consumption.

The test results for the total concentrations (TC) show that barium, copper, mercury and lead in the coal and shale material exceed the TCT0 guidelines in some of the samples. All the samples comply with the TCT1 guidelines. For all the samples the elements comply with the leachable concentrations guidelines.

Based on the above, the coal, shale, weathered sandstone and mudstone from all the different sites is classified as Type 3 Waste following the GN635 (2013) classification system.

8.1.1.8 Flora

A flora study for the mine area was initially undertaken by AGES (2012a). Dimela (2015) undertook a flora study for the railway links in early spring and again in November 2015, during which time the AGES findings for the mining right area were also ground-truthed. The AGES and Dimela reports are attached as Appendix 8 and Appendix 9 respectively.

The proposed development is situated within the Savanna Biome of South Africa and specifically within the Central Bushveld Bioregion. The railway links and Mining Rights Application Area are situated within the Limpopo Sweet Bushveld vegetation type that occurs on plains (sometimes undulating or irregular) traversed by tributaries of the Limpopo River. The vegetation structure is short, open woodland that can become impenetrable where disturbances favoured pioneer and encroacher species. Limpopo Sweet Bushveld is currently considered as Least Threatened and is not a listed ecosystem.

The Limpopo Province assessed the biodiversity in the province and classified the province in terms of Critical Biodiversity Areas and Ecological Support Areas, as well as Protected Areas and areas where No Natural Habitat remains. The loops of both railway links fall within Critical Biodiversity Area 1 (CBA1), which is considered as irreplaceable to reach the conservation targets of the province. The western and majority of the extent of the railway links fall within Ecological Support Area 1 (ESA1) that is considered to be vegetation largely in a natural state and important for biological movement. Within the Mining Rights Application Area, ESA2 and “Other Natural Areas” are also present. The mining and associated link activities within the CBA1 are considered incompatible land uses, while the railway links and mining in the ESA 1 and 2 might be considered, provided that mitigation measures are implemented to keep the disturbed area minimal. The mining could likely

proceed within 'Other Natural Areas' provided that applicable town and regional planning guidelines and policies are adhered to.

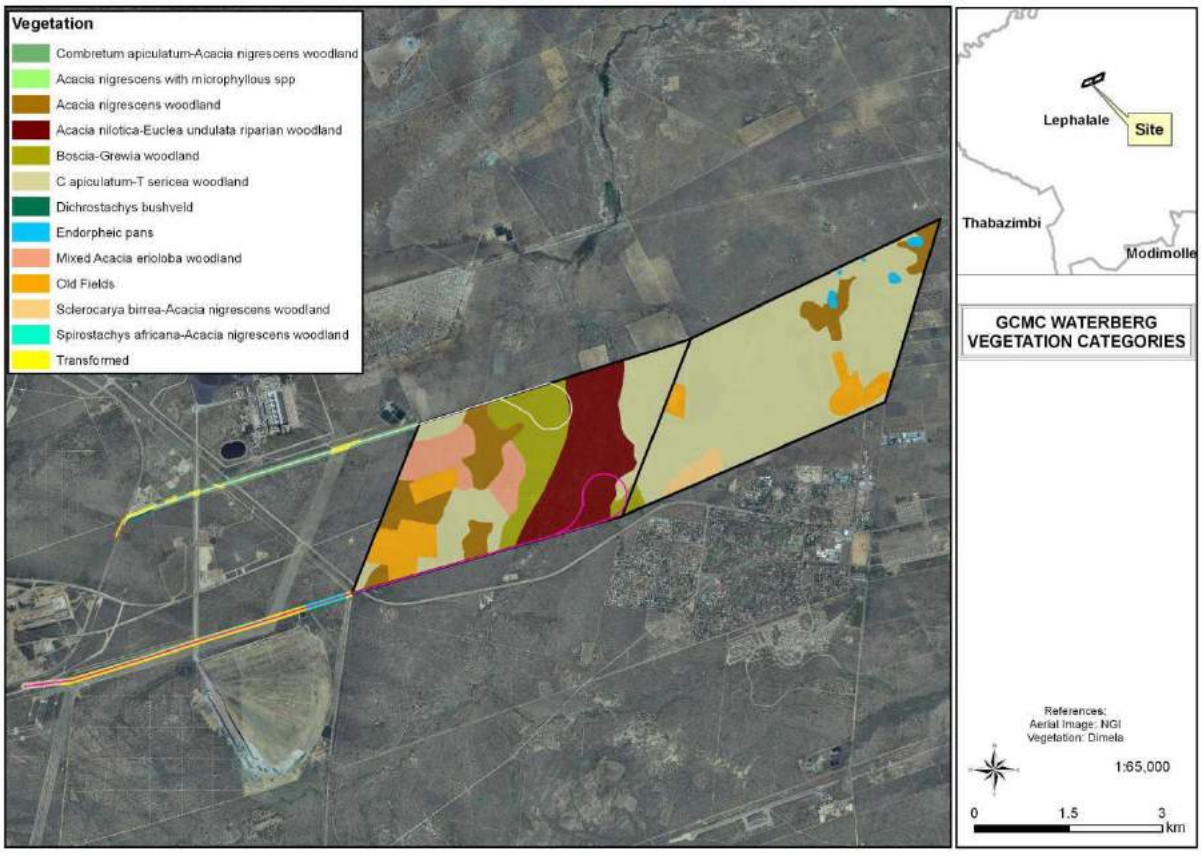
A summary of the findings of the draft vegetation assessment undertaken by AGES (2012a) within the Mining Rights Application Area (the farms Groothoek 504LQ and Eendracht 505LQ), as well as the findings of the Dimela (2015) report with regards to the proposed railway link options are combined in Table 14 and vegetation types are indicated in Plan 15 and Plan 16.

Table 14: Vegetation communities and their sensitivity ratings

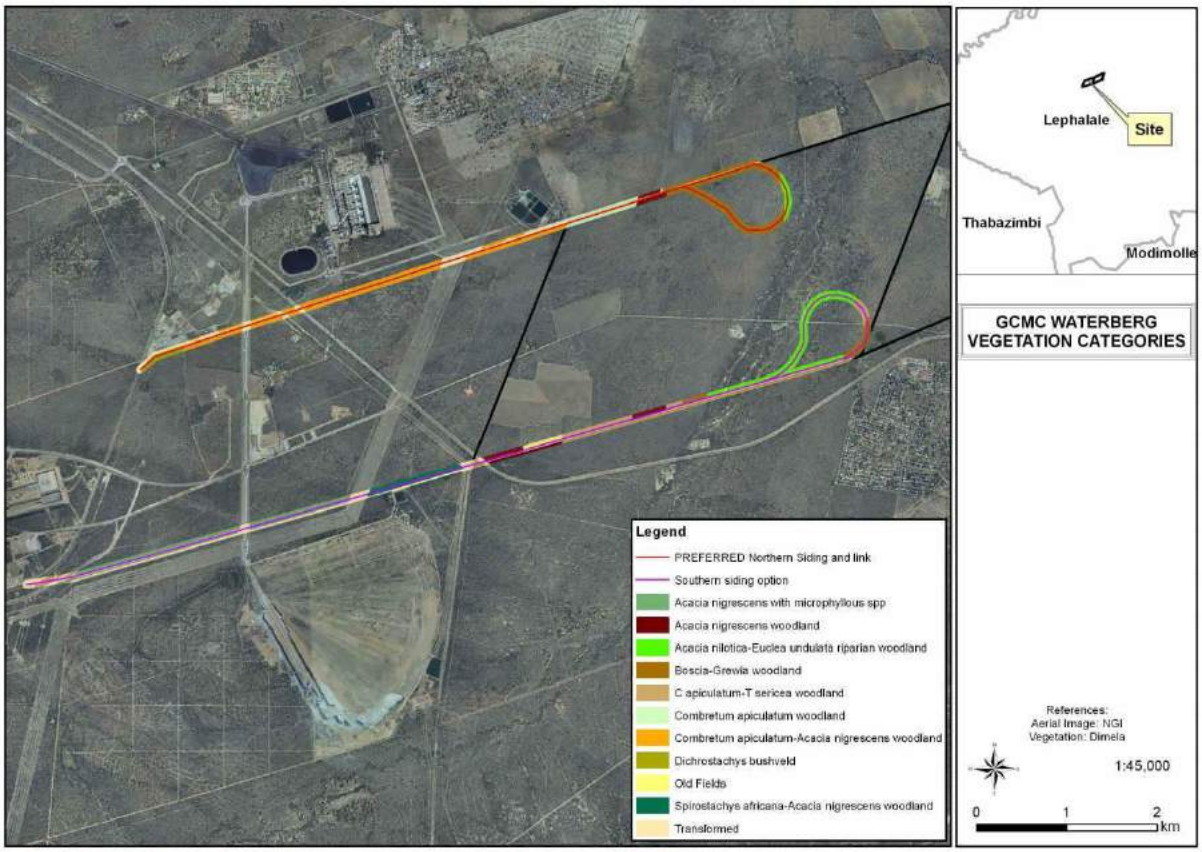
Vegetation community	Dominant species	Occurrence	Sensitivity
Old fields	Previously cultivated land in the project area and all other modified areas that range from primary old fields and secondary old fields. These secondary old fields are usually dominated by pioneer tree species such as *Dichrostachys cinerea, Terminalia sericea, Acacia tortilis* and *Ziziphus mucronata,* whereas little to no trees have colonized the primary fields yet.	Mining Right Area	Low
Dichrostachys bushveld	Dominated by microphyllous species, mainly encroachers such as *Dichrostachys cinerea* and *Acacia tortilis*. The grass layer was sparse and likely heavily grazed. Some broad leaved species were present, while the forb layer was limited to *Laggera decurrens.*	Northern link	Low
Combretum – Grewia woodland Two variants: Combretum apiculatum woodland Combretum apiculatum – Terminalia sericea woodland	Characterised by the dominance of *Combretum apiculatum* (red bushwillow) in the woody layer and *Grewia* species in the shrub layer. C. apiculatum and Grewia dominated with some Sclerocarya birrea subsp africana (marula trees). Dominated by broadleaf species such as *Terminalia sericea* and *Combretum apiculatum*, with typical sourveld grass such as *Eragrostis pallens.* This variant comprises the largest portion of the Mining Rights Application Area.	a. Mining Right Area and Southern link b. Mining Right Area	Moderate
Boscia albitrunca – Grewia bicolor woodland	Occurs mainly along the western periphery of the riparian woodland on the farm Eendracht. Dominance of the tree Boscia albitrunca and Grewia bicolor shrubs. Other common species include Commiphora pyracanthoides and Rhigozum brevispinosum. Situated within a CBA.	Mining Right Area	Moderate

Vegetation community	Dominant species	Occurrence	Sensitivity
Mixed Acacia erioloba woodland	In the north-western areas of the farm Eendracht. Characterized by a mixed woody layer dominated by species such as *Acacia erioloba* and *Combretum hereroense.* Shrub layer includes Commiphora pyracanthoides, Euclea undulata and Grewia bicolor. A degree of encroacher species noted.	Mining Right Area	Moderate
Acacia nigrescens woodland	Occurs in southern and north-western sections of the farm Eendracht and western extent of northern link. Tall woodland structure dominated by the tree species *Acacia nigrescens.*	Mining Right Area and northern link	Moderate
Sclerocarya birrea – Acacia nigrescens woodland	Small section of the southern section of the farm Groothoek. Dominated by *Sclerocarya birrea* subsp *caffra* and *A. nigrescens* in the woody layer, with some areas dominated by *Combretum apiculatum.* Mixture of palatable and unpalatable grass species such as finger grass, guinea grass and various *Aristida* species.	Mining Right Area	Moderate
Combretum apiculatum-Acacia nigrescens woodland	Much of the northern railway link, outside of the Mining Right Area, comprised *Combretum apiculatum-Acacia nigrescens* woodland. The trees *C. apiculatum* and *A. nigrescens* were the most abundant with variation in the abundance of species such as *Terminalia sericea, Pelthophorum africanum* and *Sclerocarya birrea* subsp *caffra* (marula).	Northern link	Medium
Acacia nigrescens woodland with microphyllous encroacher species	Dominated by the tall growing *Acacia nigrescens*. Comparable to that of the *Acacia nigrescens* woodland within the mining right boundary. However, a very high abundance of encroacher species were recorded (*Dichrostachys cinerea, Acacia tortilis* and *A. nilotica*). Four nationally protected tree species, as well as the provincially protected *Spirostachys africana* (tamboti tree).	Southern link	Medium
Spirostachys africana-Acacia nigrescens woodland	The provincially protected tree *Spirostachys africana* (tamboti) was particularly abundant Tamboti is known for usually occurring in dense stands, in brackish flats, poorly drained and clayish soils, riparian areas or areas where underground water is likely. The provincially protected succulent, *Aloe littoralis,* was also recorded here.	Southern link	Medium

Vegetation community	Dominant species	Occurrence	Sensitivity
Riparian woodland associated with Sandloop River	The riparian woodland associated with the Sandloop River forms part of a floodplain area. Typical woody species here include Acacia nilotica, Spirostachys africana and Acacia karroo and shrubs such as Euclea undulata. Some sections of the riparian woodland have become encroached by encroacher species such as *Acacia* species and *Dichrostachys cinerea* due to overgrazing by livestock and game in the past. Within a CBA1.	Mining Right Area and the loops of both links. Southern link will have the greatest impact	High, including a 50m buffer
Endorheic Pans	Situated on the north-eastern portion of the farm Groothoek. No specific vegetation structure exists in the pans. Surrounding tree species include Combretum apiculatum, Acacia tortilis and A. nigrescens. Within a CBA1.	Mining Right Area	High, including a 50m buffer



Plan 15: Vegetation groups in mineral boundary



Plan 16: Vegetation groups associated with the sidings and railway links

Threatened Species or Plant Species of Conservation Concern were identified on site and are summarised in Table 15.

Table 15: Threatened Species or Plant Species of Conservation Concern

Species	Conservation status	Habitat notes and potential suitable habitat on site
Acalypha caperonioides var. caperonioides	Data Deficient (taxonomic problems hinder assessment)	This species likely occurs within natural grasslands. A small likelihood of occurrence within open woodland on the whole of the site and proposed railway links. Not observed at the time of this or the AGES (2012a) assessment.
Senegalia (Acacia) erioloba	Declining	Widespread in the drier areas of the northern provinces of South Africa, deep sandy soils and drainage lines. Confirmed to occur throughout the whole proposed development footprint.
Crinum stuhlmannii	Declining	Scattered in grassland, bushveld and on sandy soils at low altitudes, in deep sand in lowveld bushveld. Suitable habitat exist within the mining rights boundary. Not observed at the time of this or the AGES (2012a) assessment, however this species would have been dormant at the time of the winter assessment. This species was not observed during the November assessment; however, the drought delayed the flowering of many species in November
Euphorbia	Rare	Northern Waterberg between Lephalale, Marongwe and the Lephalala River. Quartzite ridges and outcrops, mixed bushveld.

Species	Conservation status	Habitat notes and potential suitable habitat on site
waterbergensis		900-1 100 m. No suitable habitat was recorded within the development footprint and therefore this species is unlikely to occur.
Eulalia aurea	Near Threatened	In water, along rivers and in occasionally inundated soils. Waterberg in Limpopo; also widespread in Southern and East Africa from Botswana to Kenya. Suitable habitat exists along the Sandloop River and around the Endorheic pans within the Mining Right Area. Not observed at the time of this or the AGES (2012a) assessment. It must be noted that this assessment focussed only on the railway link locality. It was not observed during the follow-up assessment, but few grasses were flowering.
Merwilla plumbea (was Scilla natalensis)	Near threatened	Montane mistbelt and Ngongoni grassland, rocky areas on steep, well drained slopes. 300-2500 m. Confirmed by the AGES (2012a) plant list to occur, although thought to be outside of its known distribution range. It may be that the species was wrongly identified due to the early season of the AGES, (2012a) assessment. There is a possibility that the *Merwilla* recorded in 2012 was, in fact, *Ornithogalum seineri* a non-listed plant which was abundant at the time of the November survey.
Corchorus psammophilus	Vulnerable	Sandy flats in open *Terminalia serice*a veld, Lephalale. Known from four locations and potentially threatened by habitat loss to mining. Likely occurrence within the Mining Right Area and particularly within the *Combretum Grewia* woodland Variation 2: *Combretum apiculatum – Terminalia sericea* woodland. This species was not observed during the November survey, but very few forbs were flowering at the time.

A number of plants are provincially protected by the Limpopo Environmental Management Act 2003 (Act 7 of 2003). These plants are not to be removed, damaged, or destroyed without a permit from the Limpopo Economic Development Environment and Tourism (LEDET). Table 16 lists the three (3) species that were confirmed to occur, as well as one species that is likely to occur, although not observed at the time of either of the assessments.

Table 16: Some provincially protected plant species with a likelihood of occurrence

Species	Habitat
Aloe littoralis	Confirmed to occur within the *Spirostachys africana-Acacia nigrescens* woodland along the proposed southern link.
Spirostachys africana (tamboti tree)	Confirmed to occur along much of the proposed southern link
Orbea rogersii	Confirmed. One specimen observed along the southern link, near the western end of the link, within the narrow band of woodland between the pipeline servitude and the boundary

Species	Habitat
	fence.
Adenium olefolium (Impala lily)	The author previously recorded this species about 17km north west of the site and therefore it is likely to occur within the proposed development footprint. Without leaves, this species will be very difficult to spot in late winter/early spring.

A number of trees indigenous to South Africa are nationally protected under the National Forests Act, 1998 (Act No 84 of 1998). This report follows the latest list of protected trees, published in November 2014 (Government gazette no 38215, 21 November 2014. Government notice no 908: Notice of the list of protected tree species under the National Forest Act, 1998 (Act no 84 of 1998)). The removal or pruning of these protected trees will require a permit from the Department of Agriculture Forestry and Fisheries (DAFF). Table 17 lists the four species that were recorded within the Mining Right Area and along both proposed railway links.

Table 17: National protected trees that were confirmed to occur on site

Tree species	Common Name
Acacia erioloba	Camel thorn
Boscia albitrunca	Shepherds tree
Combretum imberbe	Leadwood
Sclerocarya birrea subsp. caffra	Marula

No major alien plant infestations were present on the site. The alien species identified occurred sporadically on the site. Two alien invasive species were identified and both are listed as Category 1b invaders (*Cereus jamacaru a*nd *Opuntia ficus-indica*).

8.1.1.9 Fauna

A faunal assessment of the site was completed by AGES (2012a – Appendix 8). Table 18 summarises the findings of this study. At the request of the DMR, additional information is provided for bats (completed by Cabanga Concepts' ecologist).

Table 18: Summary of the faunal assessment findings (AGES, 2012a)

Faunal group	Known on site	Cannot be excluded from site	Protected species with high likelihood of occurrence	Protected species with medium likelihood of occurrence	Protected species with less than moderate likelihood of occurrence
Mammals	Kudu, impala, warthog, blue wildebeest associated with game farm areas. Grey duiker, warthog, steenbok associated with the mixed (broadleaf and microphyllous) vegetation. Feral cats and dogs from nearby residences	Leopard and brown hyena due to presence of prey. Shrews, the African marsh rat and vlei rats could be associated with pans in the wet season.	None.	Hedgehog (NT) Brown hyena (NT) Pangolin (V) Honey badger (NT)	Cheetah (V) African wild dog (E) Serval (NT) Water Rat (NT)
Bats - specifically	No bats were identified on site. Unless surveys are conducted during the evening, bats will not be identified on site and can only be assumed to occur on site through indicators, such as preferred habitats or roosting sites.	Bats common to the Limpopo Province, within or near developed areas include: Yellow house bat, opportunistic crevice and roof rooster Cape serotine bat, roof rooster Mauritian tomb bat, roosts under eaves and on tree trunks Little free-tailed bat, variety of crevices and roof roosters Angolan free-tailed bat, roost in a variety of crevices, preferably roofs Egyptian free-tailed bat, roost in various crevices, including bark, rock and houses Common slit-faced bat, roost in various hollows, including road culverts, tree hollows, basements under raised houses, aardvark burrows, caves, mine adits Geoffrey's horseshoe bat, roost in any cavities, including disused buildings, caves, mine adits Wahlberg's epauletted fruit bat, roost in well-foliaged tall trees Gambian epauletted fruit bat, roost in well-foliaged tall trees. Long-tailed greater serotine, Kuhl's pipistrelle bat, Banana bat, Hildebrandt's horseshoe bat and Sundevall's leaf-nosed bat are rarer species associated with developed area in Limpopo.		Welwitsch's hairy bat (NT)	Rusty bat (NT)
Birds	Typical Acacia savanna bird species, specifically insectivores. The mixed (broadleaf and microphyllous) vegetation and disturbed agricultural habitats create diverse avifauna biodiversity.	Hadeda, herons and hamerkops may be attracted by frogs in the wet season. Ashy Tit, Pied Babbler, Kalahari Robin, Burntnecked Eremomela, Desert Barred Warbler, Marico Flycatcher, Pririt Batis, Crimsonbreasted Shrike, Longtailed Shrike, Threestreaked Tchagra, Great Sparrow, Whitebrowed Sparrowweaver, Scalyfeathered Finch, Violeteared Waxbill and Blackcheeked Waxbill associated with riverine areas. Broad-leaved-woodland birds include Pallid Flycatcher, Greencapped Eremomela, White-bellied Korhaan and Meyer's Parrot. The old fields would attract crowned plovers, crested guineafowls, francolin species as well as the birds of prey the smaller bird species attract.	Yellowbilled Stork (NT)	Whitebacked Night Heron (V) Marabou Stork (NT) Cape Vulture (V) Whitebacked Vulture (V) Lappetfaced Vulture (V) Kori Bustard (V) Redbilled Oxpecker (NT)	Greater Flamingo (NT) Lesser Flamingo (NT) Black Stork (NT) Secretarybird (NT) African Marsh Harrier (V) Pallid Harrier (NT) Corncrake (V) African Finfoot (V) Blackwinged Pratincole (NT) Tawny Eagle (V) African Hawk Eagle (NT) Martial Eagle (V) Peregrine Falcon (NT) Lanner Falcon (NT) Stanley's Bustard (V) Old World Painted Snipe (NT) Halfcollared Kingfisher (NT)
Reptiles	Arboreal species are the more prominent components of the local herpetofauna.	Southern rock python, the black mamba, puff adder, boomslang, vine snake, spotted bush snake and several members of the green snakes (Philothamnus spp.) could occur in the study area, dependent on presence of prey.		South African Python (V)	Jalla's sand snake (NT) Crocodylus niloticus (NT)

Faunal group	Known on site	Cannot be excluded from site	Protected species with high likelihood of occurrence	Protected species with medium likelihood of occurrence	Protected species with less than moderate likelihood of occurrence
Amphibians	Sandloop River probably harbours a number of amphibian species but no particular hotspot for amphibian diversity on site			Giant bullfrog (NT)	
Invertebrates	Invertebrate habitats are well represented by a high family richness of insects and spiders. Spiders occur throughout all the habitats, with both web builders and active hunters.			Protected invertebrates: Horned baboon spider Burrowing Scorpion Monster Tiger Beetle	

(NT = Near Threatened; E = Endangered; V = Vulnerable)

8.1.1.10 Aquatic Ecology

The Mokolo River lies east of Lephalale and was designated in 1999 as a largely modified river with a Present Ecological Status (PES) of D and River Condition of D. The Sandloop River was designated as moderately modified with a 1999 PES of C and River Condition of A/B, which is largely natural.

The aquatic assessment was conducted at the end of November and was delayed due to the very late rains. The specialist report is therefore not completed at this stage, but will be made available for review as soon as it is completed.

8.1.1.11 Air Quality

An air quality impact assessment and dispersion model was completed by Rayten (2015) and is provided in Appendix 3. The following sensitive receptors were identified on site in terms of air quality:

- Three residential areas including Lephalale, Onverwacht and Marapong.
- Several agricultural holdings (game farms).
- The D'Nyala Nature Reserve is within close proximity, approximately 7 km, to the site boundary.
- Two existing power stations, including Matimba power station and Medupi power station located approximately 2.4km and 7.8km west of the proposed Waterberg Project's nearest boundary.

Baseline concentrations for key air pollutants of concern (dust fallout, PM10 and PM2.5) need to be assessed prior to determining the impact of the proposed operations on air quality. Monitoring is conducted by the environmental department and the current status of the area is provided below:

Dust fallout monitoring is undertaken at 24 sites in the area approximately 10 – 13 km from Waterberg coal mine. Due to the close proximity of the dust fallout monitoring stations to Waterberg coal mine, the dust fallout results can be used to represent baseline dust fallout concentrations at the proposed Waterberg coal mine. However, dust fallout concentrations do tend to show significant spatial and temporal variability. It is recommended that dust fallout monitoring be undertaken at the Waterberg coal mine prior to the commencement of any activities on site to determine baseline levels.

The dust fallout concentrations recorded at seven residential sites for the period January 2007 to July 2012 are relatively high and exceeded the residential area standard of 600 mg/m^2/day on several occasions. Maximum concentrations, in excess of 2 600 mg/m^2/day, were observed at four sites in January 2007 and around April/May 2008.

The dust fallout concentrations recorded at eleven non-residential sites for the period January 2007 to July 2012 are relatively high and exceeded the non-residential area standard of 1 200 mg/m^2/day on several occasions. Maximum concentrations, in excess of 3 600 mg/m^2/day, were observed at four sites in January (2007, 2011 and 2012) and in April

2012. Higher dust fallout concentrations are observed at the non-residential sites compared to the residential sites.

At both residential and non-residential areas, an increase in the dust fallout concentrations are generally observed over the late autumn/winter season, due to lower rainfall, and in December/January, when the winds are slightly stronger.

Ambient air quality monitoring of several criteria air pollutants, including PM10 and PM2.5, is undertaken by the Department of Environmental Affairs at the Lephalale air quality monitoring station, located approximately 5.3 km south-east from the centre of the proposed Waterberg coal mine. Due to the close proximity, air quality monitoring data obtained from the Lephalale air quality monitoring station can be used to represent baseline concentrations of PM10 and PM2.5 at the Waterberg coal mine.

PM10 daily average concentrations recorded at Lephalale are in compliance for the majority of the time with only a few exceedances (approximately three) of the South African National Standard of 75 µg/m^3 observed in the year 2013. A maximum PM10 concentration of 86 µg/m^3 was observed around May 2013.

PM2.5 daily average concentrations recorded at Lephalale are in compliance with the current PM2.5 South African National Standard of 65 µg/m^3 but exceeded the future (applicable from 1 January 2016) PM2.5 South African National Standard of 40 µg/m^3. A maximum concentration of 50 µg/m^3 was observed around August 2013.

Higher PM10 and PM2.5 concentrations are observed over the late autumn and winter seasons which is likely due to reduced wet deposition of particles through lack of rain. PM10 concentrations at Lephalale also appear to have decreased from the year 2013 to 2014. This may be due to better air quality management practices or a change in operations at surrounding mining and power station operations.

Existing key sources of air pollution (both particulate and gaseous emissions) surrounding the Waterberg coal mine have been identified to be:

- Mining activity;
- Power stations;
- Vehicle dust entrainment on unpaved roads;
- Agricultural activity;
- Wind erosion from exposed areas and open storage piles;
- Municipal Waste Landfill.

Additional sources of dust from the proposed GCMC Waterberg Mine and included within the air quality impact assessment, is as follows:

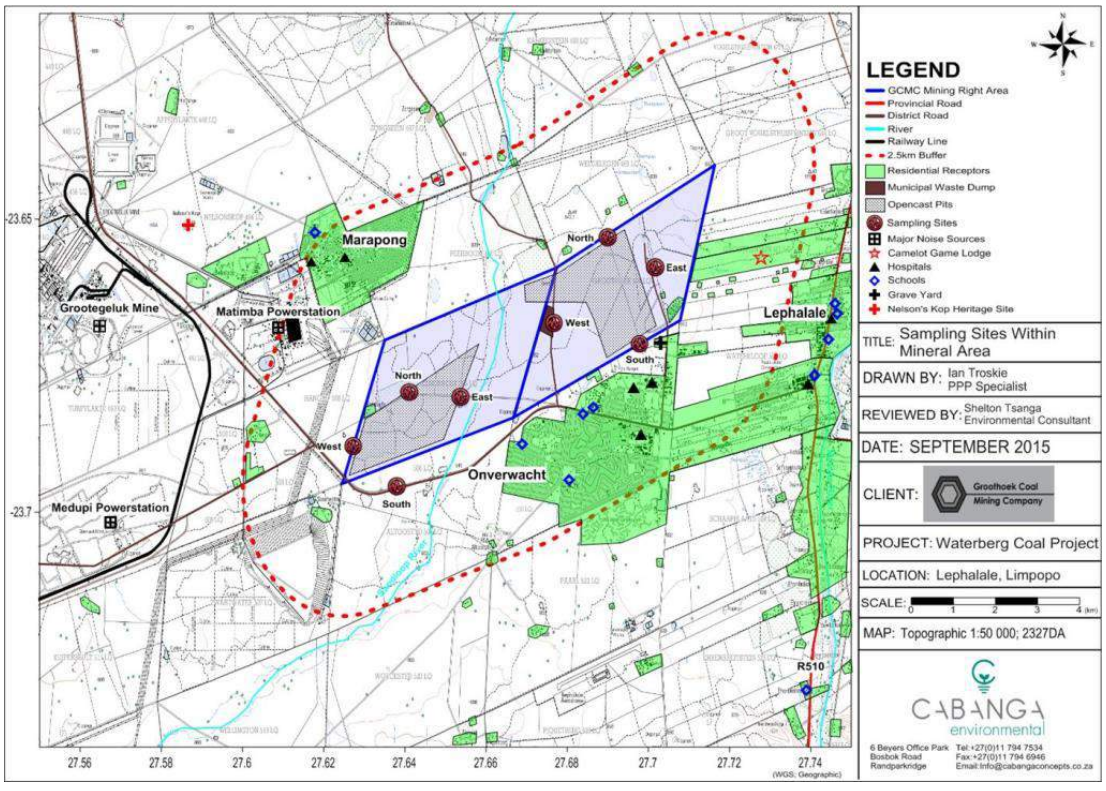
- Dust and Particulate Emissions through:
    - Construction;
    - Drilling and Blasting;
    - Land clearing, top soil and overburden removal;
    - Loading and offloading operations;

- Materials handling operations;
- Transportation of material (railway, conveyor, trucks, etc.),
- Material storage: Stockpiling and dumps;
- Material Processing: Crushing and Screening;
- Wind erosion from exposed areas;
- Vehicle-entrainment on unpaved roads

8.1.1.12 Noise

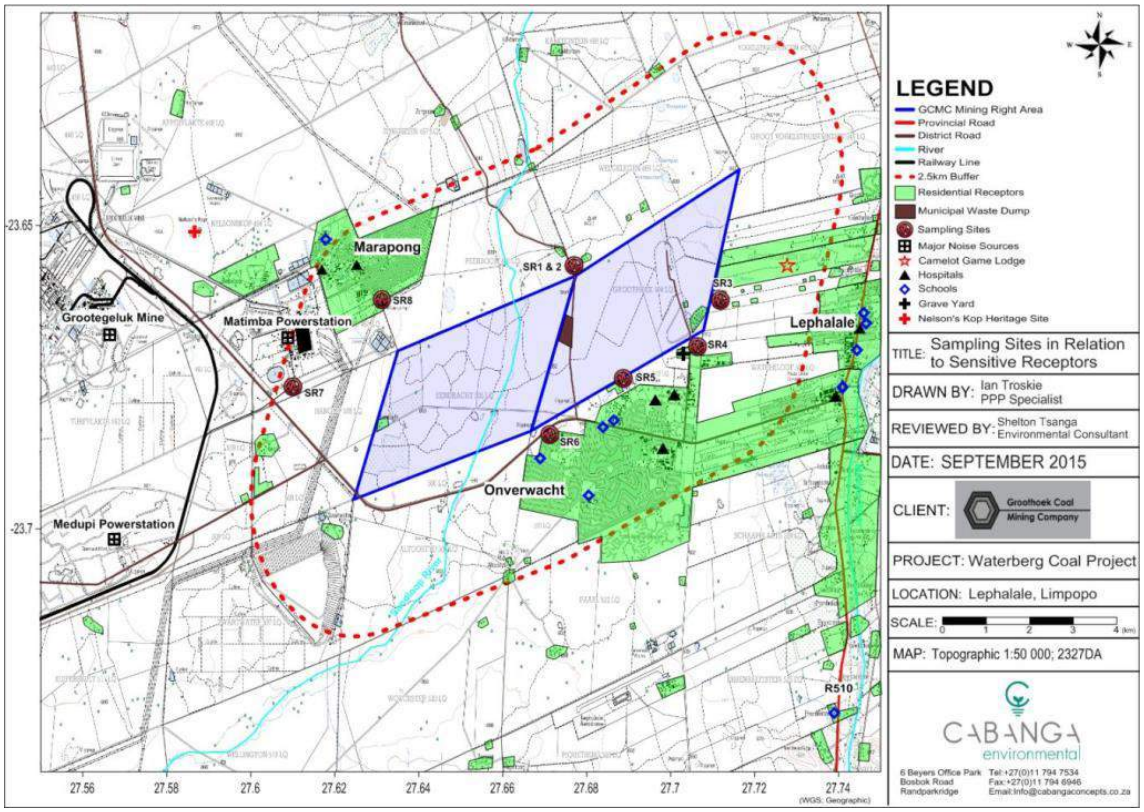
The baseline noise climate of the study area was determined by means of a field inspection and a noise measurement survey completed by Cabanga Concepts in July 2015. The survey appropriately covered the whole of the proposed site and measurements were taken at fifteen (15) main monitoring points, including points along the mineral boundary and selected nearby groups of sensitive receptors (Plan 17 and Plan 18 respectively). The sensitive receptors or groups are as follows:

- SR1 & 2: Northern Farmers - Currently +-200 meters to the proposed East Pit.
- SR3: Eastern Farmers - Currently +-940 meters to the proposed East Pit.
- SR4: SPCA / Grave Yard - Currently +-220 meters to the proposed East Pit.
- SR5: Various Complexes - Currently +-160 meters to the proposed East Pit.
- SR6: Town Residents - Currently +-1.64 kilometres to the proposed West Pit.
- SR7: Matimba Power Station - Currently +-2.05 kilometres to the proposed West Pit.
- SR8: Marapong Residents - Currently +-1.98 kilometres to the proposed West Pit.



(Note: this plan still indicates the original extent of West Pit where the noise levels were recorded)

Plan 17: Noise sampling sites around the mineral application area boundary



Plan 18: Noise sampling sites at selected nearby sensitive receptors around the GCMC mining right application area

Activities which currently generate noise on and around site, and those that have the potential to generate noise, include:

- Vehicle traffic along road network;
- Mine machinery associated with other mines;
- Blasting and excavation associated with other mines in the area;
- Power Station noise;
- Agricultural activities;
- Domestic activities;
- Meteorological conditions (Wind, rain etc.); and
- Animal noises (Birds, mammals, insects, reptiles etc.).

The results of the noise survey conducted are presented in Table 19. During noise sampling wind direction was taken into account as wind can have a significant impact on the noise measurement results, and general elevated noises were identified and recorded where possible as these would affect noise readings.

The general ambience of the surrounding areas is that of natural open space dominated by residential areas, farms, indigenous bushveld, agriculture, hunting, power stations and mining/processing of product scattered throughout the immediate and extended area.

In general there were no major disturbances during the noise recordings and the weather conditions were considered appropriate for noise measurements; dry with occasional moderate gusts of wind were noted in the evenings. However, a few samples were affected by wind temporarily which depicted a higher noise level at stages.

As can be seen in Table 19, all sites recorded noise levels higher than the SANS10103: 2008 thresholds for noise for specific land zones. In most instances exceedances were low to less than 10dB above the threshold (11 out of a total of 30 readings exceeded thresholds by more than 10dB). The highest exceedance was 27.5dB at South #2. Therefore there are already elevated noise levels experienced on and around site.

Measurements obtained during the study conducted in July 2015 indicate that day time baseline ambient noise levels range from 47.2 – 76.1 dB (A) around the sites on average, but did reach higher levels such as 95.3 dB (South #2). The acceptable ambient SANS noise rating level for these different sites range from 45 – 60 dB (A) and almost every site showed levels exceeding these limits at some stage during the sampling period.

The sites and associated receptors are already affected by noise from domestic and farm animals, insects as well as wind, as can be expected in any rural area. Noise from domestic activities at all residences and vehicles passing on the main roadway and the surrounding road network further contributed to the excessive noise levels recorded at the various monitoring positions. The findings are not considered unusual or problematic to the immediate residents as these are predominantly naturally occurring sounds which one readily acclimatises to.

Although existing noise sources are capable of causing annoyance under specific conditions, the impact of impulsive noise or any other type of noise that markedly varies in character from the residual noise sources in the area, will cause substantial annoyance, specifically at night time.

Table 19: Baseline noise level readings for selected sampling sites (highlighted cells indicate levels above SANS thresholds for specific land zone)

Sample point	District Type	Position	Recorded dB (A)					Comments on noise sources
			Period	Limit	Leq (Min)	Leq (Max)	Leq (Ave)	
SR1 & SR2	Residential Districts Rural Districts	-23.65839” 27.367731”	Day	45	34.3	65.3	49.8	Birds & slight breeze
			Night	35	35.6	41.8	38.2	Dogs & people in distance
SR3	Residential Districts Rural Districts	-23.66251” 27.70957”	Day	45	35.9	75.4	55.6	Cars, birds, people& slight wind
			Night	35	34.9	48.4	41.6	Dogs barking & road in distance
SR4	Suburban districts with little road traffic	-23.67014” 27.70445”	Day	50	44.2	67.4	55.8	Dogs barking
			Night	40	35.5	51.2	43.3	Dogs barking & insects
SR5	Urban districts	-23.67467” 27.68967”	Day	50	39.4	66.5	52.9	People & a lot of cars
			Night	45	38.1	53.3	45.7	People talking & insects
SR6	Urban districts	-23.68402” 27.67158”	Day	50	54.1	65.0	59.5	Lots of cars & trucks
			Night	45	43.5	72.1	57.8	Main road, trucks, cars & insects
SR7	Non Residential Districts Urban districts with workshops, business premises, main roads	-23.67654” 27.60877”	Day	60	52.1	92.5	72.3	Machinery, powerstation & very windy
			Night	50	54.0	65.4	59.7	Power station, cars & wind
SR8	Urban districts	-23.66133” 27.63017”	Day	50	52.4	68.3	60.3	People, machinery, generators & cars
			Night	45	43.7	52.1	47.9	Music & people talking
North #1	Residential Districts Rural Districts	-23.65291” 27.68973”	Day	45	33.4	61.1	47.2	Birds & slight breeze
			Night	35	33.4	39.7	36.5	No noise
North #2	Residential Districts Rural Districts	-23.67989” 27.64106”	Day	45	39.1	74.8	56.9	Wind effect on reading
			Night	35	36.1	74.0	55.0	Faint Music from Marapong & windy
South	Residential Districts Rural Districts	-23.67125”	Day	45	33.5	69.6	51.5	Bird & trucks in the distance

Sample point	District Type	Position	Recorded dB (A)					Comments on noise sources
			Period	Limit	Leq (Min)	Leq (Max)	Leq (Ave)	
#1		27.69792”	Night	35	34.8	42.5	38.6	No noise
South #2	Non Residential Districts Urban districts with workshops, business premises, main roads	-23.69585” 27.63819”	Day	60	56.8	95.3	76.1	Main road, lots of cars & trucks
			Night	50	60.8	94.3	77.5	Cars, trucks, insects & wind
East #1	Residential Districts Rural Districts	-23.66344” 27.70337”	Day	45	33.5	72.5	53.0	Birds & insects
			Night	35	35.0	50.7	42.8	Dogs, people & general noise
East #2	Residential Districts Rural Districts	-23.68027” 27.65487”	Day	45	39.7	79.0	59.3	Wind effect on reading
			Night	35	34.8	66.7	50.7	Road in distance, wind effect on reading
West #1	Non Residential Districts Urban districts with workshops, business premises, main roads	-23.66684” 27.67639”	Day	60	36.0	76.9	56.4	Trucks, cars & machinery on the municipal dump
			Night	50	38.5	51.3	44.9	People, dogs, insects & jackals
West #2	Residential Districts Rural Districts	-23.68951” 27.62692”	Day	45	51.9	87.9	69.9	Wind effect on reading
			Night	35	39.8	49.5	44.6	Power station & cars on main road

8.1.1.13 Visual Aesthetics

Both farms of the mineral boundary are regarded as game farming areas with a shooting range located on Eendracht 505 LQ and an equestrian farm and old racetrack located on Groothoek 504 LQ. A municipal waste dump is also located on Groothoek which is earmarked for an additional 12ha expansion. The Sandloop River, a tributary of the Mokolo River is also located on the Eendracht property. This river is dry most of the year. The farms to the north are also game farms, one owned by Eskom and the other by a local farmer. The farms to the East are dominated by residents, small holdings, game farms, small scale mining, businesses and guesthouses. The town of Lephalale including businesses, schools, residences etc. is located to the South/East of the proposed area. The town of Onverwacht including residential areas, parks, golf course, hospitals, schools and other infrastructure is located immediately south of the proposed farms. The Eskom Matimba Ash dump is located South West of Eendracht. The Eskom Matimba power station is located west of the site and the town of Marapong including residents, schools, businesses etc. is located to the North/West of the site.

The view of this site is relatively well hidden due to its location, flat topography and dense bushveld which surround the site. The nature of the landscape should allow for screening from all major roads, towns and busy commuter routes. A small hill/koppie to the East of the site will act as a screen and will restrict views from the R510 and many of the North/Eastern landowners.

Stripped topsoil and subsoil will be stockpiled as berms where needed, principally as storm water diversion berms, protective berms for the Sandloop River and where necessary as visual or noise screens.

8.1.1.13.1 Visual Character

The following are considered when determining the change of the visual landscape on the visual receptor:

- Surface area – the total surface area will influence the degree of visibility, a smaller area having a smaller degree of visibility. The surface area of the proposed site is approximately 2 067 ha in total, although the entire footprint will not be impacted at once as opencast mining will proceed in roll over method.
- Height – the total height of the structure influences the viewshed. The higher the structure the further away it will be visible, taking into account backdrop characteristics. The height of the tallest structure will not exceed 25m and depending on the view angle will be back-dropped against bushveld, power stations other collieries, residential and town areas.
- Colours – the colour of the infrastructure should either emphasise the structure or camouflage the structure, depending on the purpose of the structure. The colours at the colliery will encompass browns, black and silver. This is made up of the soil and

product stockpiles. Arrangement or configuration – a solid structure is more visible over larger distances. The structures on site will include a mixture of stockpile areas, PCDs, opencast pits, workshops, offices and mine machinery. This will increase the visibility as it will consist of varied infrastructure present and, in some cases active, on one site.

Many visual characteristics, both of the landscape and of viewers, come together to inform the visual impact a structure may have in its proposed location. Table 20 summarises various visual characteristics/criteria on site.

Table 20: Visual characterisation on site

Visual Characteristic / Aspect	General Description	Status on Site	Overall Rating for Aspect
Visual Distance / Observer Proximity	Visual exposure reduces over distance. This allows the determination of the core area of visual influence regarding a development. The visual distance and observer's proximity are closely related and are used together when considering visual impact.	Many of the small number of sensitive visual receptors are within 500m from the site. There are numerous visual receptors present along the main road (Nelson Mandela Drive). Only the quieter dirt road (Municipal Waste Dump) used mostly by a small number of farmers and workers will have full views of the mine.	The visual influence will be moderate for affected visual receptors. This is because most visual receptors are within a 500m radius; possible views beyond this distance are screened by the stands of trees and exiting infrastructure such as dumps from the various other mines. The visual distance is moderate due to the viewer's exposure to the existing infrastructure and the smaller numbers of viewers exposed.
Viewer Incidence / Viewer Perception	Number of observers / viewers and their perceptions of the development are critical to address visual impact. If there are no viewers, there is no impact. If the perception of the structure is neutral or positive, then the impact is neutral and positive. Areas of high viewer incidence must be identified. These must then be classified according to the viewer's sensitivity to the development. Perception considers many variables such as regularity of sighting, cultural background and state of mind.	Due to high density residential dwellings immediately surrounding the site, viewer incidence is relatively high. Area is a mining and agricultural area. This means that the viewer's perception of the area is that of a mining / industrial character mixed with a farming landscape character, and a certain amount of desensitising to mining would have occurred with viewers.	Viewer incidence combined with the viewer's perception is considered moderate.
Visual Absorptive Capacity (VAC) of Natural	The capacity of the receiving environment to absorb or screen the potential visual impact of the proposed infrastructure is predominantly a function of the vegetation and will be high if the vegetation is tall, dense and continuous and low	The general topography of the area is very flat, with only a small hill to the east acting as a screen from R510 road users. Thick bushveld acts as a visual screen making it difficult to see the site.	Elements of the VAC are considered moderate to low.

Visual Characteristic / Aspect	General Description	Status on Site	Overall Rating for Aspect
Vegetation	if the vegetation is patchy, sparse and low growing. The VAC can be viewed as high if the surrounding environment can absorb the structure in terms of texture, colour, form and light / shade characteristics. That of a contrasting environment would have a low VAC. VAC increases with distance, where visibility, discernible detail and colour saturation decreases the further the viewer is from the structure.	The site is not visible from any major road due to the thick bush and resident / business areas. Majority of sensitive visual receptors will be found on the immediate surrounding farms to the north, east and south of the site and will have access to the view that has a moderate VAC. VAC will further reduce as the mining area becomes bigger.	
Visual Resource Value / Landscape Quality	Determined by assessing both the objective and subjective factors relating to the landscape such as landscape quality and sense of place (Warnock & Brown, 1998).	Landscape immediately surrounding the site consists of farmsteads, existing mining infrastructure and relatively large natural areas associated with farm land and streams. The resource value is elaborated in Table 21.	The various resource ratings obtained for the area are elaborated in Table 21. The overall visual resource value can be considered as moderate – high as most of the area is classed as natural farm land with limited mining and built up areas.
Landscape Integrity and Sense of Place	According to Lynch (1992), sense of place is defined as “the extent to which a person can recognise or recall a place as being distinct from another place – as having a vivid, unique, or at least particular character of its own”. Areas of low visual quality can have a sense of place if they are seen as unique. The sense of place is attributed to the specific area by the viewers’ experience or perception of it. Some places have viewers that believe in its sense of place, giving it a strong sense of place.	The sense of place experienced in the area surrounding the site must be assessed within the landscape context and the site cannot be experienced in isolation. The generally flat topography, the dense bushveld, game farming activities and existing mining infrastructure surrounding the site contribute to the sense of place. The landscape integrity can be assessed based on the fact that the landscape does possess a unique sense of place due to the nature of the farmsteads, existing mines and small / medium town feel. The bushveld also	There is no specific rating for the sense of place, but it can be considered slightly altered due to the mining infrastructure and waste facility in the area as well as the two power stations and expanding town infrastructure.

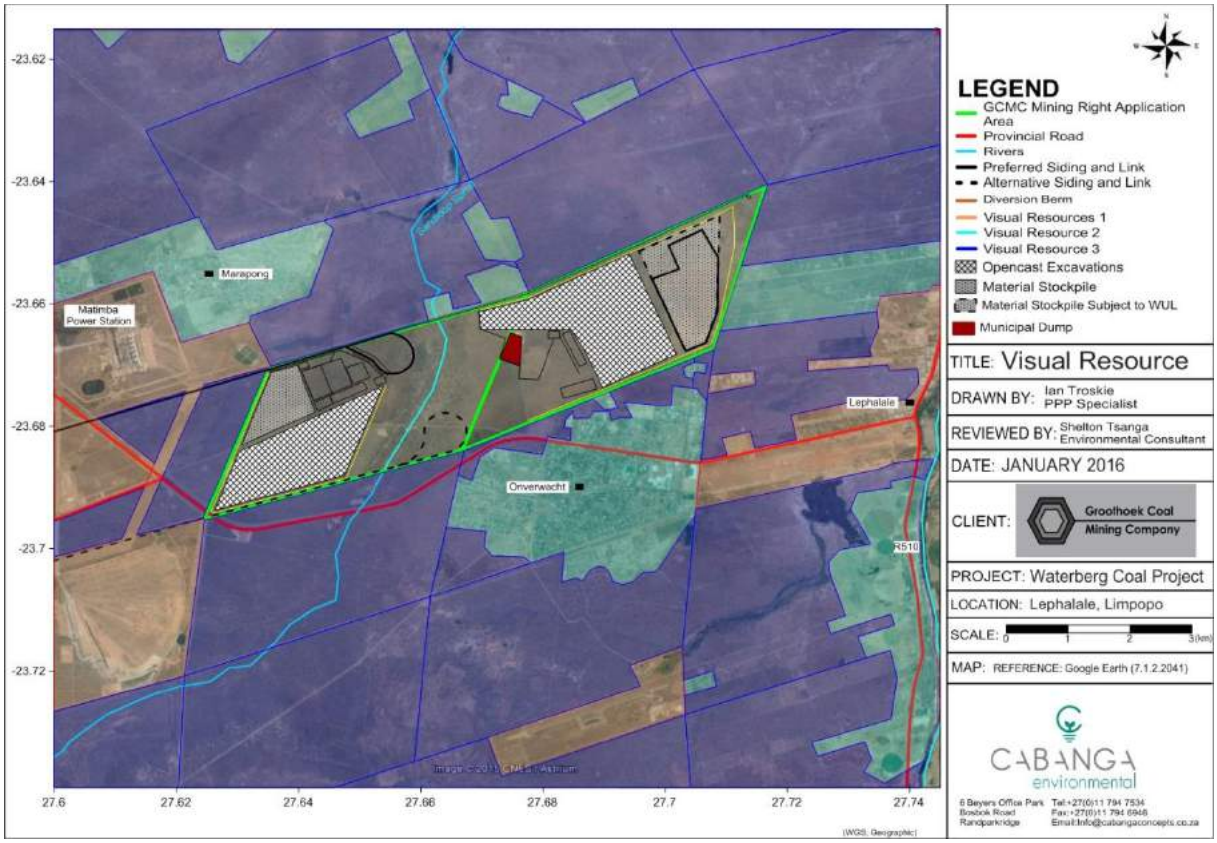
Visual Characteristic / Aspect	General Description	Status on Site	Overall Rating for Aspect
		contribute to the scenic value of the area.	
Scenic Quality	The values assigned to the visual resource are subjective. According to Crawford (1994) studies for perceptual psychology have shown that human preference is for landscapes with higher visual complexity, especially involving water bodies. Landscape quality increases when: • Topographic ruggedness and relative relief increases; • Water forms are present; • Diverse patterns of grasslands and trees occur; • Natural landscapes overpower man-made landscapes; and • Land use compatibility increases.	The scenic quality of the landscape can be summarised as having low relative relief as it is flat with little topography change. There is a river on site and the vegetation type is bushveld with associated trees.	The site is quite well screened by the bushveld / trees. Therefore the scenic quality of the site in its current state can be viewed as being moderate to low. Once the mine is active, the scenic quality of the landscape will be altered but the scenic quality will remain as moderate to low.

Table 21: Value of the visual resource - scenic quality for the proposed mine

High Natural vegetation, agricultural activity	Moderate Farmstead	Low Residential areas, roads, power lines
Distinct landscape that exhibits a very positive character with valued features that combine to give the visual experience of unity, richness and harmony. It is a landscape that may be of particular importance to conserve and has a strong sense of place. It may be sensitive to change in general and may be detrimentally affected if it is changed inappropriately.	Common landscape that has some positive character but which has evidence of alteration / degradation / erosion of features resulting in areas of more mixed character. It is potentially sensitive to change in general and change may be detrimental if inappropriately dealt with but the changes that occur may not require particular attention to detail.	Minimal landscape generally negative in character with few, if any, valued features. Positive enhancement could occur.

(After the Landscape Institute with the Institute of Environmental Management and Assessment,1996)

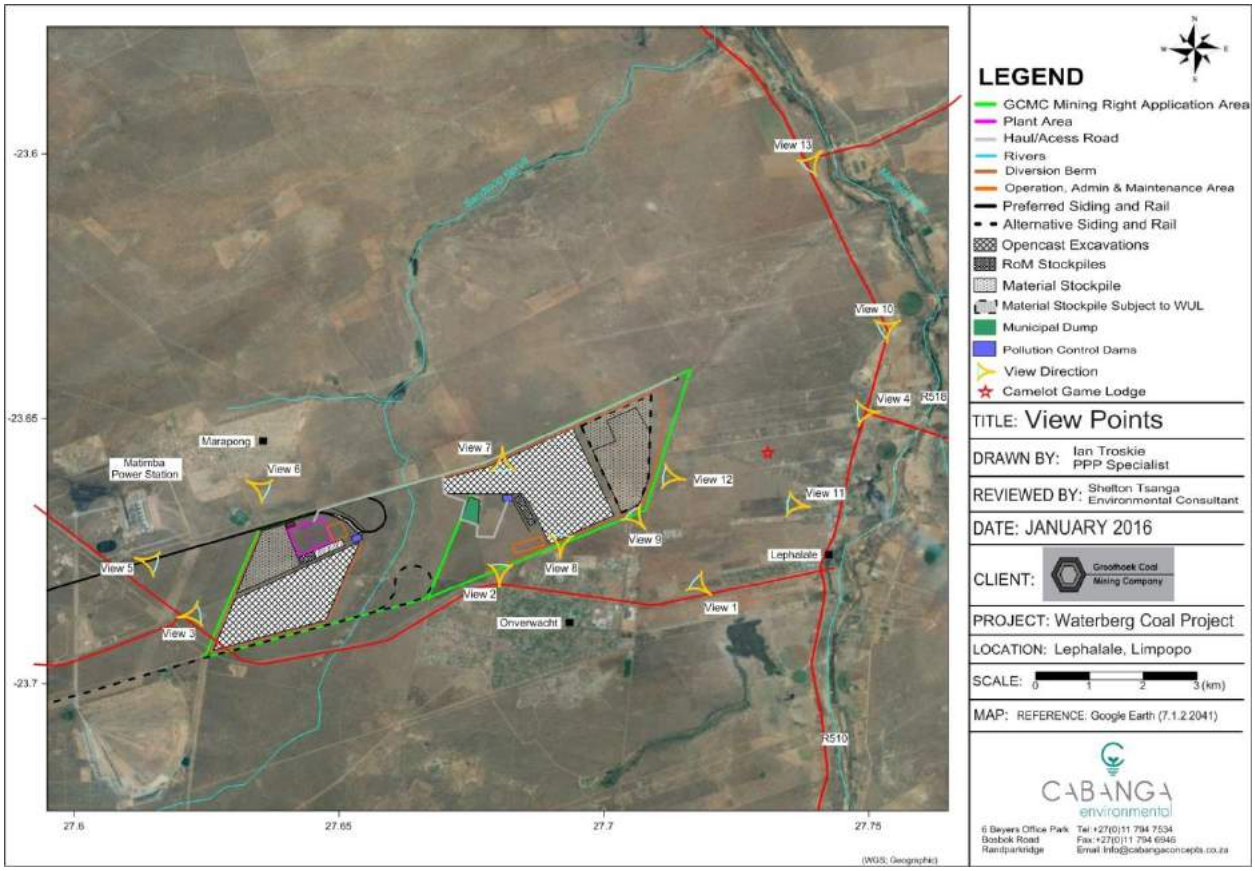
According to Plan 19 below, Visual Resource 1 has a low value; comprises industrial and mining activities (highlighted in peach). Visual Resource 2 has a moderate value; comprises farming activities and low density residential properties (highlighted in cyan). Visual Resource 3 has a high value due to the incidence of natural open space, with no visible disturbances (highlighted in dark blue).



Plan 19: Visual resource quality of the surrounding landscape

8.1.1.13.2 Views and Viewpoint

The views from potential sensitive visual receptors were taken to understand the zone of visual influence. These focussed on areas where the highest incidence of viewer is expected, and where viewers have access to the view of the area being altered from their respective locations. Few sensitive viewers were identified west of the site as the topography as well as other mining activities / power stations shield any views of the site from these viewers who are therefore considered unaffected visually. Plan 20 indicates a map showing the placement of the viewpoints which are further discussed under each panorama photo (Plate 1 to Plate 13) below.



Plan 20: Viewpoints of sensitive receptors in the area

View Point 1 (Plate 1): the view (below) from the main road (Nelson Mandel drive) between Lephalale and Onverwacht, the property (Groothoek) and proposed pit is approximately 2.17km in the distance. This is the main road in the area and has high levels of traffic and sensitive receptors. This location was chosen as one of the few areas on the road without residential or other infrastructure obscuring the view. Due to the flat topography and dense flora the property itself is not exposed or visible from this road. Depending on the size of the proposed material stockpiles, the site may not be seen at all from this main road. Therefore the road users on this road are not considered sensitive visual receptors – **low sensitivity.**

Plate 1: View from Nelson Mandela Drive between Lephalale and Onverwacht

View Point 2 (Plate 2): another view (below) from Nelson Mandela Drive but located at the Waste Dump intersection. Sensitive receptors of Onverwacht are located just south of this view and this road experiences high levels of traffic throughout the day. The road that leads to the Waste dump bisects the Groothoek property and is also used by a few farmers to the north of the site. However this road has few sensitive receptors. The proposed east pit on Groothoek is roughly 1.69km in the distance and the proposed west pit is roughly 2.26km away. Due to the flat topography and dense bushveld, neither site is visible. Depending on the size of the proposed material stockpiles, the sites may not be

seen by road users, as is evident by the fact that you cannot currently see the Municipal Waste Dump at this location. Therefore the road users on this road are not considered sensitive visual receptors – **low sensitivity**.

Plate 2: View from Nelson Mandela Street at the Waste Dump intersection

View Point 3 (Plate 3): the view (below) from the Nelson Mandela Drive and Steenbokpan intersection. Here the Matimba Power Station can be seen in the distance (West) and various power lines traverse the road. The proposed west pit is the closer of the two at this point and is roughly 1.04km away. Due to the flat topography and dense bushveld surrounding the site, the site itself is not visible. However, this site is not as densely covered as other locations so depending on the size of the proposed material stockpiles; the site may be seen at this location by road users. The existing power station (Matimba) and associated infrastructure from Matimba already reduces the viewer's sensitivity here – low sensitivity.

View Point 4 (Plate 4): view (below) from the R510 and R518 intersection. This site was selected as a potential sensitive site along the main routes between Thabazimbi, Grobler's Bridge and Marken. This is regarded as a high traffic location with many sensitive receptors. The proposed east pit is the closest site to this point and is roughly 5.15km away in the distance. The immediate topography has a small hill / koppie between the site and the road. This road is generally lower than the site as it is situated next to the Mokolo River. This koppie is also densely covered with bushveld and as a result the site cannot be seen from this point. It is highly unlikely that the proposed project will be seen from this site due to these factors including distance and as such, the road users on this road are not considered sensitive visual receptors – low sensitivity.

Plate 3: View from Nelson Mandela and Steenbokpan intersection

Plate 4: View from R510 and R518 intersection

View Point 5 (Plate 5): view (below) from the existing Eskom Matimba Power station which is located to the West of site. The view is taken from the visitor parking lot, as this is a national key point, no photos can be taken within the site itself. This site employs many locals and is visited frequently making is a high traffic sensitive receptor. The proposed west pit located on Eendracht is located roughly 2.25km in the

distance. The proposed siding, plant area and administration area will be located approximately 2.1km from this point. Due to the flat topography and dense bushveld surrounding this site, the site is not visible to visitors and employees. Only employees located higher than the first floor will be able to see the site. The visual receptors from this viewpoint are of **low sensitivity** due to their current view of the power station and the Grootegeluk mine to the West and being within an industrial setting.

Plate 5: View from Eskom's Matimba Power Station parking lot

View Point 6 (Plate 6): the view (below) from the edge of Marapong to the North/East of the sites, this site was chosen as it is one of the few areas that is not obstructed by residential houses and infrastructure. Marapong has many sensitive receptors but it is assumed that not many receptors will frequent this point. The proposed west site is the closest to this location. The pit itself will be roughly 1.9km away while the siding, plant and administration area will be around 900 meters away. The proposed east pit is located some 3.93km away and due to the flat topography and dense bushveld the sites can barely be seen. The Municipal Waste Dump can just be seen in the distance meaning that overburden material stockpiles will likely be visible from this point, although at a distance and screened to some extent. Therefore the people in this area are not considered sensitive visual receptors – **low sensitivity**.

Plate 6: View from the edge of Marapong town

View Point 7 (Plate 7): the view (below) from the driveway of one of the adjacent farmers overlooking the Municipal Dump road which bisects Groothoek 504 LQ. The view is of agricultural areas (dense bushveld). The proposed East pit will be located roughly 30 meters in front of this point. It is expected that this distance will have to be increased to 500 meters or greater to provide adequate buffer zones. The site is shielded by bushveld which helps to buffer some visual impacts associated with the mine, however it is expected that the stockpiles will be visible from this point in the future. Note that you cannot see the Municipal Waste Dump which is located along the dirt road in the middle of the picture roughly 770 meters away. This clearly illustrates that seeing the infrastructure through the dense bushveld is difficult. The fact that very few receptors use this road and see this site reduces the sensitivity somewhat. This site can be regarded as having **moderate sensitivity**.

View Point 8 (Plate 8): the view (below) is from the cul-de-sac at the Waterberg 1 and Bateleur complexes next to Groothoek 504 LQ. You can see the Waterberg 1 complex to the left and the Bateleur complex to the right. Both of these complexes are immediately adjacent to the Groothoek farm as can be seen from the Groothoek farm boundary fence in the centre. There are other complexes behind this point and it is estimate that over a thousand sensitive receptors are located around this point. The proposed east pit is approximately 250 meters away, however it is expected that this distance will have to be increased to 500 meters or greater to provide adequate buffer. The proposed west pit is approximately 3.2km away to the west. Although the infrastructure may not be visible from ground level, it is expected that people living on higher levels within the two complexes will have full view of the mine and as a result are regarded as **high sensitivity**.

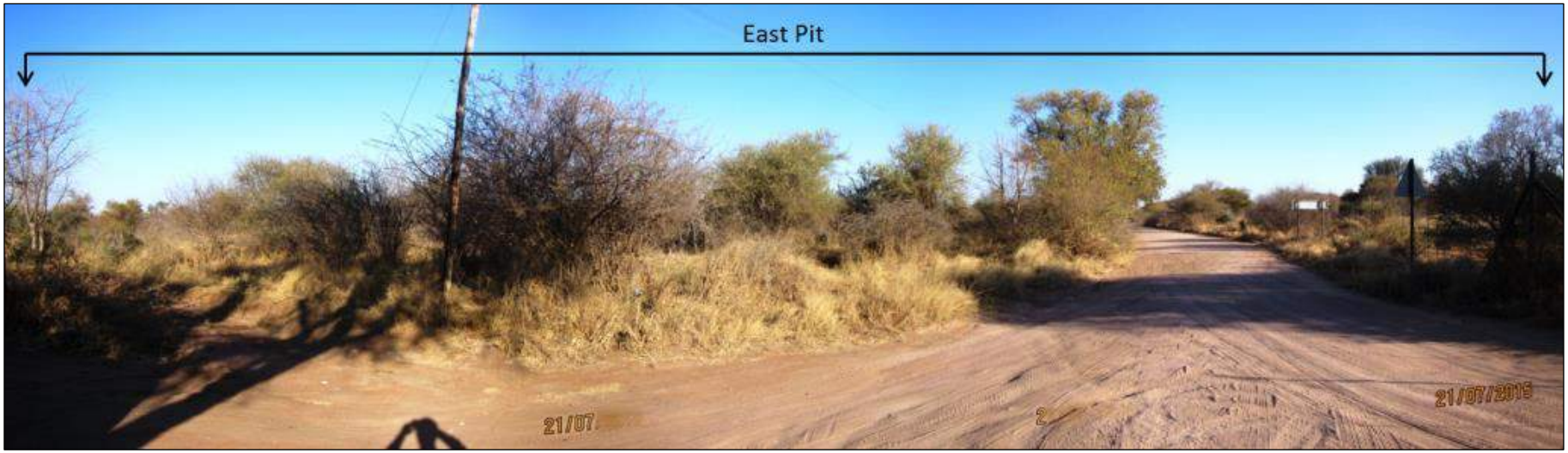


Plate 7: View from Northern Farmers road access, road to waste dump

Plate 8: View from the Waterberg 1 and Bateleur complexes cul-de-sac. Groothoek 504 LQ boundary fence can be seen bordering these complexes

View Point 9 (Plate 9): the view (below) is from the SPCA gate on Apiesdoring Avenue towards the Groothoek 504 LQ and Equestrian park main gate. The entrance gate can be seen at the end of the dirt road. This point is roughly 200 meters away from the proposed East pit. It is expected that this distance will have to be increased to 500 meters or greater to apply appropriate buffer. The topography is flat in this area, however the bushveld is not as thick as at other points, and this together with the close proximity of the receptors makes this a highly sensitive point. However, due to the fact that the only receptors along this road include the SPCA, the graveyard and equestrian users, means that this point is reduced to a – **moderate sensitivity**.

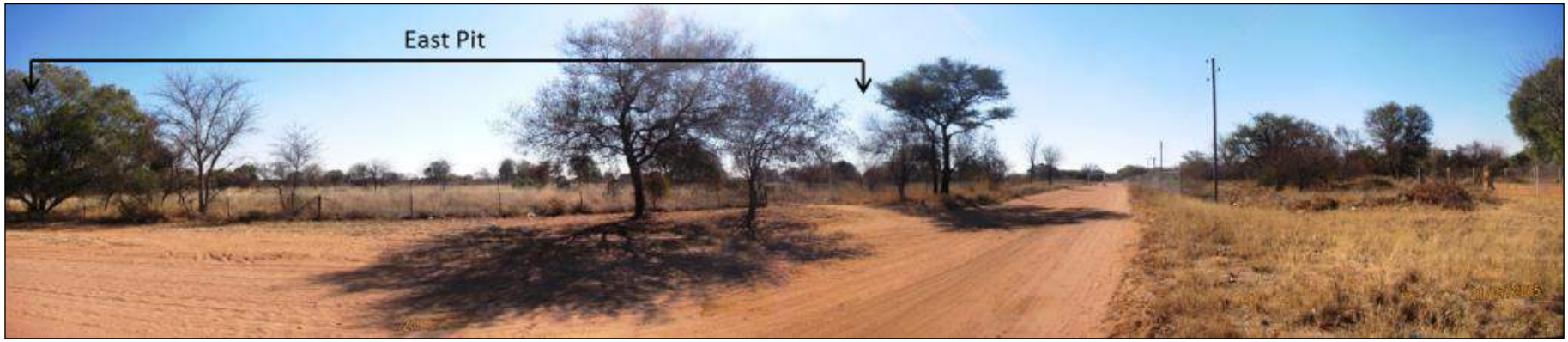


Plate 9: View from the SPCA on Apiesdoring Avenue towards Groothoek 504 LQ main gate

View Point 10 (Plate 10): the view (below) is from a northern farm located on the main R510 road; this site was chosen as the closest sensitive receptor towards the North / East of site. The east pit is the closest point to this location and is roughly 6.2km away. Due to a lower topography and a small hill / koppie between the site and this point, the sites are not visible and are unlikely to be visible in the future. Evidence of this is that the current Municipal Waste Damp on site cannot be seen from this location. Due to these various factors, these receptors and road users are not regarded as sensitive receptors – **low sensitivity**.

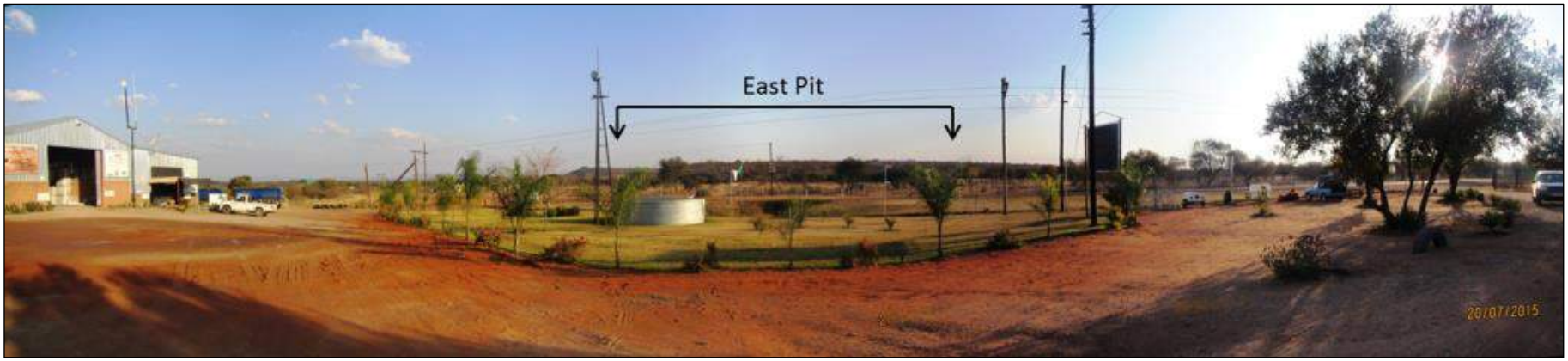


Plate 10: View from Northern Sensitive Receptor on R510

View Point 11 (Plate 11): the view (below) is from behind the Lephalale Hoërskool (Afrikaans high school) and associated residential area situated to the East of the two farms. Due to the high numbers of receptors at the school, it was felt that a view point within the school premises was necessary. However, the site / general area of the site cannot be seen from anywhere within the School grounds. This is due to large buildings and sports stands obscuring any outside views. Thus the viewpoint was taken just behind the School. The proposed East pit is located roughly 3.29km away in the distance. Due to the flat topography and dense bushveld the site is not visible. Depending on the size of the proposed material stockpiles, the site may become visible to the receptors. However, due to the fact that the site cannot actually be seen from within the school premises this site can be regarded as a – **low sensitivity**.

View Point 12 (Plate 12): the view (below) is from the last sensitive receptor on Grootfontein 501 LQ portion 2 and was chosen as the closest sensitive receptor to the site and proposed East pit from the Eastern farms. The gate seen at the end of the road is another entrance onto Groothoek 504 LQ. The proposed East pit will be roughly 990 meters away from this site. There are a total of twelve (12) sensitive receptors on this farm portion but are all situated behind this site up to 3.2km away. Four (4) other sensitive receptors are within a similar range on adjacent Grootfontein portions to the right of this location. Due to the flat topography and relatively close proposed material stockpiles to this site, it is likely that these will be seen, although from 990 meters to over 1.4km away. Note that the current Municipal Waste dump, although some

3.5km away, cannot be seen from this location. Due to low amount of sensitive receptors and the distance from the site, this point can be regarded as low – **moderate sensitivity**.

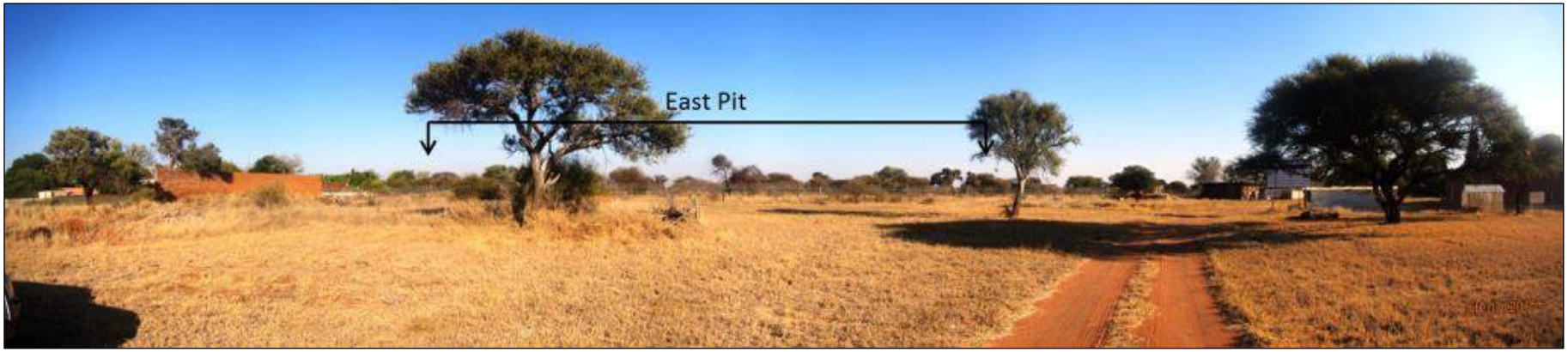


Plate 11: View from behind the Ellisras Hoërskool and other residential areas

Plate 12: View from last sensitive receptor on Grootfontein 501 LQ in front of Groothoek 504 LQ gate

View Point 13 (Plate 13): the last view point (below) is from the R510 and Beska intersection. This site was selected as a potential sensitive site along the main routes between Thabazimbi, Grobler's Bridge and Beska. The proposed east pit is the closest site to this point and is roughly 7km away in the distance. Due to the flat topography and thick bushveld the site cannot be seen. It is thus highly unlikely that the proposed project will be seen from this site due to these factors and as such, the road users on this road are not considered sensitive visual receptors – **low sensitivity**.

Plate 13: View from the R510 and Beska intersection

8.1.1.14 Socio-Economics

8.1.1.14.1 Socio-Demographic Profile

The project area falls under the Lephalale Local Municipality area, which in turn is under the jurisdiction of the Waterberg District Municipality within the Limpopo Province. The information below was obtained from the Local Municipal Integrated Development Plan (IDP, 2015/16) and StatsSA census data (2011). Furthermore a socio-economic study was undertaken by Zone Land Solutions (2015) and the report is attached as Appendix 10.

According to the (CBD Development Plan, August 2013, p. 11), the socio-economic profile of Lephalale can be summarised as follows:

> *The current population in the Lephalale Provincial Growth Point (PGP) is 27 328. It is further estimated that the Lephalale PGP population will grow to 65 000 people or 16 264 households by 2020. These figures indicate more than a doubling of the resident population from 2011 to 2020. The growth is largely ascribed to the expected growth of the mining and energy sectors in the vicinity.*

Approximately 21% of the adult population within the local municipality (LM) has no form of schooling and only 44% has primary education (Census 2011). It was further indicated that only 3.6% has a post matric/ tertiary qualification.

The CBD Development Report, 2013 further indicated that the 15-34 age group constitutes the majority of the local municipality's population, namely 43.2%. In terms of gender dominance, males are slightly more than females at 54%. The high proportion of the male population within the LM may be due to the employment opportunities in the mining and industrial sectors which are typically related to hard physical labour.

According to income data, approximately 23.1% of households in Lephalale LM have no form of income, while 18.5% of households earn less than R4 800 per month. Census 2011 indicated that approximately 12 234 households depend on free basic services, and 42% of the population receive government grants.

8.1.1.14.2 Economic Profile

Economic drivers relate to the way in which people make a living and the economic activities within that society. The employment rate and general living standard are good indicators of the community's economic wellbeing.

According to the 2011 census, a large proportion of people over 20 years have no schooling, which results in low skills levels, contributing to unemployment. The number of people with secondary and tertiary education is extremely low, which is the reason for a lack of access to opportunities associated with a rapidly growing economy.

The mining sector is the greatest economic asset of the LLM as it contributes a significant 71% to the local economy. Other sectors include electricity and agriculture, which contribute a relatively small percentage. The economy leans heavily on coal mining (a primary economic activity) and is not at all diversified.

8.1.1.14.3 Institutional and Governance Framework

Institutional and legal governance refer to the role and efficiency of the local authority and other service providers in terms of their capacity to deliver a quality and uninterrupted service to local communities. Job creation and social development are priorities, which is often a symptom of a buoyant economy and thus a priority (Lephalale IDP 2015-2016, p. 37):

> *"The largest coal production shift in the history of South Africa is scheduled to take place towards 2015, with the production of coal progressively moving from Witbank to Lephalale."*

Many sources acknowledge the leverage of the energy sectors' immense contribution to the economic growth of the town. The obvious environmental impact and social pressure ('….to create sustainable development nodes') is a balancing pressure against the GCMC development, where the proposed site is the also earmarked for residential development and a connecting primary road across the mining rights area (Lephalale IDP 2015-2016, p. 46).

> *"The objective of the Municipality is that development should preferably be targeted at infill development in areas determined as priority development areas. The SDF however took cognizance of this challenge, and made specific provision for future development and growth to ensure the linkage and integration of Marapong with Onverwacht and Lephalale/Ellisras. The farm Eendracht 505-LQ is a potential integrator between Marapong and other nodes of the Lephalale town. However, due to environmental concerns a full environmental investigation is required prior to allowing any development on the farm." (LLM IDP 2015-2016 p. 43-44)*

The LLM has no jurisdiction over the administration and granting of mineral rights but does have the right to be consulted on each application that will affect it (Spatial Planning and Land Use Management Act, 16 of 2013). The municipality is however also obliged to facilitate economic and mining development processes by building networks and promoting good working relationships in the sector.

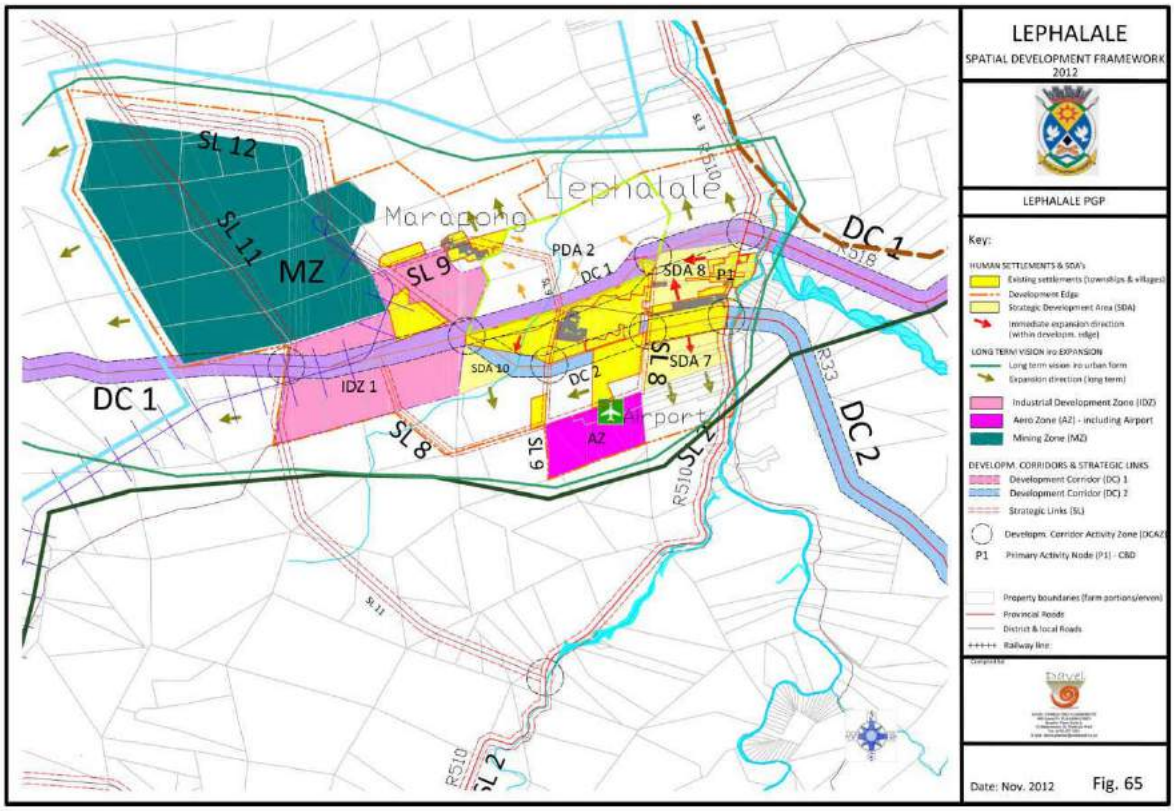
8.1.1.14.4 Local and District Municipal Plans

Development Plans: Spatial Development Framework (SDF), 2012

The development edge (red dotted line – Plan 21) is applied as a boundary where development may occur (urban area or specialised use associated with urban area) and will be allowed, and areas where it shall not be established under normal circumstances (p191) [see CBD plan summary below for special circumstance considered]. It must be stipulated that this area includes mining, industrial, residential and open space areas. The fact that a mining zone has been encompassed within the area means that mining development cannot unreasonably be excluded as a land use inside the development edge, despite wording to the contrary in the SDF (p191 & p212).

Strategic development areas (SDAs) are indicated as light yellow areas with the associated immediate expansion areas within development edges indicated by the red arrows. Long

term expansion areas are indicated by the green arrows (p109). The ten SDAs identified are the main focus areas for the future development of residential areas (housing) and expansion of townships and represent a short to medium term development potential; it may not be necessary to develop the total potential in the near future (p192).

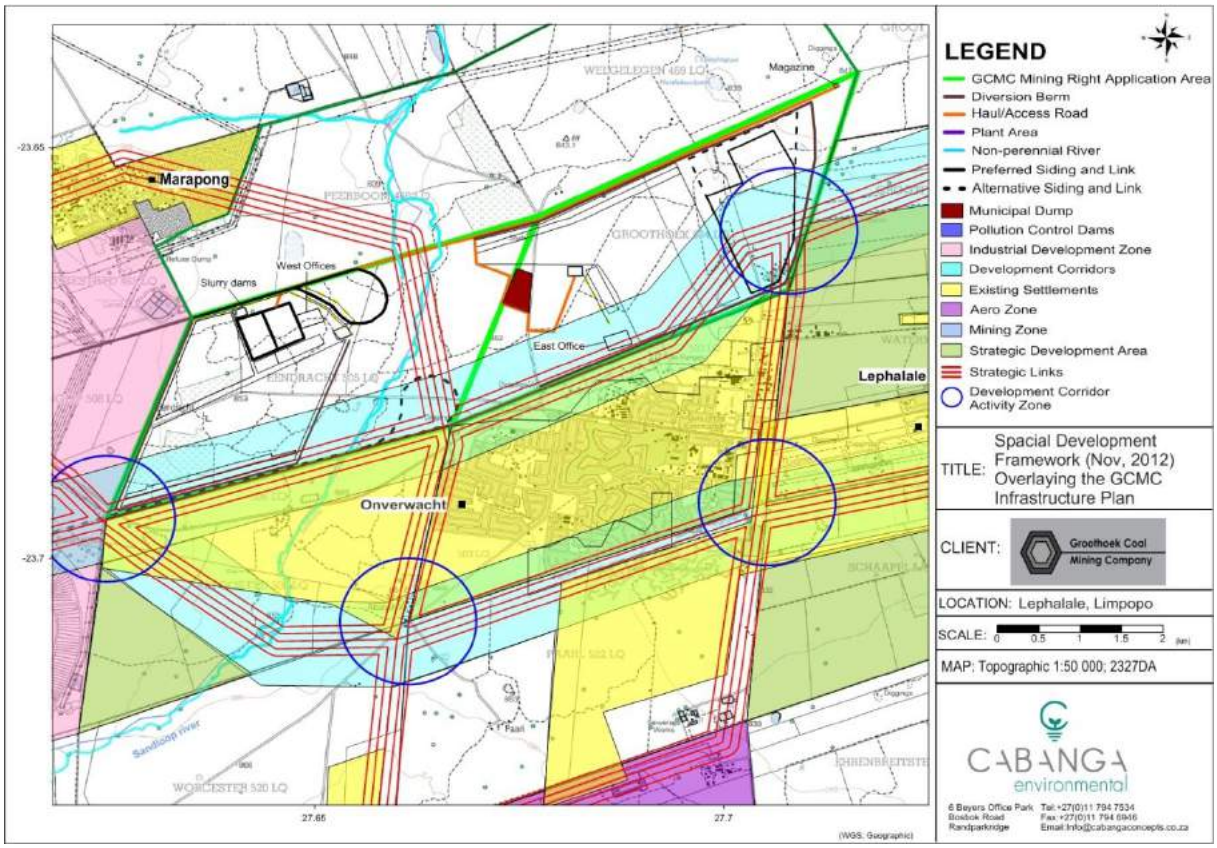


Plan 21: Lephalale Spatial Development Framework (SDF, 2012)

As per the SDF Report (2012), the 4 591ha of land contained within the SDAs makes sufficient provision for residential and township development without the necessity to undertake any development outside these SDA's in the short to medium term, and perhaps even into a long term perspective (p193). This is supported further in the SDF with additional plans including in-fill and densification development within developed areas (p197-201).

No SDAs have been targeted over GCMC' s mineral boundary, which has been specifically designated as a Potential Development Area (PDA 2) (Plan 21 and Plan 22).

As per the SDF (2012), the concept of the PDAs and possible development of PDAs are subject to further investigations over the medium to long term. Either due to uncertainties or lack of any final decisions regarding PDA development, it is not possible to make final recommendations in all circumstances. The Municipality should therefore investigate which of, where and to what extent, the PDA's should be developed. Final proposals with regard to the PDA's would require extensive discussions and negotiations with various role players (p201).



Plan 22: Proposed mine infrastructure plan overlaid onto the SDF (2012)

The SDF report (2012) goes on to specifically discuss the properties (Eendracht, Groothoek, Peerboom and Welgelegen) and does state that the area was previously identified for mining in earlier SDFs but is strategically located to ensure integration of the remotely removed Marapong, and that development of a mining area would create a final "barrier" between these areas (p202). The SDF Report then goes on to state that (p202):

> *"…but due to inputs received from the Groothoek Coal Mining Company … during the public participation process, it was pointed out that there are prospecting rights granted on the land and that the company is in an advanced stage of investigations in developing a coal mine in the affected area.*
>
> *In the light of the aforegoing and for purposes of this report, it would not be possible to make any final recommendation at this stage. The only option is now to indicate that it holds the potential to be developed in future, either as residential area or for mining purposes. It is therefore recommended that the municipality together with other role players such as the land owners, the Department of Mineral Resources and holders of the prospecting rights, investigate the two possibilities for future development."*

Further recommendations are provided (p202-203) regarding aspects that should be weighed up against each other to determine the most appropriate land use development.

Development Plans (cont.): Central Business District (CBD) Development Plan, 2013

The specific CBD plan for Lephalale Municipality (2013), states that the Potential Development Areas (PDAs) include development areas informed by demands of the national energy development programme, driven by the need to hold strategic energy feedstock (National Energy Act, Act 34 of 2008 - NEA), which would, under normal circumstances, be discouraged, but in this instance provides for special consideration of such development (p10).

According to the CBD plan (2013 – Plan 23), no development is targeted for the proposed properties other than links between nodes through a proposed road network. In fact, the CBD plan has acknowledged that Eendracht is a future mining area. No specific plans are stipulated for Groothoek, other than the link to Marapong, which is in the CDB report inferred to be over mining land.

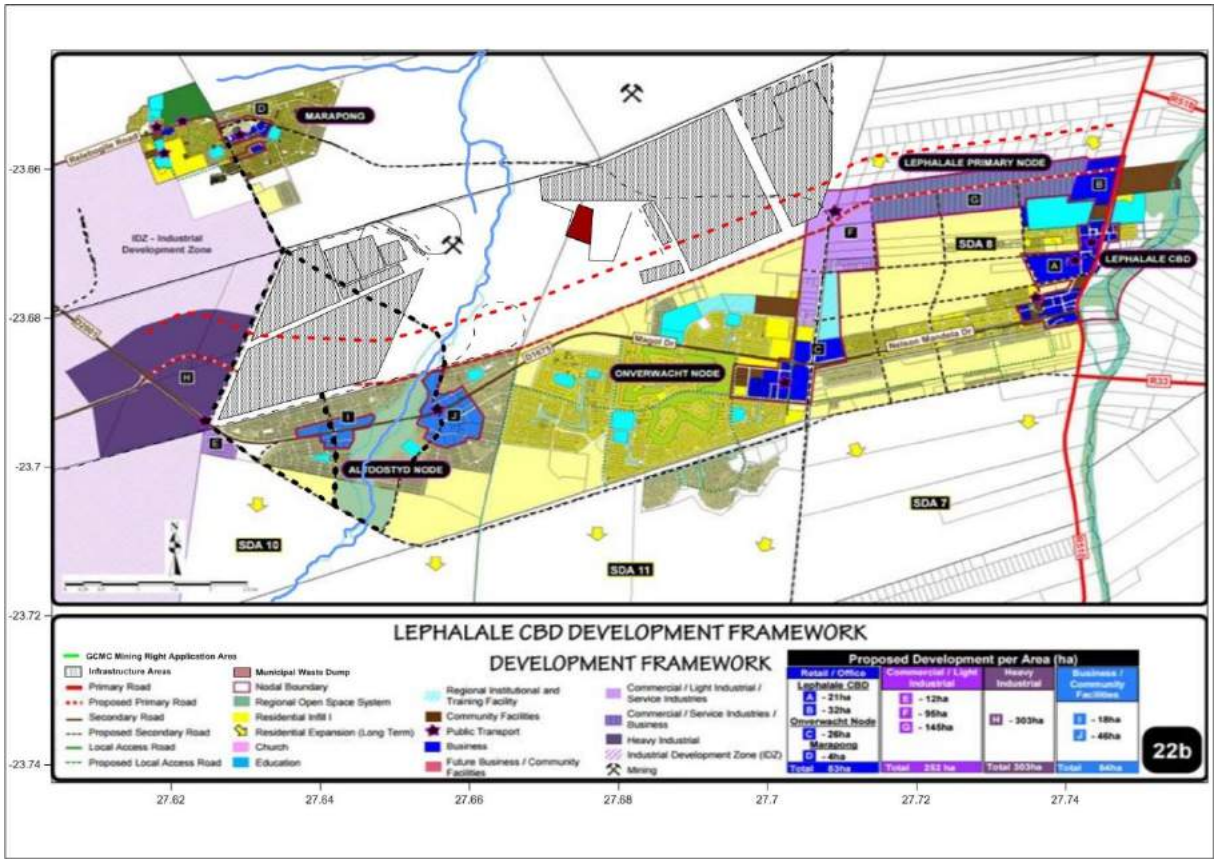
In the CBD development plan of 2013, the Municipality acknowledges the prospecting rights held by "Groothoek Coal Mining Company (Pty) Ltd over the farms Eendracht 505 LQ and Groothoek 504 LQ between the Onverwacht Node and Marapong Township" (p15). Furthermore, the link development to Marapong through roads, is acknowledged in the CBD plan to potentially be over mine land: "Extension of Onverwacht Road from Onverwacht light industrial area to Marapong across mining land" (p51).

The CBD plan has therefore acknowledged that Eendracht is a future mining area (Plan 232), with future residential expansion proposed south of Onverwacht, and no specific plans for Groothoek, other than the link to Marapong as discussed above and inferred to be over mining land. [CBD plan, p51: "Extension of Onverwacht Road from Onverwacht light industrial area to Marapong across mining land."]

Therefore, the only planned infrastructures that may be affected by the proposed mining development are the links, where the Municipality acknowledged that these may be over mine land. These links as proposed in the CBD plan can be diverted to some extent to avoid the mine pits without losing their functionality, which according to the CBD plan (2013), is as follows (p51):

- Extension of the Onverwacht Road from the Onverwacht light industrial area to Marapong across mining land.
- Upgrading of existing link road from Marapong to Heavy Industrial Area at the intersection between the northern bypass and route D2001.
- New link road from Marapong to the future Altoostyd node.

The CBD plan is largely in line with the SDF (2012) and it is assumed that through the consultation processes proposed in the SDF, that the links can be finalized without the need to unnecessarily affect mining development.

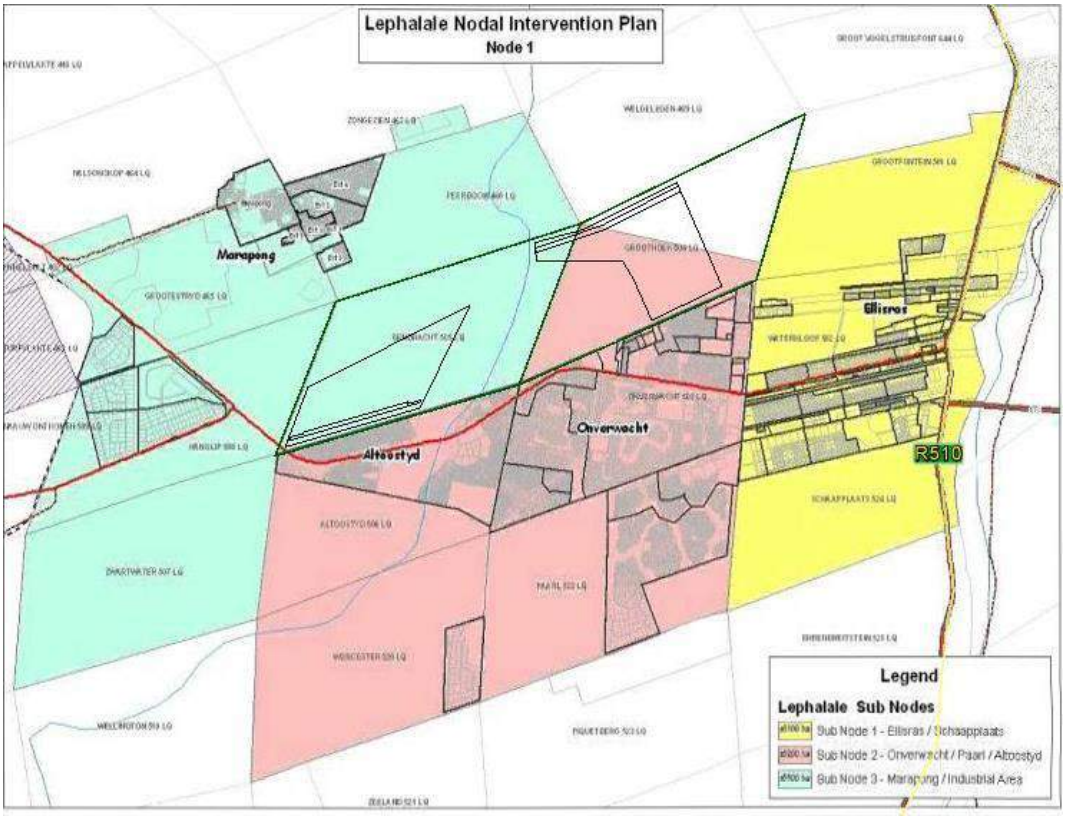


Plan 23: Proposed CBD Plan for Lephalale (CBD Plan, 2013) overlaid with the proposed GCMC mine layout

Development Plans (cont.): Integrated Development Plan (IDP), 2014-2016

Municipal SDFs are an important component of the Municipality's Integrated Development Plan (IDP). In terms of the Municipal Systems Act, 2000 (Act 32 of 2000), it becomes essential that the Lephalale SDF 2012 be incorporated into the IDP through the IDP review process. The 2014-2016 IDP therefore must consider the SDF as a guideline.

The 2014-2016 IDP plan is indicated in Plan 24 (with mine pits overlaid) and should have considered the 2012 SDF. Unfortunately no plan indicating the specific SDA areas is provided and only the sub-nodes (Plan 24) are provided in the IDP. There is no direct correlation between the SDA as verbally described on page 44 and the sub-node areas depicted on page 45 (Plan 24) of the report.



Plan 24: Lephalale Nodal Plan (Lephalale IDP: 2014-2016)

According to the latest IDP both farms of relevance have been included now into SDA 1. As per page 44 of the IDP (2014-2016):

> *"Spatial Development Area 1 includes areas designated as priority development areas. It includes the remainder of Altoostyd 506-L, Paarl 522-LQ, Schaalpplaats 524-LQ, Waterkloof 408-LQ and Onverwacht 508-LQ. Peerboom 466-LQ and Groothoek 504-LQ north of the proposed primary collector route are also part of the SDA1. The designated areas are in proximity to and forms natural extension of existing development.*
>
> *The farm Eendracht 505-LQ is a potential integrator between Marapong and other nodes of the Lephalale town. It is designated SDA1, however, due to environmental concerns a full environmental investigation is required prior to allowing any development on the farm."*

The IDP report also stipulates that:

> *"Spatial Development Area 3 has assumed a character of mixed non-residential land-use driven by mining and energy. This form of development should be encouraged in this area. Developments related to such land-uses might be considered without linking approvals to the state of development in SDA 1 and 2. It includes Zwartwater 507-LQ, Hanglip 508-LQ and Grootestryd 465-LQ."*

The IDP (2014-2016) now causes some confusion and lacks clarity on many issues, some of which are detailed below:

- Groothoek and Eendracht have been designated as SDA1, yet there is nothing in the IDP that indicates as to how this decision was reached and there is no clarity on any social consultation with affected parties regarding this decision, nor any studies supporting the decision that this land use is most feasible as recommended under the 2012 SDF (p202-203). As much as the SDF agrees that the areas should be incorporated into an SDA, it acknowledges that doing so without proper consultation and feasibility studies has legal and socio-economic implications and certain steps must be followed prior to designating final land use developments. It also stipulates that such decisions should be made over the medium to long term, yet the IDP of 2014-2016 has come to the conclusion in contradiction to the SDF (2012) and CBD (2013) in a period of 1 to 2 years.
- Zwartwater 507-LQ, Hanglip 508-LQ and Grootestryd 465-LQ designated as areas where development supporting mining and energy must be encouraged, are within:
    - Sub-node 3 (Marapong / Industrial Area – Plan 24), as is the adjacent farm, Eendracht, which cannot however be considered for mining development as it is being considered as part of SDA1 (IDP, 2014-2016, p44-45).
    - The IDZ (Industrial Development Zone) and not the MZ (Mining Zone) of the SDF, which supports industrialisation activities but not necessarily mining.

The latest IDP therefore does not seem to be aligned with the SDF, nor the CBD plan, and motivation, consultation and research that should have been conducted to determine the initial PDA's SDA status is not reported in the IDP and can only be assumed to be incomplete.

Furthermore, there is nothing stated in the IDP regarding the prospecting rights held by GCMC over the properties as is acknowledged in both the SDF and CBD plan. It is not merely because the issue is not discussed in the IDP as Anglo and Exxaro are recognized as coal mine developers in the area (p146).

There is nothing in the IDP which discusses the legal implications of developing the area as SDA1 with regards to the Energy Act. The National Energy Programme is discussed (p146) but is not tied into the development plan. The CBD plan (2013), states that the PDAs (now SDAs in the IDP) include development areas informed by demands of the National Energy Development Programme, driven by the need to hold strategic energy feedstock (National Energy Act, Act 34 of 2008 – NEA) (p10). This is however not elaborated in the IDP and no motivation is provided as to how urban development was selected as the preferred land use rather than securing energy feedstock as per the NEA.

Furthermore, the mining rights are discussed in terms of objectives of the MPRDA in the IDP but again are not motivated for SDA land use development that has been proposed in the IDP. Nothing is stated with regards to the sterilisation of the potential 1 Billion tons of coal

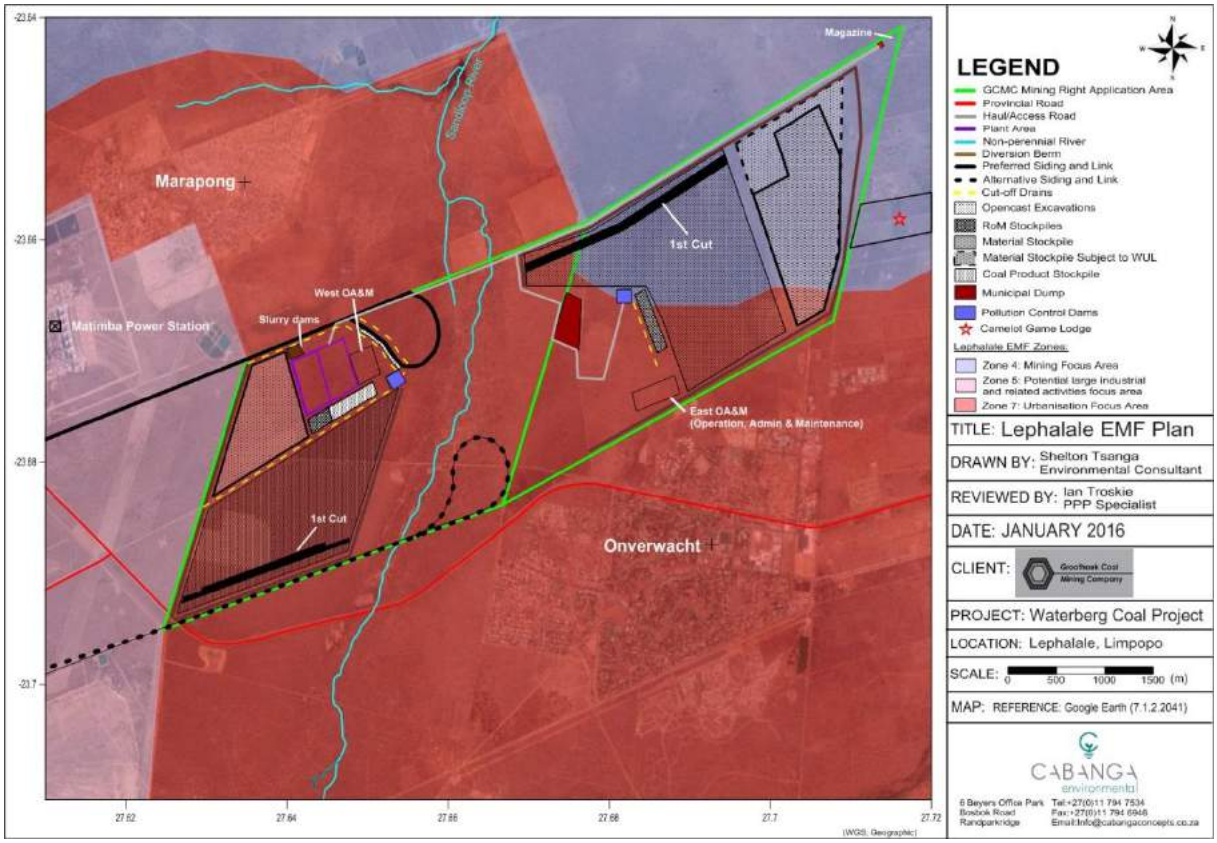
(SDF, 2012) which will occur if mining development is excluded in favour of urban development. The IDP simply makes a statement to the affect that the:

> *"Municipality has no jurisdiction over the administration and granting of mineral rights but does have the right to be consulted on each application that will affect it. The Municipality is also obliged to facilitate economic and mining development processes by building networks and promoting good working relationships in the sector, such [as] private company, parastatal, development organizations and public infrastructure agencies."*

Waterberg Environmental Management Framework (EMF)

The western activities of the proposed operation fall within Zone 7 (Urbanization Focus area) of the EMF, with the eastern activities largely in Zone 4 (Mining Focus Area) as indicated in Plan 25. As per the EMF guideline (GN806, 10 October 2012), "the purpose of EMFs is to inform environmental management in the area and to inform decisions on applications for environmental authorisations. The legislative framework accordingly does not make EMFs binding on decisions that are, for example, processed by local authorities" (p2). The EMF (2012) is considered a guideline for decision-making purposes, which has not been consulted in the latter (2013) CBD Plan (Plan 23 above), causing conflict and contravening principals of co-operative governance as stipulated in NEMA.

The success of the mining right would result in the rezoning of the properties to mining land, which would alter compatible water uses allowed for Zone 7 areas. In terms of the water use, GCMC intend to apply for a water use license to conduct the necessary water uses required for mining and will apply necessary GN704 principals which guide mine water management to prevent degradation to water quality in nearby water resources.



Plan 25: Proposed mine plan overlaid onto the Waterberg EMF zones

Limpopo Biodiversity Assessment and Conservation Plan (C-Plan)

The CBA Plan (Plan 26) refers. In the absence of the Conservation Plan (C-Plan), the mine plan was approached with the intent to maintain the river and 1:100 year floodline and the associated wetlands and 100m buffer zones. Therefore large areas of the CBA1 associated with the Sandloop River have not been targeted for any development. This will also maintain this area as an ecological corridor. The conservation plan stipulates that mining and industrial, infrastructure and residential development are incompatible land uses for CBA 1 areas, incompatible with ESA 1 (unless developments can be designed to maintain overall ecological functioning of ESAs) and would be deemed incompatible land uses for ESA 2 areas as activities resulting in additional impacts on the ecological functioning are excluded. According to the proposed mine plan, only mining and infrastructure (other than the stockpile area) on Groothoek would be “appropriate” land uses in terms of the C-Plan.

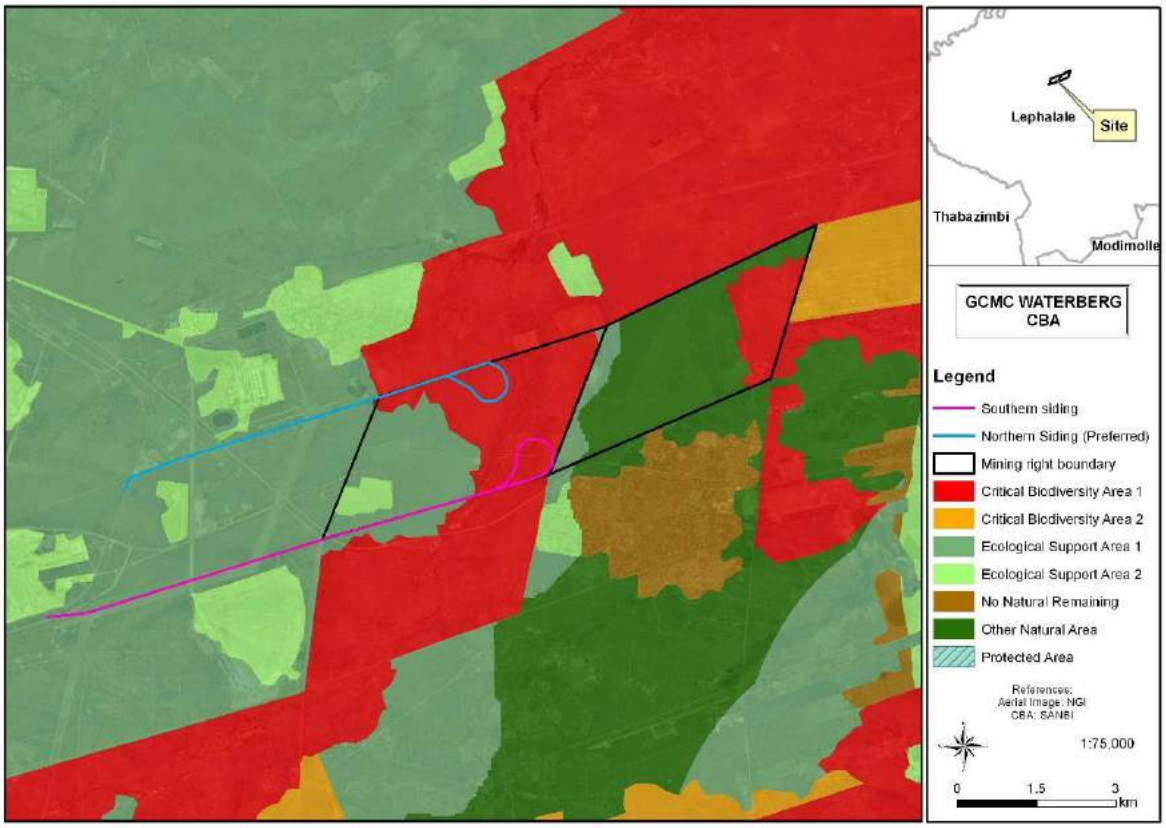
In terms of Section 48(1) of NEM:BA, a bioregional plan (the main purpose of the Limpopo Conservation Plan) may not be in conflict with:

> *(b) Any integrated development plans adopted by municipalities in terms of the Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000);*

(c) Any spatial development frameworks in terms of legislation regulating land-use management, land development and spatial planning administered by the Cabinet member responsible for land affairs; and

(d) Any other plans prepared in terms of national or provincial legislation that are affected.

As depicted above and under section 8.1.1.14 (Development Plans), there is much conflict between the C-Plan, SDF, EMF, CDB and IDP plans. This results in a situation where stakeholders can essentially provide argument for or against the development based on one specific plan at the exclusion of the others



Plan 26: GCMC Mining Right application area overlaid onto the Limpopo Conservation Plan (Dimela, 2015)

8.1.2 Description of the Current Land Uses

8.1.2.1 Current Land Use Status

The site is characterised as largely natural with some scattered agricultural areas or areas disturbed by past agricultural activities and an area cleared for the equestrian club. A municipal waste dump is located on Groothoek 504LQ. The site is also traversed by largely gravel roads.

The locality and extent of current land uses within the GCMC mining right area are shown in Plan 27 and are summarized in Table 22. The South eastern section of Groothoek 504 LQ is

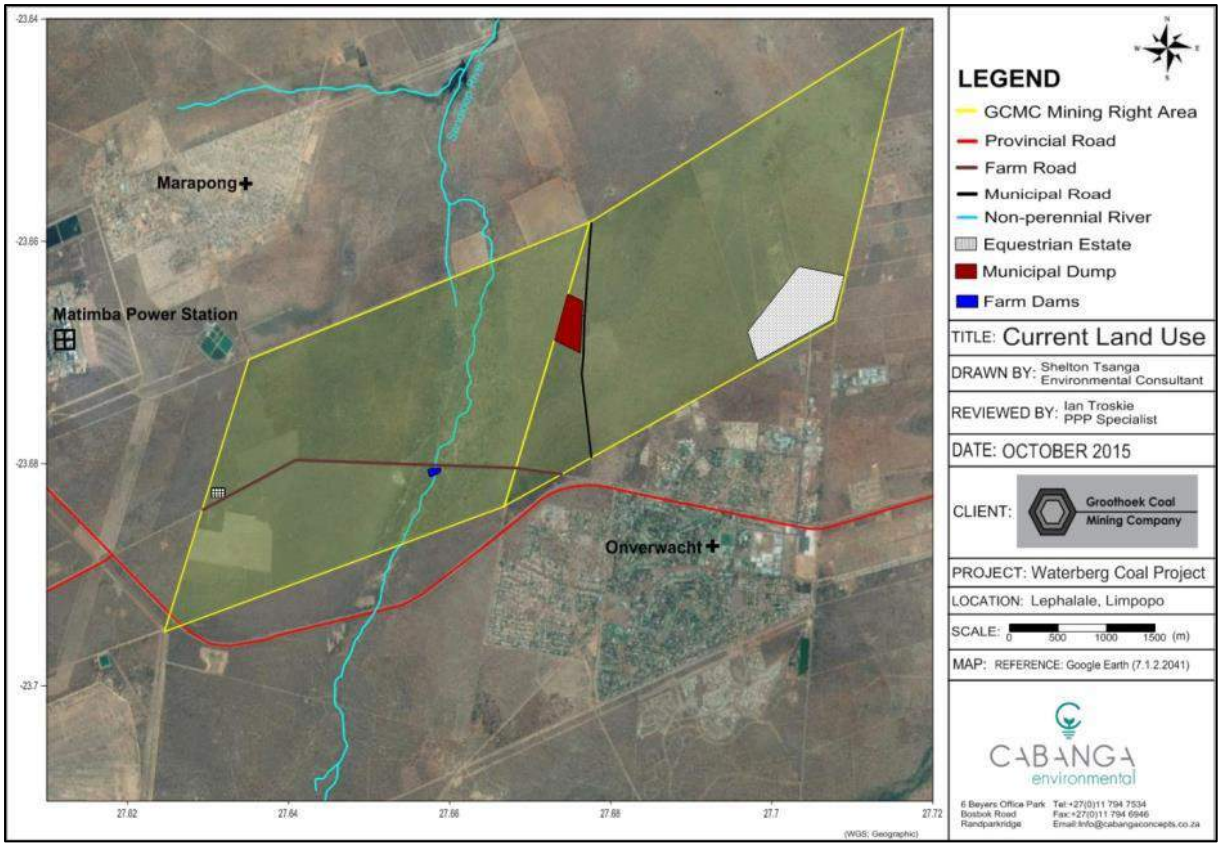
an Equestrian Estate. The municipal dump is located within the property on the western boundary of the property. The remainder of the property is utilised for livestock grazing.

The Farm Eendracht 505 LQ is utilized for livestock grazing and the Sandloop River flows through the eastern part of the farm from south to north. A farm dam along the Sandloop River is located within the property.

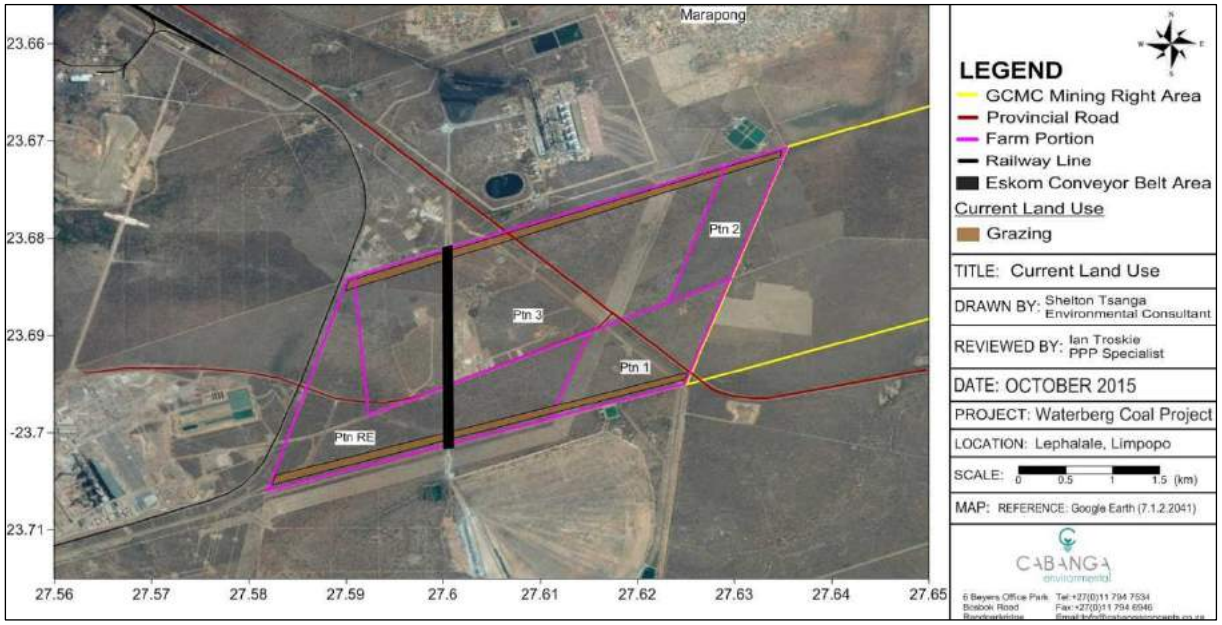
Land uses within the railway links associated with the siding alternatives, summarized in Table 22, are shown in Plan 28.

Table 22: Land uses within GCMC mining right area

Legend	Area	Area %
Mineral Boundary		
Grazing	1966	96.04
Municipal Dump	14	0.63
Equestrian Estate	56	2.74
Farm Dam	1	0.05
Farm House	2	0.10
Farm Roads	5	0.24
Municipal Road	3	0.15
Total	2047	100
Railway Links		
Grazing	15.6	100%



Plan 27: Land use map within the GCMC mining right application area



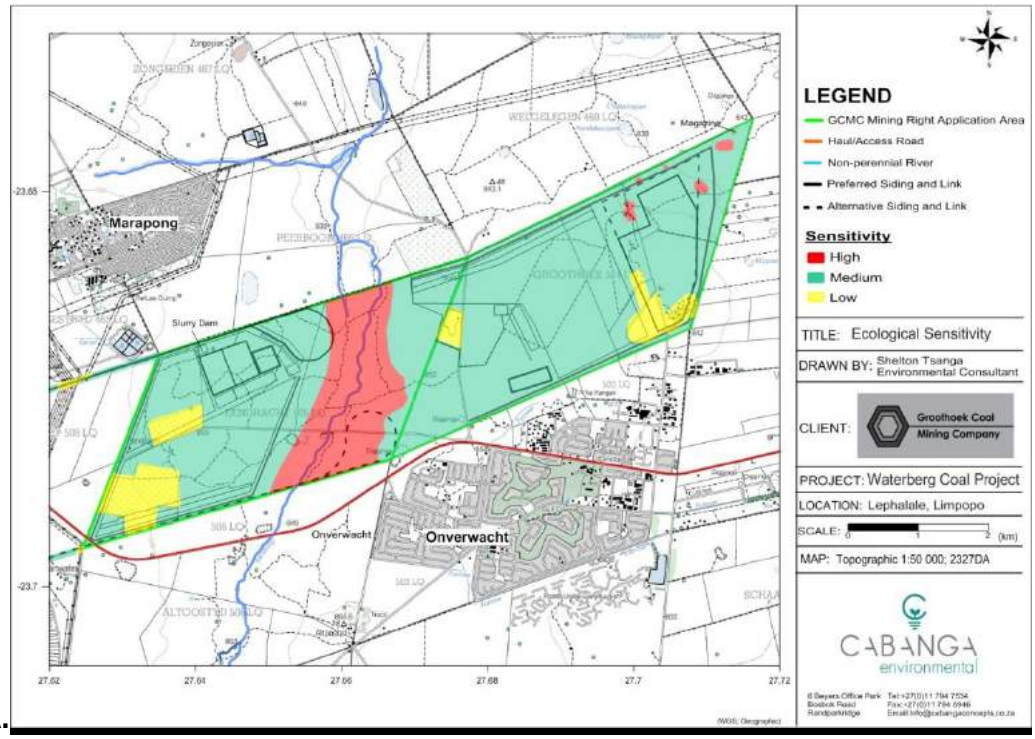
Plan 28: Land use map within proposed railway link footprint area

8.1.3 Description of Specific Environmental Features and Infrastructure on the Site

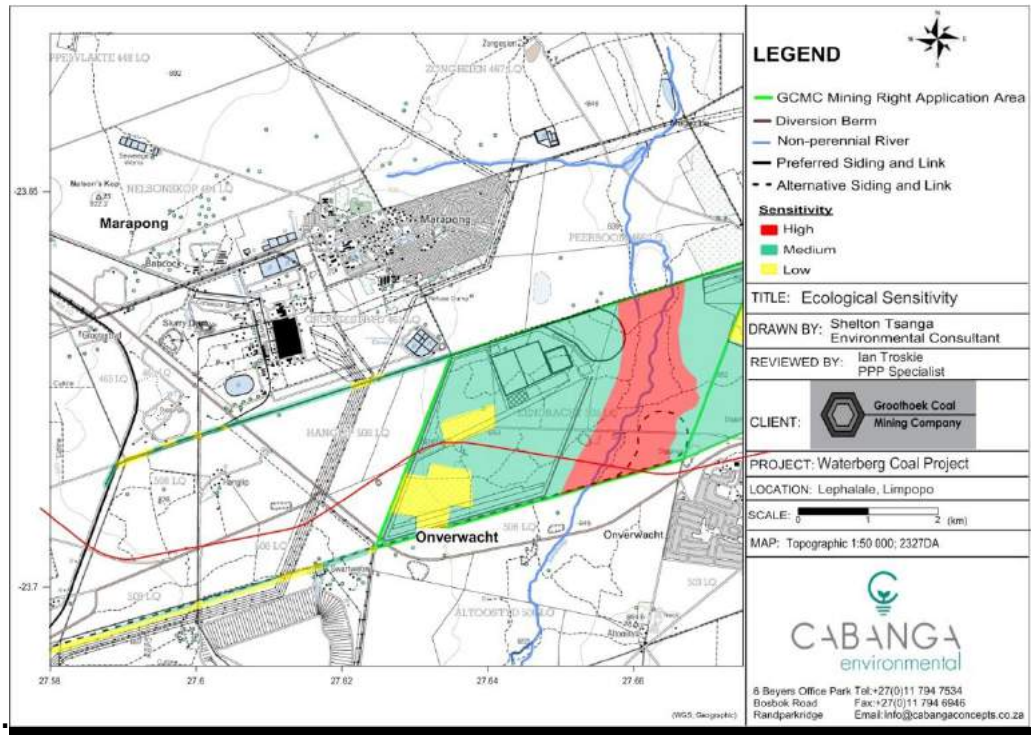
8.1.3.1 Ecological Sensitivity

Sensitive ecological areas are indicated in Plan 29.

A.



B.



Plan 29: Ecological sensitivity for the Mine area (A) & Siding and railway links (B)

Of significance is the role of the river and riparian zone as an ecological corridor. All highly sensitive areas are associated with surface water features on site.

8.1.3.2 Wetlands

A wetland assessment was initially completed by AGES (Henning, 2012). This study was however done during the dry season and therefore a follow-up study was completed in the wet season (November 2015) by SAS Environmental (2015). It must be stressed that rainfalls came very late in 2015 and the site was still dry at the time of assessment. The SAS Environmental report is attached as Appendix 11.

The wetland and riparian features identified within the project area were classified as Inland Systems falling within the Limpopo Plain Aquatic Ecoregion, and within the Central Bushveld Group 4 WetVeg group. Table 23 presents the classification at levels 3 and 4 of the wetland Classification System.

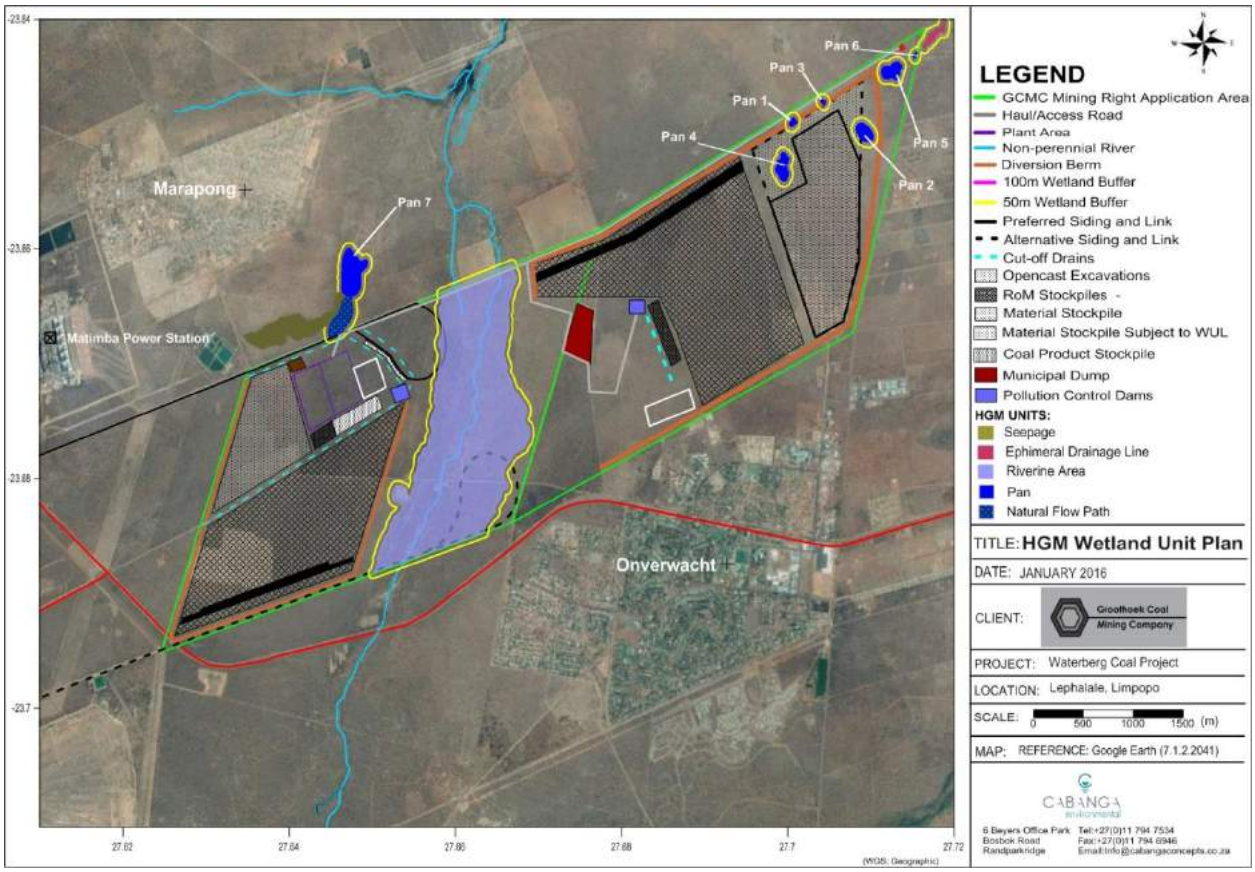
Table 23: Characterisation of the riparian and wetland systems within the project area, according to the Classification System (Ollis et al., 2013)

Wetland/riparian Resource	Level 3: Landscape unit Level	4: Hydrogeomorphic Unit HGM Type	 Longitudinal zonation / landform / Inflow drainage
Sandloop River	Slope: an included stretch of ground that is not part of a valley floor, which is typically located on the side of a mountain, hill or valley.	River: a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water.	Not applicable.
Pans 1 to 7	Plain: an extensive area of low relief characterised by relatively level, gently undulating or uniformly sloping land.	Depression: a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates.	Not applicable.

In addition to the above mentioned wetland/riparian resources, the following features were identified (Plan 30):

- A seepage area associated with Pan 7, draining from west to east in the direction of Pan 7, which may potentially originate within the Matimba Power Station premises. This feature was not assessed since it is apparent from historical and current digital satellite imagery as well as observations made during the site assessment that this feature would not persist under “normal circumstances” as per the definition of a wetland in the NWA;

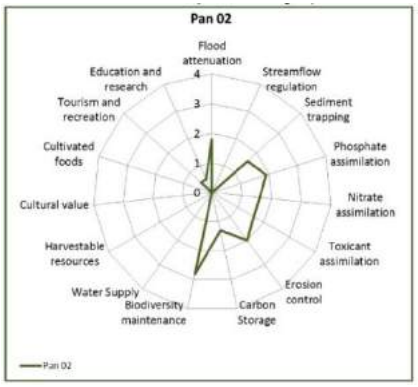
- Based on observations of historic and current digital satellite imagery, it is likely that there is a natural preferential flow path associated with Pan 7 located south of the pan. However, due to the limited access in this area, as well as the ephemeral nature of the feature the preferential flow path was not assessed. It is however deemed to form part of the system associated with Pan 7 and should therefore be afforded a level of protection in order to aid in maintaining the hydrology of Pan 7;
- An ephemeral drainage line was identified during the desktop phase of the study on the eastern border of the subject property. This feature could not be accessed during the site assessment, since it is located on private property. The feature was therefore not assessed, but it is highly recommended that suitable mitigation measures are taken throughout the life of the proposed mining activities to mitigate impacts to this feature, since it is forms a part of the unnamed tributary of the Mokolo River, located to the north east of the subject property.

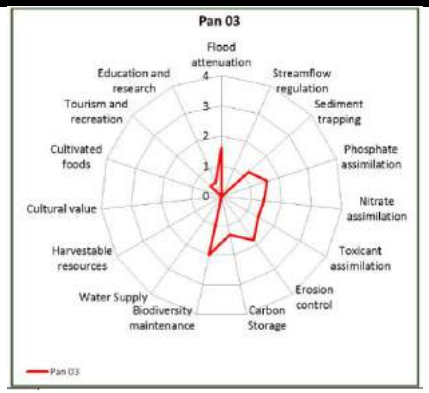
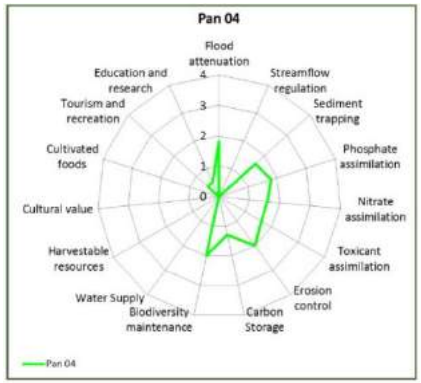


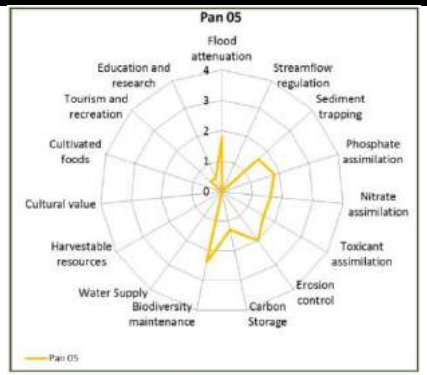
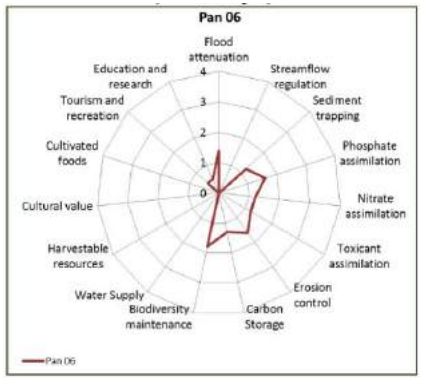
Plan 30: Wetlands and watercourse/riparian features assessed on site

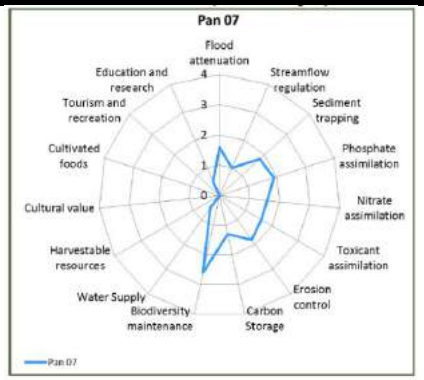
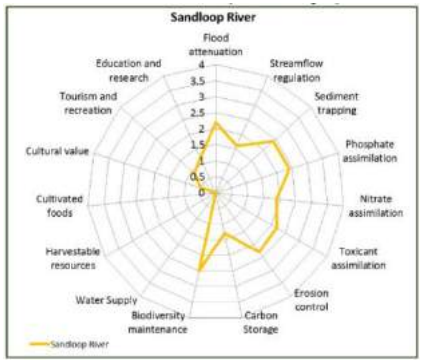
Each wetland unit identified is discussed in terms of ecological status, ecological sensitivity and wetland function in Table 24. Plan 31 indicates the proposed mine plan overlaid onto the wetland features identified on site with 100m wetland buffer zones and 1:100 year riverine floodline indicated.

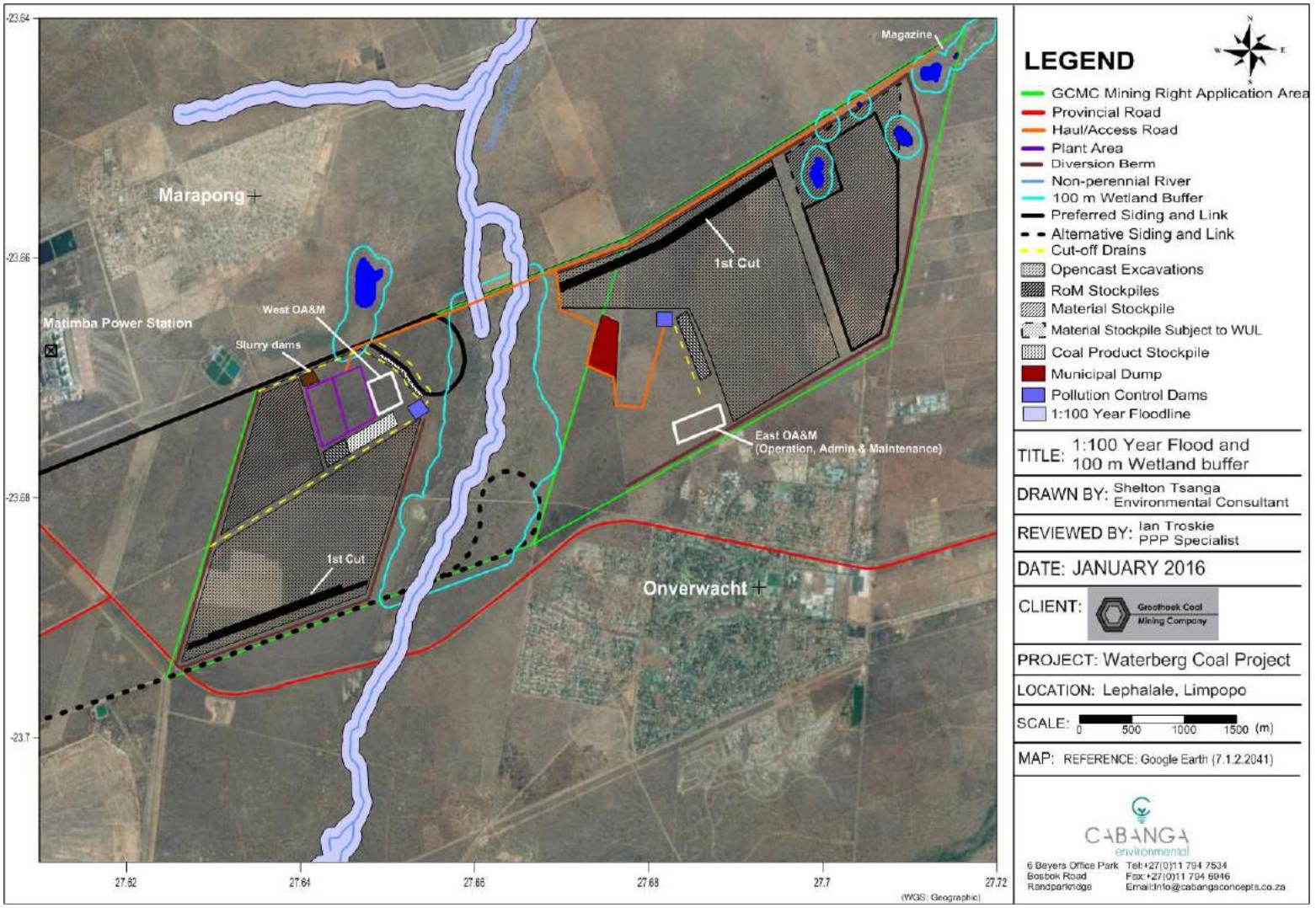
Table 24: Wetland characteristics

Wetland	Ecoservice provision	Present Ecological State (PES)	Ecological Importance & Sensitivity (EIS)	Recommended Ecological Category (REC)	Habitat & Biota
Pan 1 – Endorheic depression (pan)	Moderately Low 	A: Modifiers include grazing, expected increased silt loads in runoff from adjacent gravel road, some erosion due to trampling by livestock, marginally altered vegetation due to historic disturbances.	B/C: Despite ecological integrity, the relatively small size of the wetland resource, combined with seasonal availability of water, reduces capacity to support wetland biota	A	Habitat appears to be mostly intact, with good vegetation cover. The lack of surface water for much of the year is likely to have a major influence on the utilisation of the wetland resource by fauna, especially those dependent on wetlands.
Pan 2 – Endorheic depression (pan)	Moderately Low 	B: Modifiers include grazing, expected increased silt loads in runoff from gravel roads traversing southern portion of wetland resource, some erosion due to vegetation loss and trampling by livestock, altered vegetation due to historic disturbances.	C: Despite ecological integrity, the relatively small size of the wetland resource, combined with seasonal availability of water, reduces capacity to support wetland biota.	B	Habitat appears to be mostly intact, although some loss of vegetation has occurred, but mostly within the centre of the pan. The lack of surface water for much of the year is likely to have a major influence on the utilisation of the wetland resource by fauna, especially those dependent on wetlands.
Pan 3 – Endorheic depression (pan)	Moderately Low	A/B: Modifiers are similar in nature and extent to Pans 1 and 2, and include grazing,	C: Despite ecological integrity, the relatively small size of the wetland	B	Habitat considered to be relatively intact, particularly on outer boundaries and immediate terrestrial surrounds; however

Wetland	Ecoservice provision	Present Ecological State (PES)	Ecological Importance & Sensitivity (EIS)	Recommended Ecological Category (REC)	Habitat & Biota
		expected increased silt loads in runoff from gravel road adjacent to wetland resource, minimal erosion, marginally altered vegetation due to historic disturbances.	resource, combined with seasonal availability of water, reduces capacity to support wetland biota.		utilisation by fauna, particularly wetland-dependent fauna is likely to be seasonally influenced by availability of surface water.
Pan 4 – Endorheic depression (pan)	Moderately Low 	A/B: Modifiers are similar in nature and extent to Pans 1, 2, and 3, and include grazing by domestic livestock, expected increased silt loads in runoff from the gravel road traversing the wetland resource, minimal erosion, altered vegetation community structure due to historic disturbances.	C: Despite ecological integrity, the relatively small size of the wetland, combined with seasonal availability of water, reduces capacity to support wetland biota.	B	Habitat considered to be relatively intact, particularly on outer boundaries and immediate terrestrial surrounds; however utilisation by fauna, particularly wetland-dependent fauna, is likely to be seasonally influenced by availability of surface water. Disturbances to fauna also likely due to regular use of the roads traversing the wetland resource by farm employees.
Pan 5 – Endorheic depression (pan)	Moderately Low	B: Modifiers include grazing, expected increased silt loads arising from erosion due to vegetation loss and trampling by livestock,	C: Despite ecological integrity, the relatively small size of the wetland, combined with seasonal availability	B	Mostly intact habitat with reasonably good vegetation cover, however a seasonal limitation on the availability of water is likely to limit utilisation of the wetland by faunal species.

Wetland	Ecoservice provision	Present Ecological State (PES)	Ecological Importance & Sensitivity (EIS)	Recommended Ecological Category (REC)	Habitat & Biota
		altered vegetation due to historic disturbances.	of water, reduces capacity to support wetland biota.		
Pan 6 – Endorheic depression (pan)	Moderately Low 	B: Modifiers include grazing, leading to slightly altered vegetation community with some indigenous invasive floral species.	C: Despite ecological integrity, the small size of the wetland, combined with seasonal availability of water, reduces capacity to support wetland biota.	B	Habitat and biota not observed
Pan 7 – Endorheic depression (pan)	Moderately Low	B: Modifiers include historic agricultural activities such as grazing, and possible crop cultivation in the adjacent terrestrial areas. Sedimentation and erosion due to	C: due to historic impacts, the wetland is deemed to be of lowered ecological integrity, thus lowered sensitivity	C	Although the habitat is not considered to be intact, several common faunal species were observed and it is therefore concluded that the wetland resource is utilised to some extent by various fauna, including both wildlife and domestic livestock

Wetland	Ecoservice provision	Present Ecological State (PES)	Ecological Importance & Sensitivity (EIS)	Recommended Ecological Category (REC)	Habitat & Biota
		trampling by livestock and small antelope species observed. Vegetation component altered by floral species invasion although this is not considered severe at this time.			(antelope species were directly observed during the site assessment, whilst is was apparent from spoor and dung that domestic livestock also utilise the pan). Utilisation by wetland-dependent species is limited however due to the seasonal availability of water.
Riparian Resource: Sandloop River – Ephemeral river, with associated floodplain, and the presence of small depressions within the riparian zone.	Intermediate 	B/C: Impacts include grazing, trampling by livestock and farmed game animals, seasonal burning, sedimentation, potential pollution transported from upstream areas.	B: the Sandloop as a tributary of the Mokolo River is deemed an important drainage feature. Furthermore it is considered to be important from an ecological perspective due to increased ecological integrity.	B	The habitat is considered to be relatively intact, with some indigenous floral & invasive species, but nevertheless providing breeding and foraging habitat for a variety of fauna. According to Henning (2012) “Loss of the riparian habitat associated with the Sandloop River will also result in permanent loss or displacement of the invertebrates, birds and small mammals dependant on the wetland vegetation for feeding, shelter and breeding purposes.” The river further provides an essential corridor for such species, since it is connected to other natural areas in the vicinity of the project area.



Plan 31: Mine infrastructure plan overlaid onto the 1:100 year floodline and 100m wetland buffer zones

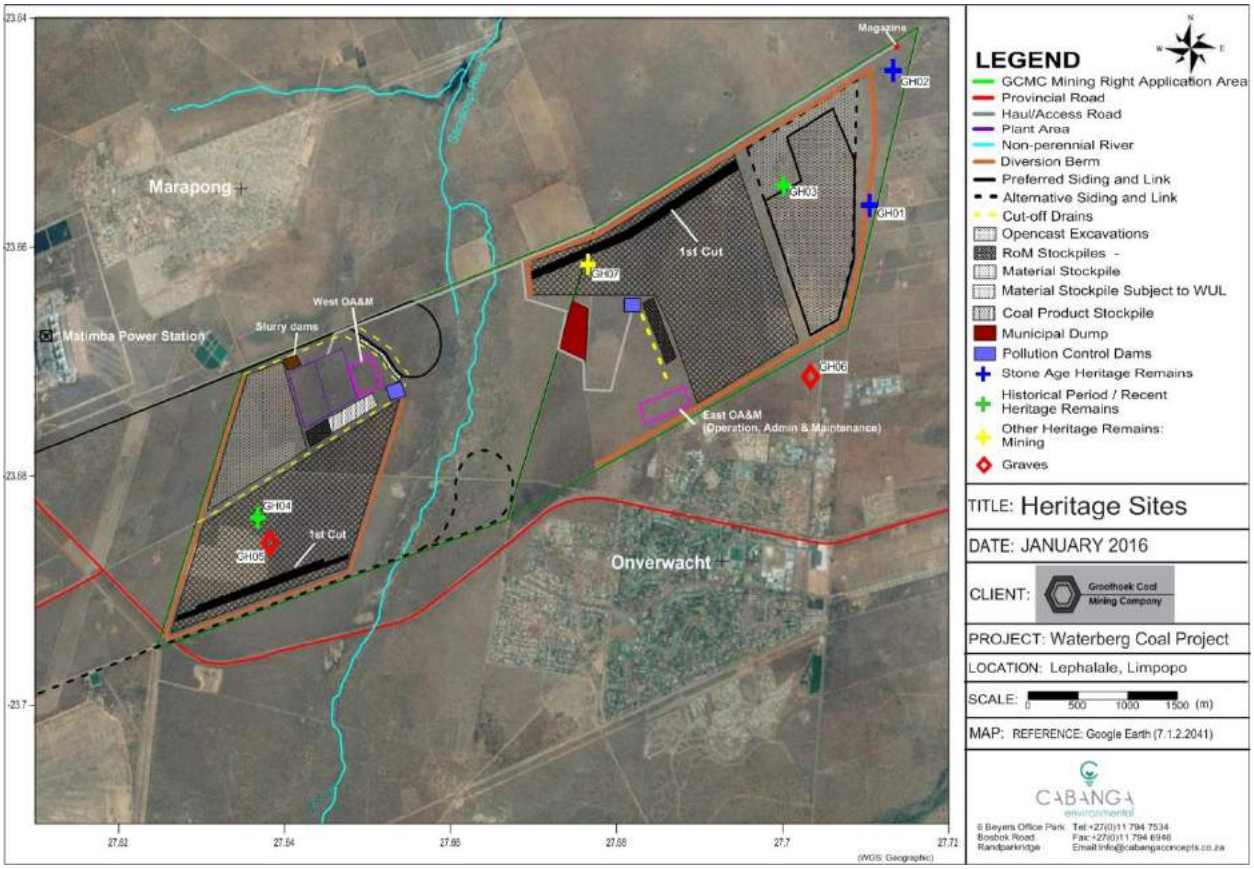
8.1.3.3 Sites of Archaeological and Cultural Interest

The initial assessment of the mineral area was completed by AGES (Kruger, 2012). The siding and proposed rail link alternatives were assessed by Archaetnos (2015), at which time the initial sites identified by AGES, within the mining right area, were also ground-truthed. Both reports are attached as Appendix 12 and Appendix 13 respectively. Sites that were identified are indicated in Plan 32 and include:

- Stone Age Site GH01 and GH02: Single debris lithic flakes on fine grained stone were observed near the two small pans on Groothoek. A large rock core showing clear signs of knapping were also observed. They are of limited scientific value (Kruger, 2012). Site GH01 could not be confirmed during the 2015 survey. Both sites are of limited scientific value, and due to the fact that the sites could have been transported in or carried away through storm water runoff, the sites have limited archaeological value (Archaetnos, 2015).
- Historical / Colonial Period Site GH03: A number of poorly preserved brick and concrete foundation structures, wall enclosures and middens occur in an area of approximately 200m x 50m, probably belonging to farm workers or employees of the equestrian club in the later-20th century. Material in middens such as glass, metal, enamel, plastic and wood as well as farming implements indicate a more recent age for the structures. The sites are probably of limited significance (Kruger, 2012). Archaetnos (2015) confirmed the site and advocates that it may have been a school as it includes remains of ablution facilities.
- Historical / Colonial Period Site GH04: The ruined remains of houses, fire places and large middens. The houses, generally built with clay bricks, belonged to farm labourers and are of recent age. The sites are probably of limited significance (Kruger, 2012). Site was confirmed by Archaetnos during the 2015 survey.
- Historical / Colonial Period Site GH05: A small graveyard was recorded south of the ruins (Site GH04). The site consists of 2 graves of which one has a marble gravestone with dressings. The inscription recorded was for Mokau Malefyane Elizabeth (Birth: 1931-02-03; Death: 1965-02-28). The site has high significance and must be preserved or relocated (Kruger, 2012). Site was confirmed by Archaetnos during the 2015 survey, although the site has at least 3 graves.
- Historical / Colonial Period Site GH06: The Lephalale municipal cemetery is situated directly south of the farm Groothoek outside of the study area, next to a small road towards the Lephalale equestrian grounds. The fenced and well maintained graveyard containing a large number of marked and unmarked graves is currently still in use (Kruger, 2012). Site was confirmed by Archaetnos during the 2015 survey. The site will remain unaffected by the proposed development and buffer zones must be implemented.
- Historical / Colonial Period Site GH07: During the 2012 assessment undertaken by AGES, the remains of a mine were documented on the farm Groothoek, directly north of the Lephalale refuse dump site. Small mine dumps, an open mine shaft and

mining infrastructure such as a crusher, mine tower and generators were noted on site (Kruger, 2012). Subsequent to this assessment, the shaft, the mine tower and all supporting infrastructure has been removed, presumably by the landowner Exxaro. This was confirmed by Archaetnos during the 2015 survey, when it was noted that all metal was removed from the site.

No additional sites were identified over two railway links associated with the siding alternatives.



Plan 32: Location of heritage sites (Kruger, 2012 Archaeological Report)

8.1.3.4 Characteristics of Surrounding Structures

Blast Management & Consulting (2015) completed a blast impact assessment study. The detailed report is included in Appendix 14. A summary of the baseline environment that may be affected by blasting is provided below.

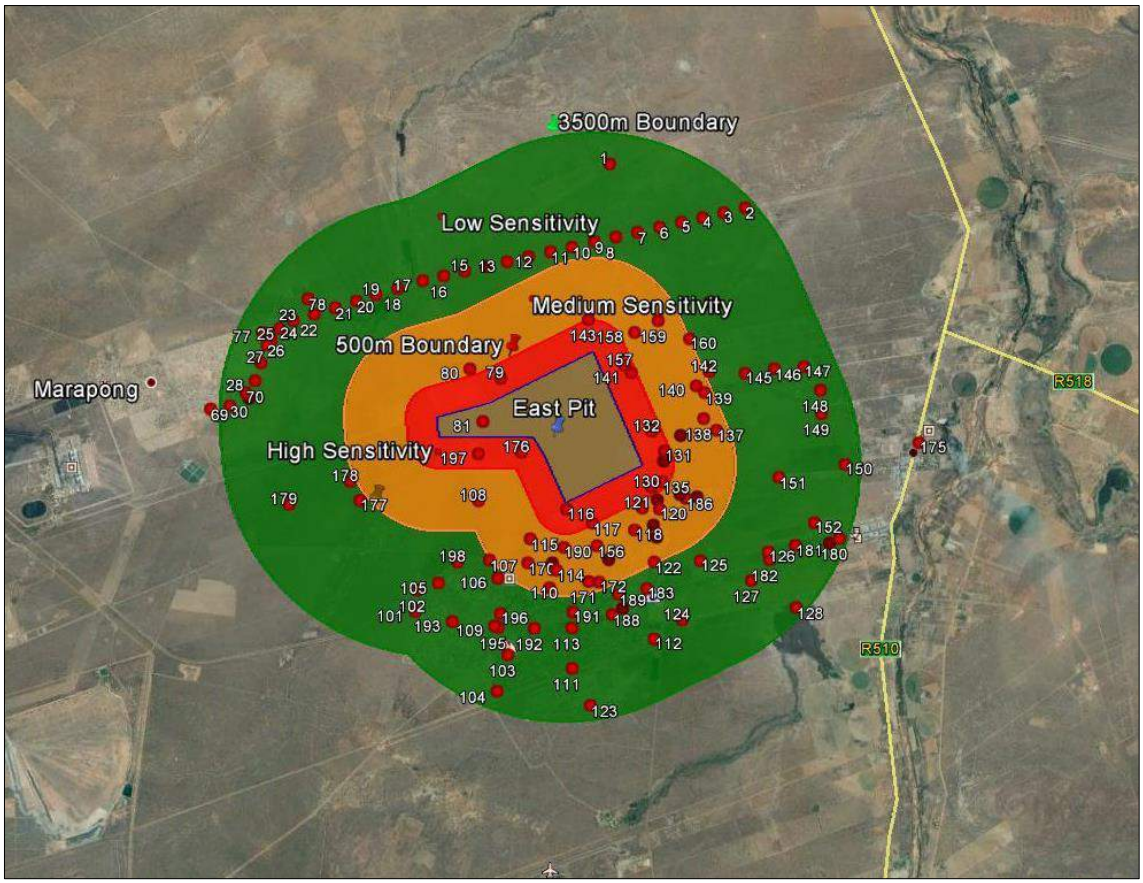
Review of the project area and surrounds was undertaken in order to complete sensitivity mapping, taking into account the typical areas and distances from the proposed mining area. This sensitivity map uses mainly distances where possible influences may occur or are not expected to occur under normal circumstances. Three different areas were identified for this.

Firstly a highly sensitive area of 500 m area around the mining area is identified. Normally the 500 m is considered an area that should be cleared of all people and animals prior to

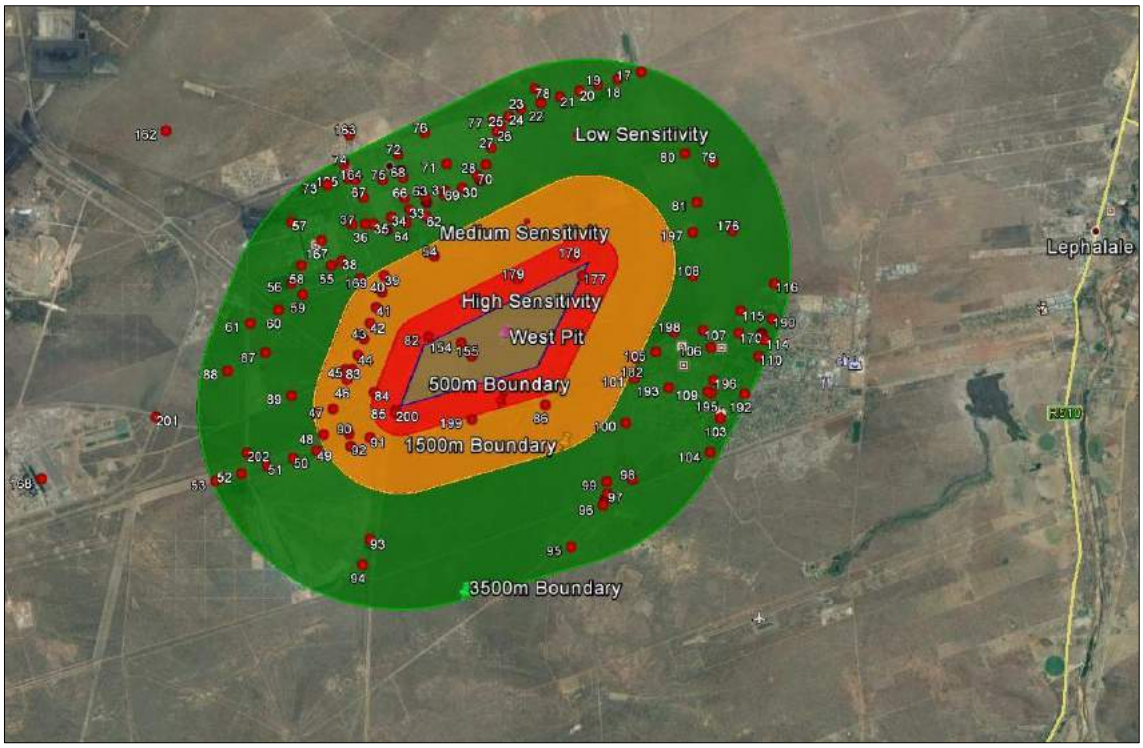
blasting. Levels of ground vibration and air blast are also expected to be higher closer to the pit area.

Secondly, an area of 500 m to 1500 m around the pit area can be considered as medium sensitivity, where there is possibility of influence but definitely with lower impact significance.

Thirdly, the least sensitive area is identified at a distance of 1500 m to 3500 m. The expected level of influence will be low but there may still be reason for concern as affects may still upset people, although there is much less concern for structural damage. Plan 33 and Plan 34 show the sensitivity mapping for the East and West Pits respectively with identified points of interest (POIs).



Plan 33: Identified sensitive areas for East Pit



Plan 34: Identified sensitive areas for West Pit

The list of POIs is not necessarily individual structures but may represent a number of structures or installations found in the vicinity of that relevant POI. A list of POIs was required for determining the allowable ground vibration limits and air blast limits possible at each POI. A comprehensive list of each of the POIs is presented in Table 26 along with each POI's classification (Table 25). The classification used is a BM&C classification and does not relate to any standard or national or international code or practice.

Plan 35 at the end of this section highlights the sensitive POIs with respect to blasting, including the buffer zones within these areas where blast management needs to be applied, further detailed in the blast impact assessment (Section 9.1).

Table 25: POI Classification used

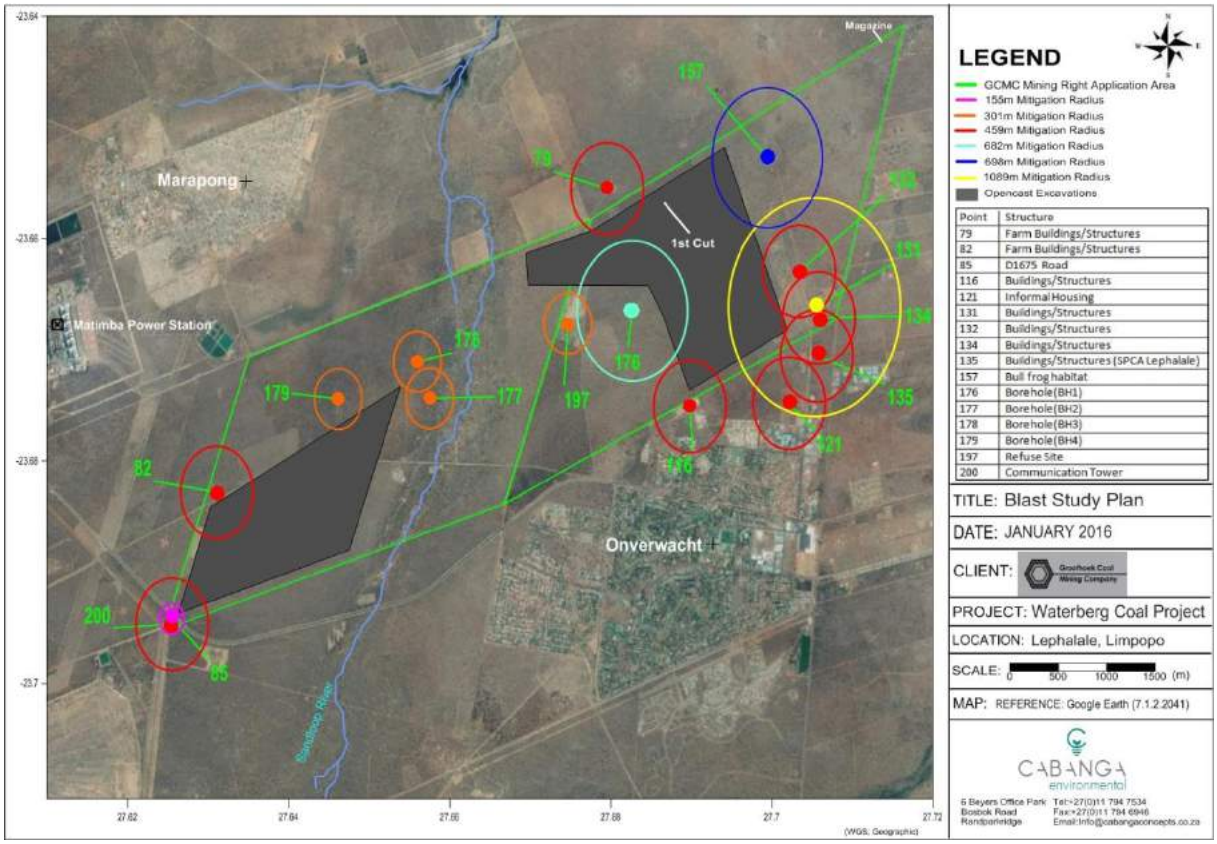
Class	Description
1	Rural Building and structures of poor construction
2	Private Houses and people sensitive areas
3	Office and High rise buildings
4	Animal related installations and animal sensitive areas
5	Industrial buildings and installations
6	Earth like structures – no surface structure
7	Graves & Heritage
8	Water Borehole

Table 26: List of points of interest identified (WGS – LO 27°)

Tag	Description	Class.	Tag	Description	Class.
1	Farm Buildings/Structures	2	102	D1675 (Nelson Mandela Drive) Road	5
2	Power line/Pylons	5	103	School	2
3	Power line/Pylons	5	104	Lephalale Houses	2
4	Power line/Pylons	5	105	Lephalale Houses	2
5	Power line/Pylons	5	106	Reservoir	5
6	Power line/Pylons	5	107	D1675 (Nelson Mandela Drive)	5
7	Power line/Pylons	5	108	Road	5
8	Power line/Pylons	5	109	Lephalale Houses	2
9	Power line/Pylons	5	110	Lephalale Houses	2
10	Power line/Pylons	5	111	Lephalale Houses	2
11	Power line/Pylons	5	112	Lephalale Buildings/Structures	3
12	Power line/Pylons	5	113	Lephalale Houses	2
13	Power line/Pylons	5	114	D1675 (Nelson Mandela Drive)	5
14	Power line/Pylons	5	115	Buildings/Structures	2
15	Power line/Pylons	5	116	Buildings/Structures	2
16	Power line/Pylons	5	117	Buildings/Structures	2
17	Power line/Pylons	5	118	Lephalale Hospital	3
18	Power line/Pylons	5	119	Lephalale Houses	2
19	Power line/Pylons	5	120	Buildings/Structures	2
20	Power line/Pylons	5	121	Informal Housing - Lephalale	1
21	Power line/Pylons	5	122	Buildings/Structures	2
22	Power line/Pylons	5	123	Lephalale Houses	2
23	Power line/Pylons	5	124	Lephalale Houses	2
24	Power line/Pylons	5	125	Lephalale Houses	2
25	Power line/Pylons	5	126	Lephalale Houses	2
26	Power line/Pylons	5	127	Lephalale Houses	2
27	Power line/Pylons	5	128	Lephalale Houses	2
28	Power line/Pylons	5	129	Chris Hani Avenue	5
29	Power line/Pylons	5	130	Heritage Site (Graves)	7
30	Power line/Pylons	5	131	Buildings/Structures	2
31	Power line/Pylons	5	132	Building/Structure	2
32	Power line/Pylons	5	133	Buildings/Structures	2
33	Power line/Pylons	5	134	Building/Structure	2
34	Power line/Pylons	5	135	Buildings/Structures(SPCA Lephalale)	4
35	Power line/Pylons	5	136	Buildings/Structures	2
36	Power line/Pylons	5	137	Buildings/Structures	2

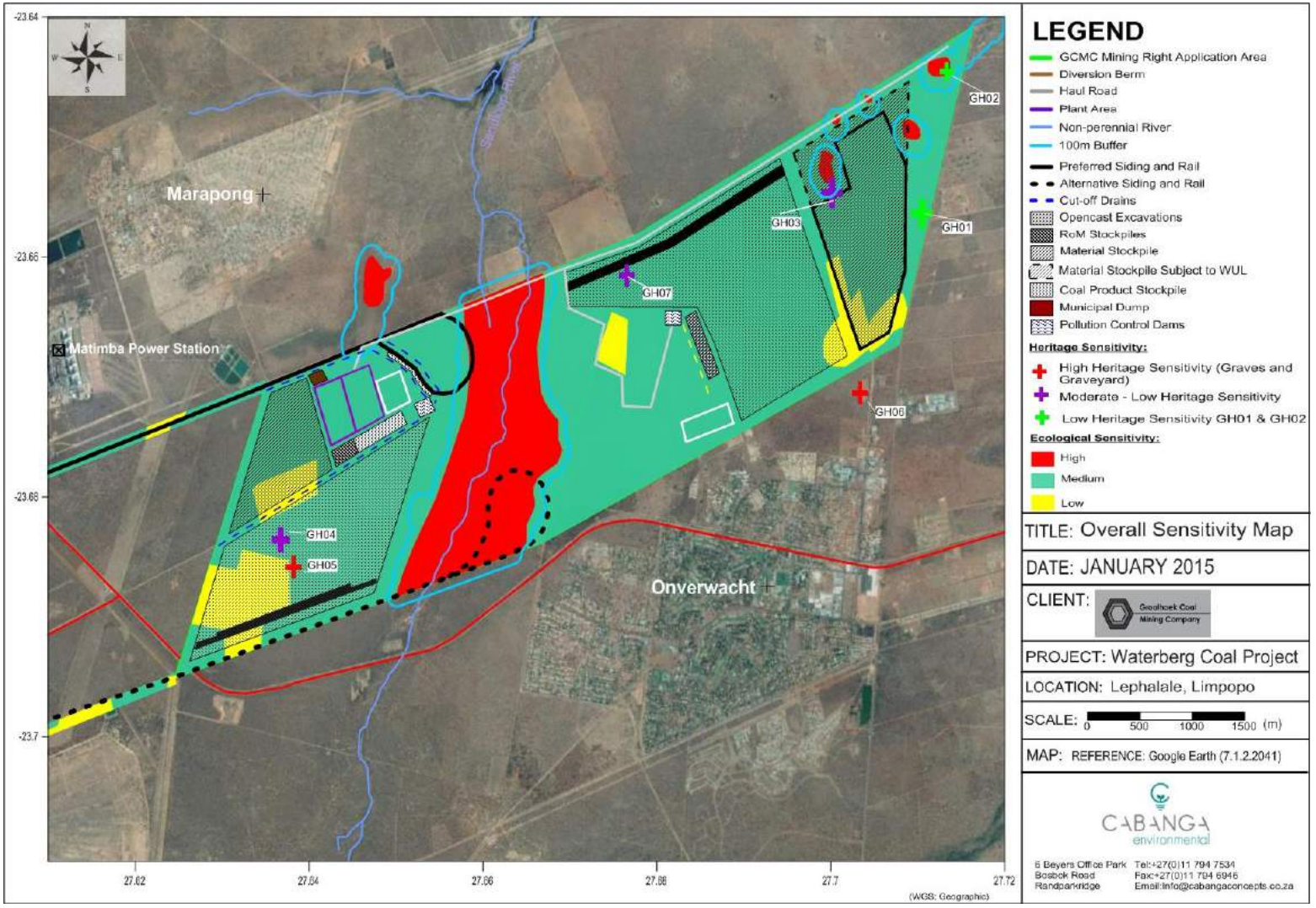
Tag	Description	Class.	Tag	Description	Class.
37	Power line/Pylons	5	138	Buildings/Structures	2
38	Eskom Power Station - Matimba	5	139	Buildings/Structures	2
39	Power line/Pylons	5	140	Heritage Site (Graves)	7
40	Power line/Pylons	5	141	Heritage Site (Graves)	7
41	Power line/Pylons	5	142	Farm Buildings/Structures	2
42	Power line/Pylons	5	143	Farm Buildings/Structures	2
43	Power line/Pylons	5	144	Heritage Site (Graves)	7
44	Power line/Pylons	5	145	Farm Buildings/Structures	2
45	Power line/Pylons	5	146	Buildings/Structures	2
46	Power line/Pylons	5	147	Farm Buildings/Structures	2
47	Power line/Pylons	5	148	Farm Buildings/Structures	2
48	Power line/Pylons	5	149	Farm Buildings/Structures	2
49	Power line/Pylons	5	150	Buildings/Structures	2
50	Power line/Pylons	5	151	Buildings/Structures	2
51	Power line/Pylons	5	152	Buildings/Structures	2
52	Power line/Pylons	5	153	Lephalale Houses	2
53	Power line/Pylons	5	154	Heritage Site (Graves) – Inside West Pit Area	7
54	Dam	5	155	Heritage Site (Graves) – Inside West Pit Area	7
55	Buildings/Structures	2	156	School	2
56	Dam	5	157	Potential Bull frog habitat	4
57	Railway Line	5	158	Potential Bull frog habitat	4
58	Railway Line	5	159	Potential Bull frog habitat	4
59	Railway Line	5	160	Potential Bull frog habitat	4
60	Railway Line	5	161	Potential Bull frog habitat	4
61	Railway Line	5	162	Nelson's Kop Heritage Site	7
62	Marapong Community Houses	1	163	Phegelelo High School	2
63	Marapong Cemetery	7	164	Mathomo Training Facility	2
64	Marapong Community Houses	1	165	Marapong Private Hospital	3
65	Marapong Community Houses	1	166	Nelsonkop Primary School	2
66	Marapong Buildings/Structures	3	167	Industrial Complex/Matimba PowerStation	5
67	Buildings/Structures	2	168	Medupi PowerStation	5
68	University/College Buildings	3	169	Airfield	6
69	Marapong Community Houses	1	170	Mogol Animal Clinic	4
70	Marapong Community Houses	1	171	Mogol Sport Centre	2
71	Buildings/Structures	3	172	Swimming Pool	2
72	Marapong Community Houses	1	173	Shopping Centre	2
73	Dams	5	174	Fet College - Lephalale	2

Tag	Description	Class.	Tag	Description	Class.
74	Marapong Community Houses	1	175	School	2
75	Marapong Community Houses	1	176	Borehole(BH1)	8
76	Marapong Community Houses	1	177	Borehole(BH2)	8
77	Marapong Community Houses	1	178	Borehole(BH3)	8
78	Dams	5	179	Borehole(BH4)	8
79	Farm Buildings/Structures	2	180	Lephalale Houses	2
80	Farm Buildings/Structures	2	181	Lephalale Houses	2
81	Heritage Site (Graves) – Inside East Pit Area	7	182	Reservoir	5
82	Farm Buildings/Structures	2	183	Filling Station	5
83	D2001 and D1675 Roads	5	184	Buildings/Structures	2
84	D1675 Road	5	185	Industrial Area	5
85	D1675 Road	5	186	Filling Station	5
86	D1675 Road	5	187	Buildings/Structures	2
87	Buildings/Structures	2	188	Telkom Tower	5
88	Buildings/Structures	2	189	Medi Clinic	3
89	Buildings/Structures	2	190	Communication Tower	5
90	Dam	5	191	Water Tower	5
91	Buildings/Structures	2	192	Communication Tower	5
92	Tailings Facility and Buildings/Structures	2	193	Buildings/Structures	2
93	Tailings Facility Dam	5	194	Communication Tower	5
94	Sub Station	5	195	Communication Tower	5
95	Informal Housing	1	196	Buildings/Structures	2
96	Cement Dams	5	197	Refuse Site	5
97	Informal Housing	1	198	Communication Tower	5
98	Ruins	1	199	D1675 Road	5
99	Informal Housing	1	200	Communication Tower	5
100	Lephalale Houses	2	201	Road Bridge	5
101	Lephalale Houses	2	202	Conveyor Belt	5



Plan 35: Sensitive points of interest in relation to blasting activities

8.1.4 Environmental and Current Land Use Map



Plan 36: Overall environmental sensitivity map

9 IMPACT ASSESSMENT PROCESS AND FINDINGS

9.1 Impacts and Risks Identified by Specialists

This section deals specifically with impacts from the relevant modelling exercises completed by various specialists. The findings presented within the various models have also been incorporated into the detailed impact assessment included in Appendix 16, and the overall impact assessment summary provided in Section 11.

9.1.1 Soil & Land Capability

Due to the nature of the soils and their water holding capacities, wetland soils were only identified in the two larger pans in the far north eastern corner of the mineral boundary. Project layout as presented here has been altered to largely avoid these pans (Appendix 2).

The most significant impact identified during the soil assessment (moderate significance) was the loss of fertile (in relation to subsoil) topsoil layer as a result of stripping of all infrastructure areas, development footprints and associated activities, and the associated impact this would have on land capability. This impact can be easily mitigated through proper soil handling and management as per the soil utilisation guide.

Land use will change to mining as is the nature of mining developments.

Other minor impacts include:

- Soil erosion, although the flat topography will limit the impact to soil stockpiles and berms.
- Soil compaction.
- Chemical soil pollution as a result of surface contaminants.

No fatal flaws were identified, but the soil report acknowledges that poor handling of soil on site from the onset will cause long term problems with rehabilitation. Strictly applying the soil utilisation guide will mitigate the impact and provide enough soil of adequate quality to largely return rehabilitated areas to similar land capability provided other mitigation measures are applied.

9.1.2 Surface Water

The floodline delineation report (Appendix 5) indicates that the 1:100 year floodline was wider than the 100m horizontal distance of the Sandloop River. The riverine wetland area with a 100m buffer however comfortably encompasses the 1:100 year floodline (Plan 11) and therefore the riverine wetland area and 100m buffer zone are considered the developmental boundary in terms of water use. The project layout avoids the 1:100 year floodline, and the only activity proposed is access along the existing farm road in the northern boundary (mine plan in Appendix 2). Furthermore, the final layout has been altered

to avoid direct impact to the riverine wetland and 100m buffer zone as far as possible (see Section 9.3 below).

During a 1:100 year flood event, no flooding impacts are expected on any of the infrastructure areas as a result of flow in the Sandloop River. The farm road on the northern boundary which is proposed to be utilised for access is likely to be flooded, and a formalised river crossing may need to be developed. This will require engineered designs and a water use license.

During the 1:100 year flood event, the riverine area may become inundated. A small section of the preferred siding option (length of approximately 400m) infringes on the riverine wetland area, and the preparation of the siding in this area must consider geotechnical stability of the area.

Detailed hydrological assessments have been completed for the site (LWES, 2015 – Appendix 6). Using hydrological modelling, the on-site storm water management features were appropriately sized as reported in Section 3.1.7. Therefore, the proposed on site dirty water management infrastructure will contain a 1:50 year storm event as required by legislation. PCD sizes as reported within the EIA/EMPr report are the minimum sizes required to contain surface water runoff from the various dirty water footprint areas.

Impacts identified in the surface water assessment (LWES, 2015) are summarised below:

- Proximity of mining activities, railway siding and municipal landfill site to the Sandloop River was rated as the highest significance.
- Other moderate impacts include:
    - Soil erosion which will cause downstream sedimentation.
    - Deterioration of water quality due to transported surface contaminants
    - Increase in hydrological yield, due to decreased inundation of rainfall over compacted surfaces.
    - Decrease in total hydrological yield to downstream catchment due to containment of water over development footprint (necessary to contain dirty water).

All impacts can be mitigated to various extents and no long term latent impacts or fatal flaws were identified with proper implementation of mitigation measures.

9.1.3 Groundwater

9.1.3.1 Construction Phase

The box-cuts will be excavated, breaching the groundwater level. The West Pit and East Pit box-cuts dimensions will be 2 000 m x 99 m and 2 300 m x 70 m respectively (length x depth) (Stripp, 2013).

Pit dewatering will be required, leading to the localised dewatering of the aquifer. The zone of influence will not extend more than 400 m from the box-cuts and the maximum drawdown in groundwater level in the fractured aquifer will be around 50 m and 70 m in the East and

West Pits respectively. Groundwater inflows into the box-cut are expected to be in the order of 1 000 m^3/day.

Surface construction of the overburden stockpiles, settling and evaporation ponds, PCD, haul roads and offices will not breach the groundwater level and is therefore not expected to have any impact on the groundwater levels.

It is assumed that adherence to general good housekeeping rules with regard to diesel, oil and other potential contaminants will prevent contamination of the aquifers.

No private groundwater users or surface water bodies will be impacted by the dewatering and associated drawdown cone during the construction phase.

In general it can be said that the impacts during the construction phase will be localised.

9.1.3.2 Operational Phase

The East Open Pit configuration will commence with the box-cut along the northern boundary and advance to the south of the Groothoek Farm with mining strips being aligned in an approximate west-east direction. The maximum mining depth in the East Pit is 90 m.

The West Open Pit configuration will commence with the box-cut along the southern boundary of the Eendracht farm and advance to the north of the farm with mining strips being aligned in an approximate west-east direction. The maximum mining depth in the West Pit is 120 m.

9.1.3.2.1 Groundwater Level Changes and the Zone of Influence

The mine floor elevations are below the general groundwater level thus causing groundwater flows into the opencast mining area from the surrounding aquifers during operations. Therefore, the mining area will be actively dewatered by pumping water that seeps into the opencast mine area to the surface; this ensures a safe working environment.

Numerical modelling shows that during the life of operations the groundwater flow directions in the vicinity will be directed toward the pit areas. This is due to mine dewatering causing the groundwater levels to be drawn down to the pit floor elevations.

The drawdown in groundwater level and the associated cone of depression will develop over time as the mining progresses. The maximum drawdown in the groundwater level from pre-mining levels is estimated at 65 m and 110 m for the East and West Pits respectively (Plan 37). The drawdown will extend up to 700 m north and 2 300 m south from the pit areas along the non-perennial Sandloop stream.

Plan 37 shows that 14 of the hydrocensus boreholes; BH7, BH8, BH9, BH13, BH23, BH24, BH25, BH26, BH27, BH28, MBH1, MBH2, MBH3 and MBH4 will be impacted by the drawdown in the area. The maximum drawdowns in groundwater level in each of the boreholes during the life of operations are calculated at:

- BH7: 19.5 m (year 20);
- BH8: 40.3 m (year 9);
- BH9: 18.1 m(year 20);
- BH13: 5.1 m (year 20);
- BH23: 19.3 m (year 20);
- BH24: 7.7 m (year 20);
- BH25: 5.4 m (year 20);
- BH26: 5.4 m (year 20);
- MBH1: 54.6 m (year 12);
- MBH2: 80.3 m (year 20);
- MBH3: 26.74 m (year 20); and
- MBH4: 24.7 m (year 20).

As indicated above, the maximum groundwater level drawdown in the boreholes will not necessarily be at the end of the operational phase. This is due to the fact that the extent and the depth of the pits will migrate over time. In association with this migration, and the continuous rehabilitation of the pits, the groundwater level drawdown around the pit area is expected to decrease due to the combined effect of:

- The decreasing pit size as the bulk of the mining has been completed and thus a decreasing zone of influence of groundwater level drawdown; and
- The effect of the artificially increased recharge from rainfall in the rehabilitated areas where groundwater levels will have started to recover.

9.1.3.2.2 Groundwater Inflows

Groundwater inflows volumes into the mine area over time were calculated using the 3-D numerical flow model. The obtained data is summarised in Table 27.

Table 27: Groundwater inflow volumes into the mining area

Year	Expected groundwater inflow volume (m^3/day)	
	West Pit	East Pit
1	4 620	3 640
2	3 220	2 460
3	2 655	1 970
4	2 400	1 985
5	2 305	1 670
6	2 170	1 660
7	2 050	1 615
8	2 085	1 320
9	2 085	1 460
10	2 015	1 605
11	2 000	1 630
12	2 020	1 520

Year	Expected groundwater inflow volume (m^3/day)	
	West Pit	East Pit
13	2 085	1 650
14	2 060	1 720
15	2 020	No mining
16	2 070	No mining
17	2 115	No mining
18	2 175	No mining
19	2 550	No mining
20	2 870	No mining

The groundwater inflow volumes at the West Pit are expected to range between 2 000 and 2 870 m^3/day during the course of LoM. The East Pit groundwater inflow volumes are expected to range between 1 320 and 1 985 m^3/day. The initial inflow volumes are high due to the increase in seepage wall area. The pit inflows are expected to decrease during the later years of the life of mine. This is due to less, new, saturated rock being broken. This reduced release of groundwater from storage will reduce the overall pit inflows. Minor faults traverse the open pit areas. This results in slight increases in mine inflow volumes when the mining pit area progresses through the faults, which provide preferential paths for groundwater flow.

The flow model only takes average yearly values such as average annual recharge from rainfall into consideration. Therefore, no seasonality is included in the calculations. However, it is not expected that the fractured rock aquifer will show significant seasonal changes. In addition, the shallow weathered material aquifer is to a large extent dry in the study area and will only contribute inflows during the rainy season.

9.1.3.2.3 Groundwater Contamination

Before potential pollution migration patterns (Plan 38) are discussed it has to be re-iterated that the leach testing results show that no elements are expected to be present in elevated concentrations (compared to IFC effluent quality guidelines, as well as GN635 (2013) Leach Test LCT0 quality guidelines) in the mining environment.

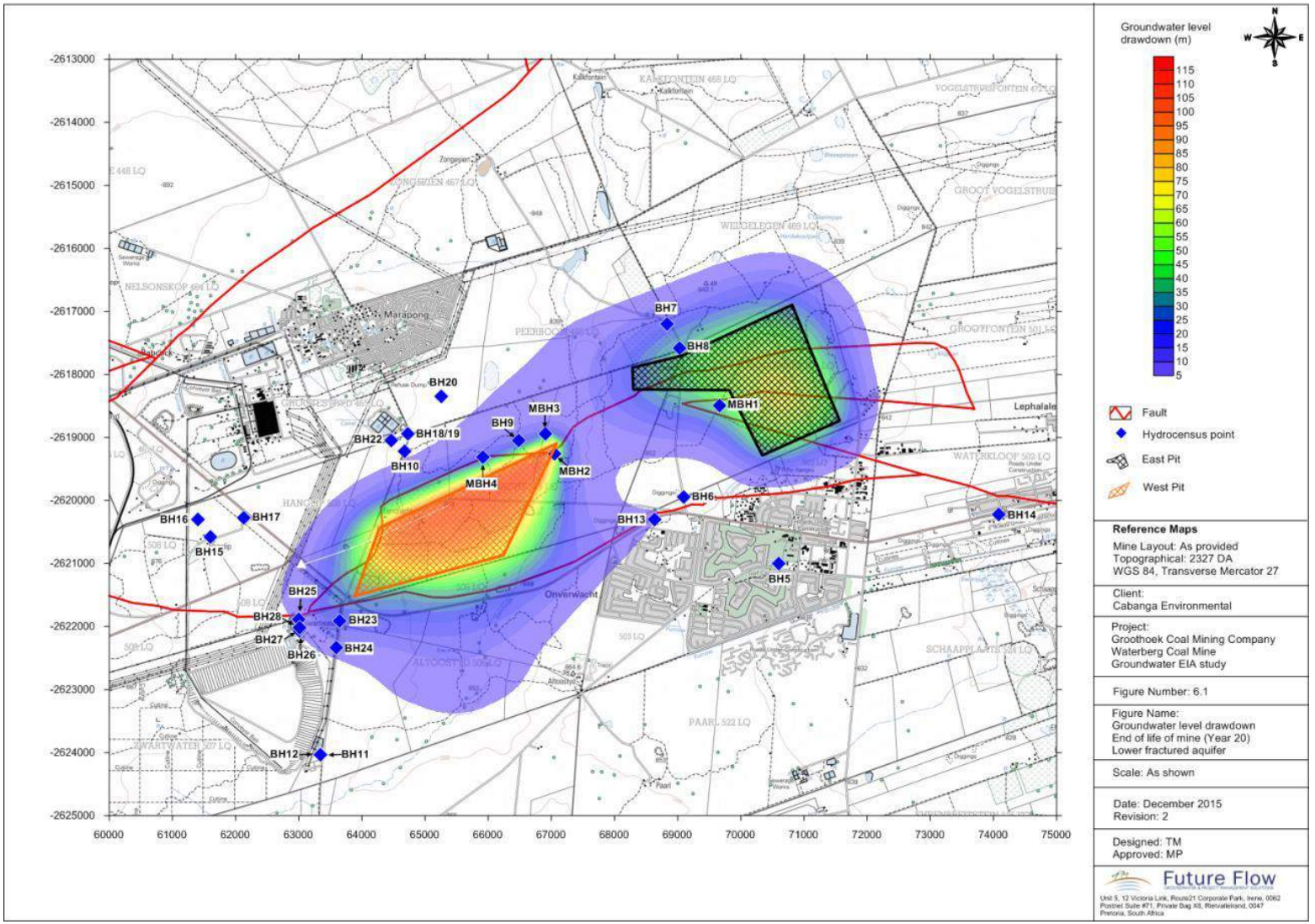
No potential contamination is expected to leave the West Pit during the operational phase due to the fact that operations within the pit, and therefore active dewatering of the pit, will continue for the total 20 years life of operations at the mine. The active pit dewatering will maintain the groundwater level drawdown cone around the West Pit, which causes groundwater flow directions around the pit to be directed towards the pit. This concentration of groundwater flow gradients towards the pit will prevent any contamination that could potentially form in the pit from migrating away from the pit.

Limited contaminant migration can develop away from the East Pit due to the fact that the East Pit operations will stop after 14 years of operation, which will allow 6 years of

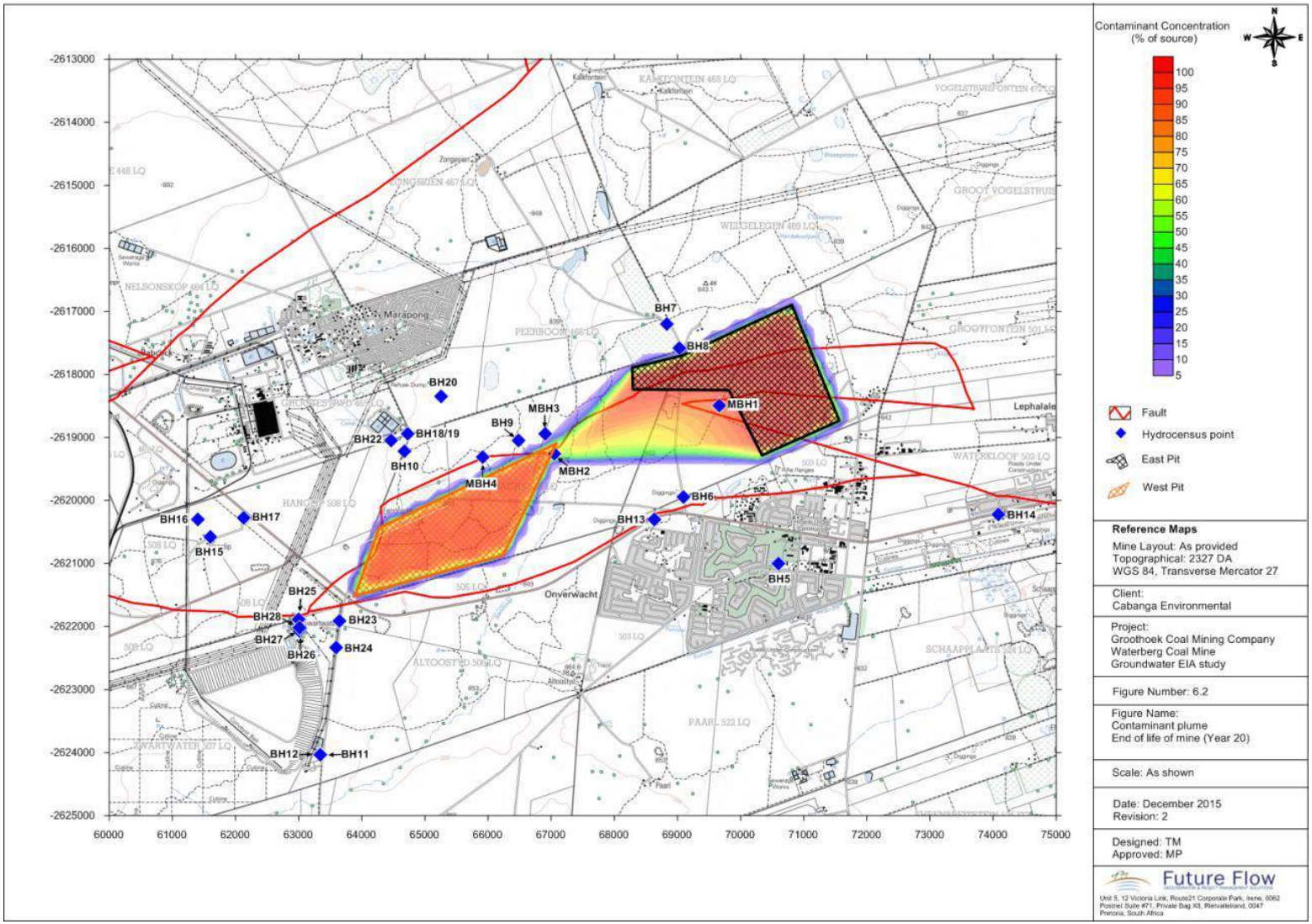
groundwater level recovery while operations at the West Pit continues. The recovering groundwater level in the East Pit will allow for any contamination that could potentially develop in the East Pit to migrate away from the pit area towards the West Pit.

Potential contaminant migration from the East Pit is towards the West Pit due to the fact that:

- Dewatering at the West Pit, which is deeper than the East Pit, continues; thereby maintaining the drawdown in groundwater level around the West Pit;
- The shallower East Pit falls within the zone of influence of the groundwater level drawdown cone around the deeper West Pit and the water. This causes the water, and the associated contamination that might migrate away from the East Pit, to migrate towards the West Pit from where it will be dewatered and incorporated into the mine water system.



Plan 37: Groundwater level drawdown, end of life of mine (Year 20) – Lower fractured aquifer



Plan 38: Contaminant plume – End of life of mine (Year 20)

9.1.3.3 Long Term Post-Operational Phase

9.1.3.3.1 Recovery of Groundwater Levels and Decant Potential

The proposed mine plan involves the roll-over methods where mined-out areas are continuously rehabilitated as mining progresses. Groundwater levels in the rehabilitated areas will start to rise once a mining area is rehabilitated. The rate of rise of the groundwater level will depend on:

- Recharge from rainfall into the rehabilitated material can be assumed to be around 8 % of mean annual rainfall (Hodgson & Krantz 1998); and
- There will be inflows into the pit from the surrounding aquifers. The inflow rate will depend to a large extent on the groundwater flow gradient between the surrounding aquifers and the water level in the rehabilitated material.

The groundwater level in the East Pit will already start recovering during years 15 to 20 of the life of operations of the West Pit as mining in the East Pit is scheduled to stop at the end of year 14 of the life of operations. The numerical model was used to calculate the rate of the rise in groundwater levels for the mining area. Results show that the groundwater levels in the rehabilitated pits will rise to pre-mining levels within 40 years after mine closure.

The numerical groundwater flow model shows that the groundwater level in the rehabilitated pit is expected to rise to pre-mining levels and the groundwater level in the rehabilitated area in the long term can be expected to be near the same as pre-mining (thus at around 30 mbgl). Therefore, direct surface decant is not expected.

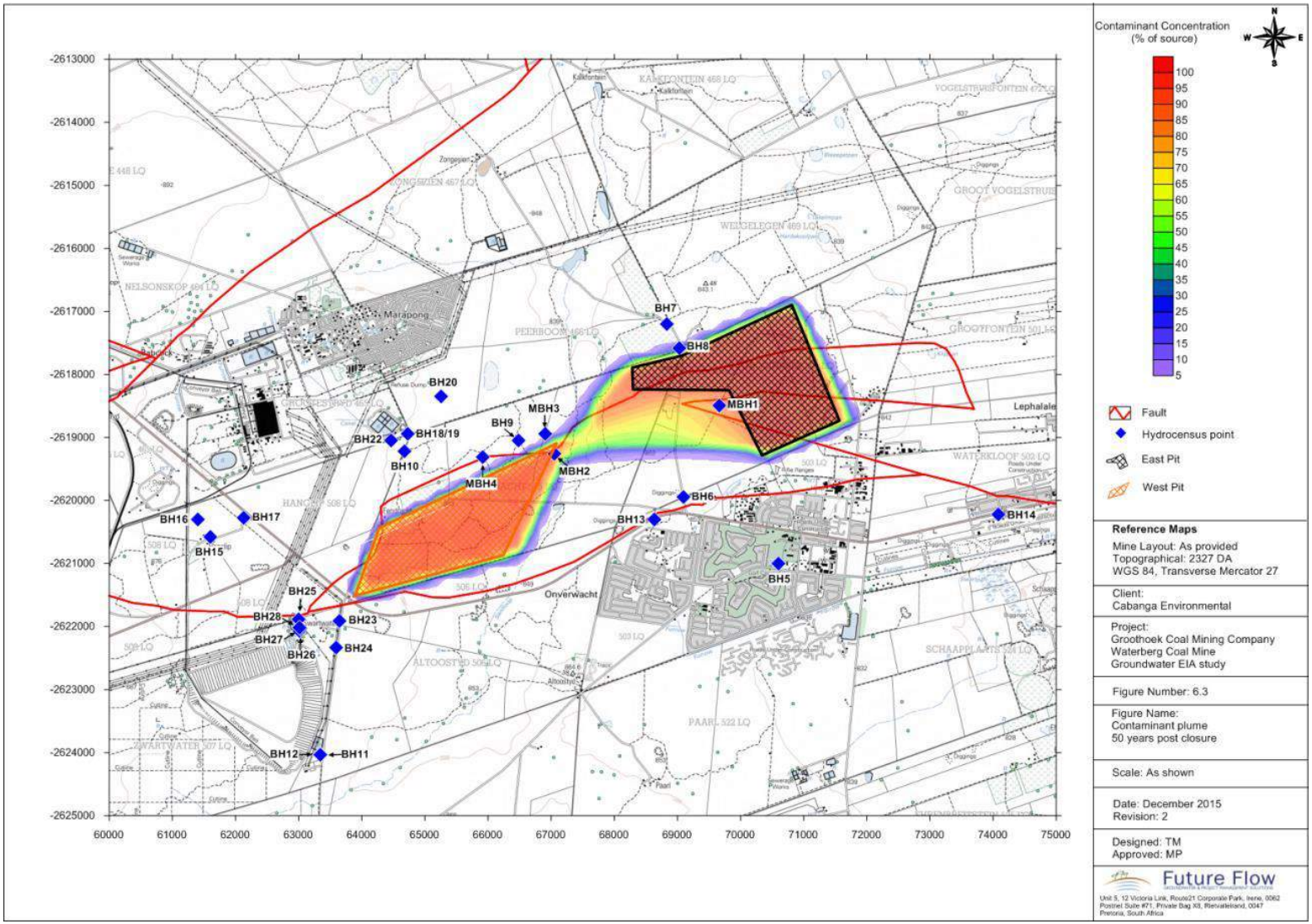
9.1.3.3.2 Groundwater Contamination

The recovering groundwater levels will cause re-establishment of near natural groundwater flow directions and patterns which will allow for groundwater flow away from the mining area. Any contamination that could develop in the area will migrate following the groundwater flow patterns. Here it should be noted that the leach test results show that no element concentrations are expected to exceed the IFC effluent quality guidelines, or the GN635 (2013) Leach Test LCT0 quality guidelines, but for the sake of completeness, potential pollution plume migration patterns in the post-closure phase have to be discussed.

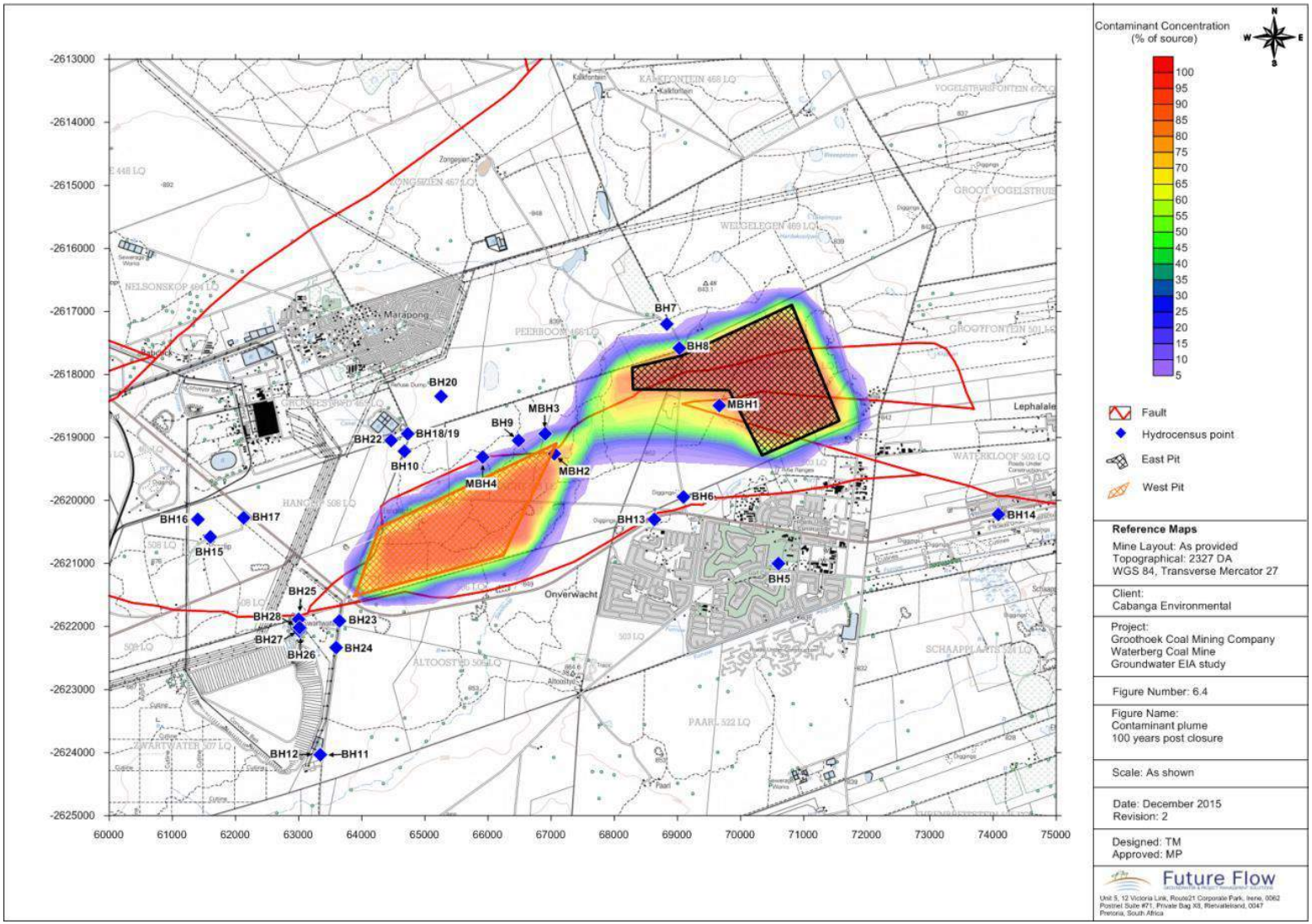
Contamination that could potentially form in the West Pit migrates 500 m down gradient in an easterly direction and could impact the Sandloop River (Plan 39 and Plan 40). During high rainfall events the groundwater level in the upper weathered material aquifer could rise to near surface and contribute potentially contaminated baseflow into the stream. The baseflow that seeps into the stream will not exceed relevant water quality guidelines. The baseflow into the stream will be diluted by the stream water, thereby further reducing the element concentrations.

The East Pit is partially located on a groundwater flow divide. Groundwater flows from the East Pit will be in both a westerly direction towards the Sandloop River, and in an easterly direction towards the Mokolo River, but will not reach the Mokolo River (Plan 39 and Plan

40). The contaminant plume is not expected to impact the Onverwacht community south of the proposed mine.



Plan 39: Contaminant plume – 50 years post closure



Plan 40: Contaminant plume – 100 years post closure

9.1.4 Flora

Due to the nature of the site, being largely of moderate to high ecological sensitivity, means that most flora impacts are of moderate to high significance (Dimela, 2015). The main impacts of high significance identified include:

- Destruction of natural vegetation, including identified protected species.
- Disturbance to the riverine area and pans, classed as highly sensitive ecological areas.
- Deterioration of the Sandloop River in the long term due to poor rehabilitation on site.

As stipulated above under surface water, measures have been put in place to mitigate direct impact on the Sandloop River, where the river and its 1:100 year floodline will be preserved in situ with only the use of the farm road in the northern boundary proposed for access between the east and west workings. Also stated under the surface water section above, the mine plan has been altered to preserve the bulk of the riverine wetland and 100m buffer zones, and the pans will only be disturbed if the integrated water use license (IWUL) is granted and if needed for material stockpiling (Section 9.3). Therefore the impacts on the latter two have been greatly reduced due to alterations in the final mine plan.

The remaining broadleaf woodland is not unique to site and is already suffering from edge effects of the surrounding developments and transformed patches of land within the mineral boundary and cannot be considered in a complete natural state.

The main impact where minimal mitigation can be applied is the removal/destruction of protected species. The nature of mining means that this impact cannot be fully mitigated. Permits must be obtained to remove/destroy these species. Mitigation measures in terms of preserving the species where possible, or planting seeds to replace these species have been proposed as an “offset” approach.

9.1.4.1 Assessment of Specific Impacts Related to the Highland / Lowland Interface

It must be stressed that in terms of the site, no official highland / lowland or macroclimatic interface occurs on site. The site itself could be seen as a lowland area to the Waterberg Mountains. Therefore in terms of the site, the “highland” and “lowland” interface has been considered as the 100m buffer zone around the riparian area and the pans in the area, with the Sandloop River and Pans indicative of the lowland features. Therefore, this impact assessment is considered in terms of potential impacts to the downstream sensitive features, which are addressed in the full impact assessment table under the “surface water and associated wetlands” aspect and also in the “flora” aspect as the riverine vegetation area is encompassed within the buffer area around the Sandloop River.

9.1.5 Fauna

As per the AGES (2012a) report, protected fauna is unlikely to occur on site due to the existing surrounding activities and the existing disturbances on site. Many protected species,

such as water birds, may only occur on site periodically during the wet seasons. Other protected species such as predators may hunt over the area, but are unlikely to reside on site.

Despite the low likelihood of protected species and the homogenous nature of the site, the patchwork presence of disturbed fields, surrounding infrastructure of varying nature and the riverine and pan areas will create a higher biodiversity than would be associated with just a homogenous broadleaved woodland. However, representative habitats do occur in the surrounding region and alternative habitats will be available.

Fauna are mostly mobile and are likely to move away from disturbances to other areas. The preservation of the riverine area associated with the Sandloop River provides fauna with an ecological corridor within which to take refuge or move to other natural areas (areas to the north as all other directions are developed to some extent).

Lastly, the fauna on site is already habituated to some extent to human-related activities and developments and are less sensitive to disruption, in some instances preferring human settlements, such as bats with preferences for roosting in buildings and roofs, and scavenger birds and smaller mammals.

It was stated in the AGES report that bullfrogs may be associated with the pans in the northeast of the mineral boundary; however during their 2012 surveys the occurrence of the species could not be confirmed. During the 2015 surveys (November, 2015) completed for the EIA/EMP, the species was also not confirmed on site. Furthermore, no I&APs have made any statement with regard to the presence of the species on site. It is therefore unlikely to occur on site.

Overall, no impacts of moderate-high or high significance on fauna have been identified.

9.1.5.1 Assessment of Specific Impacts related to Avifauna & Bats

It must be stated that the most common bats in the area are species that would also roost in roofs, abandoned buildings and general crevices. Most red data bird and bat species are not likely to occur on site. The area surrounding the site is already largely developed in terms of residential and industrial developments, roads and powerlines, with associated lighting impacts already present.

The riverine area and buffer around the Sandloop River will be preserved in situ. No activities, other than the slight infringement of the loop siding into the riverine area is proposed (West Pit area was reduced to ensure mining activities remain outside the 100m buffer zone). The trains will enter the loop siding in a clockwise direction in order to ensure that trains traversing the rail in the riverine area are empty and prevent risk of coal spillages in the area.

This riverine area creates an ecological corridor which connects to the north and eventually to the ecological corridor associated with the Mokolo River. Therefore, all the birds and bats utilising the Riverine habitat will be largely unaffected, and more sensitive species will be able to relocate to other areas through or within the ecological corridor.

There will be a loss of trees for breeding and roosting for birds and bats in the woodland habitat. The greater area, and even areas within the mine site which will remain intact and connected to the riverine corridor, still provide tracts of bushveld and associated woodland habitat and birds and bats will most likely fly away from the immediate site of activity to these areas, and therefore there will be a decrease in overall avifauna and bat biodiversity associated with the woodland vegetation. It must be stipulated that the entire footprint of the opencast pits will not be successively cleared as mining progresses and birds will have the opportunity to migrate away from the site.

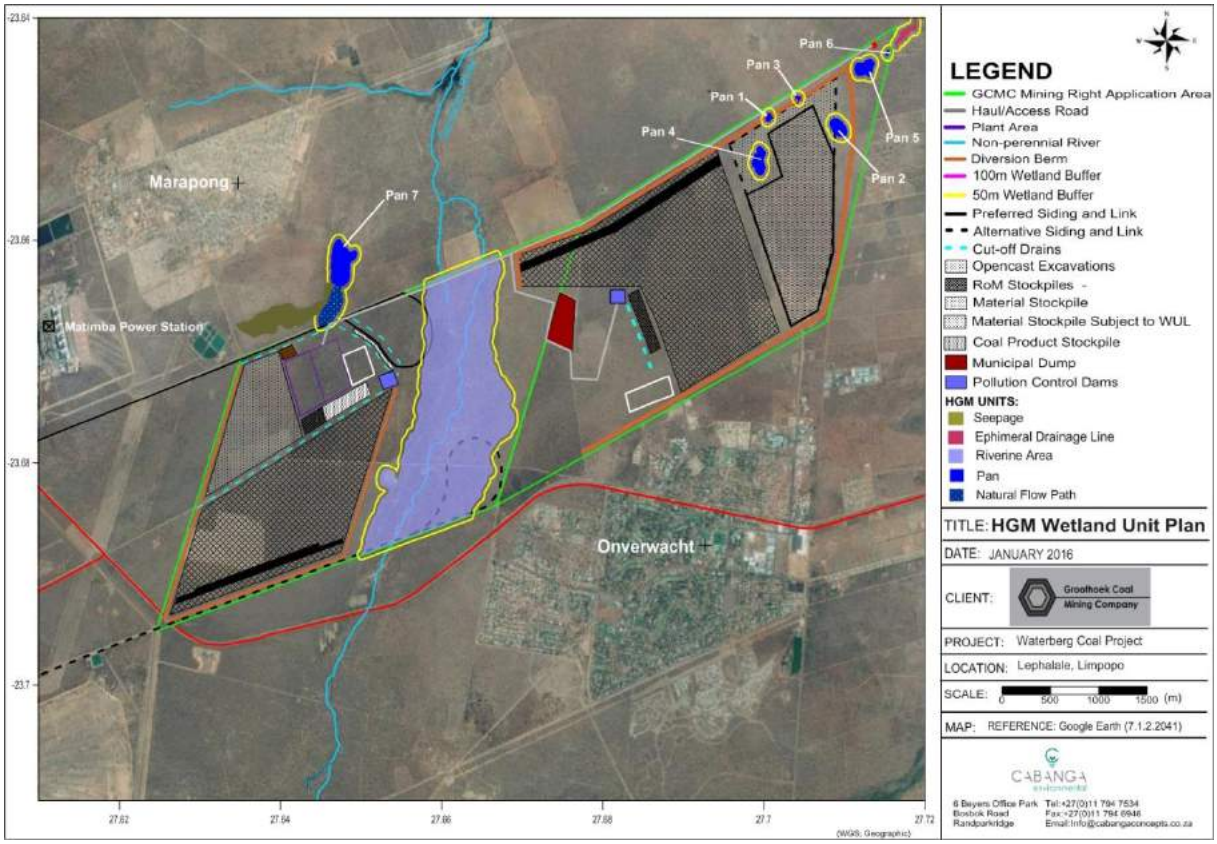
Due to the proximity of the site to surrounding developments, light pollution is already an impact in the general area. It is not expected to cause any further significant impact to nocturnal birds and bats.

The detailed impact assessment table in Appendix 16 assess and details impacts to birds and bats for the proposed development.

9.1.6 Wetlands

The wetland assessment (Appendix 11) identified impacts to the Sandloop River as very high. As stipulated above under surface water, measures have been put in place to mitigate direct impact on the Sandloop River, where the river and its 1:100 year floodline will be preserved in situ with only the use of the farm road in the northern boundary proposed for access between the east and west workings. Also stated under the surface water section above, the mine plan has been altered to preserve the bulk of the riverine wetland and 100m buffer zones (Section 9.3).

Impact significance to Pans 1, 2 and 3 (Plan 41) has been rated as high, while impact significance to remaining pans is rated as low due to the disturbed and / or limited extent of these pans. The mine will attempt to limit the eastern stockpile area to the extent south of the pans (Mine Plan – Appendix 2) if the site can accommodate the volume of material needed for storage. Regardless, no activity will take place in any of the pans until the necessary IWUL is obtained to do so.



Plan 41: Location of pans of relevance within the East Material Stockpile area

9.1.7 Air Quality Dispersion Modelling

Air quality dispersion modelling was undertaken to determine the effect of the operation on dust, PM10 and PM2.5 emissions. The modelling was completed for the mine as a standalone development and then also modelled taking into account existing background air quality. On this note it must be stipulated that the existing background quality levels already exceed most air quality limits and therefore the combined model situation therefore also exceeds standards. Furthermore, the model has also been modelled under an unmitigated and mitigated scenario for operational phase (please see Appendix 3 for full details), but the mitigated scenario assumes general wetting of surfaces and does not include the full spectrum of mitigation measures that can be applied.

The Code of Practice for Air Dispersion Modelling in Air Quality Management in South Africa (DEA, 2014), recommends the use of the 99th percentile concentrations for short-term assessment with the National Ambient Air Quality Standards since the highest predicted ground-level concentrations can be considered outliers due to complex variability of meteorological processes. This might cause exceptionally high concentrations that the facility may never actually exceed in its lifetime.

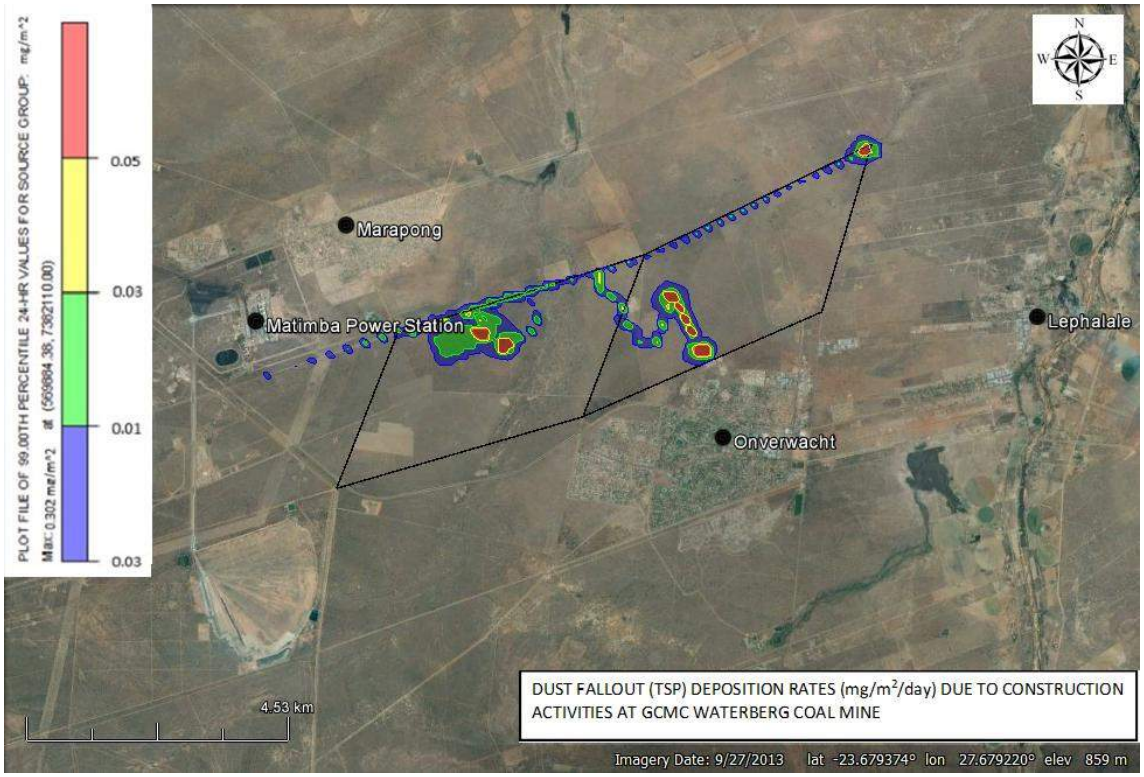
Isopleth plots of predicted concentrations for daily and annual average dust fallout, PM10 & PM2.5 concentrations are given in Figure 10 to Figure 20. For daily averaging periods, the predicted 99th percentile concentrations are provided. Comparison of the predicted ambient

PM10 and PM2.5 concentrations has been made with the National ambient air quality standards to determine compliance. Comparison of the predicted dust fallout concentrations is made with the National dust fallout Regulations to determine compliance.

9.1.7.1 Construction Phase: Dust Fallout

Predicted incremental dust fallout rates associated with construction activities at Waterberg coal mine are well within the allowable dust fallout limit of 600 mg/m^2/day for residential areas and 1200 mg/m^2/day for non-residential areas (Figure 10). Very low dust fallout rates (< 10 mg/m^2/day) are predicted at all the surrounding sensitive receptors.

Predicted Dust Fallout (TSP) Deposition Rates – Construction Phase



COMMENTS: No exceedances observed.	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Deposition Rates
	NUMBER OF SOURCES: X 8 area sources	ASSUMPTIONS: Worst case scenario – No dust suppression measures.
	EXCLUSIONS:	DUST FALLOUT STANDARD: 1200 mg/m^2/day (non-residential areas) 600 mg/m^2/day (residential areas)
		DATE: 23/10/2015

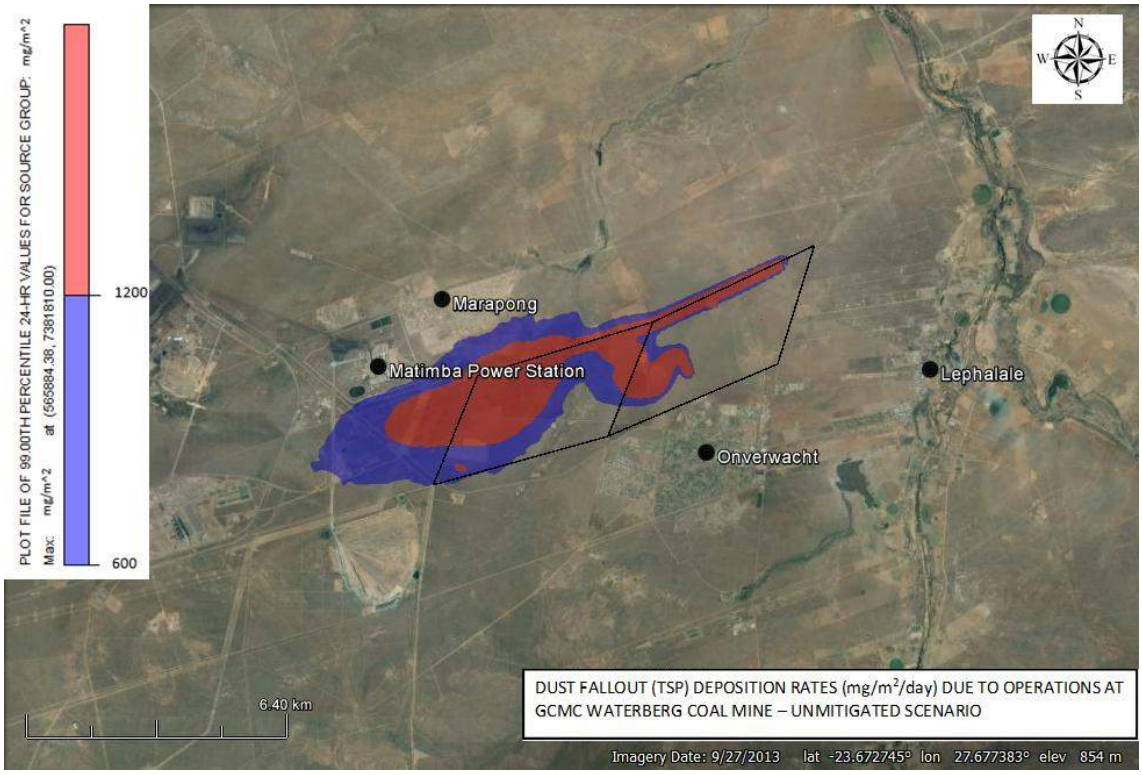
Figure 10: Predicted dust fallout rates due to the construction activities at GCMC Waterberg Coal Mine

9.1.7.2 Operational Phase: Dust Fallout Deposition Rates

9.1.7.2.1 Unmitigated Scenario

Predicted incremental dust fallout rates associated with unmitigated operational activities at Waterberg coal mine exceed the dust fallout limit of 600 mg/m^2/day for residential areas and 1 200 mg/m^2/day for non-residential areas (Figure 11). High dust fallout rates are predicted to occur to the north and west of Waterberg coal mine.

Predicted Dust Fallout (TSP) Deposition Rates - Operational Phase – Unmitigated Scenario



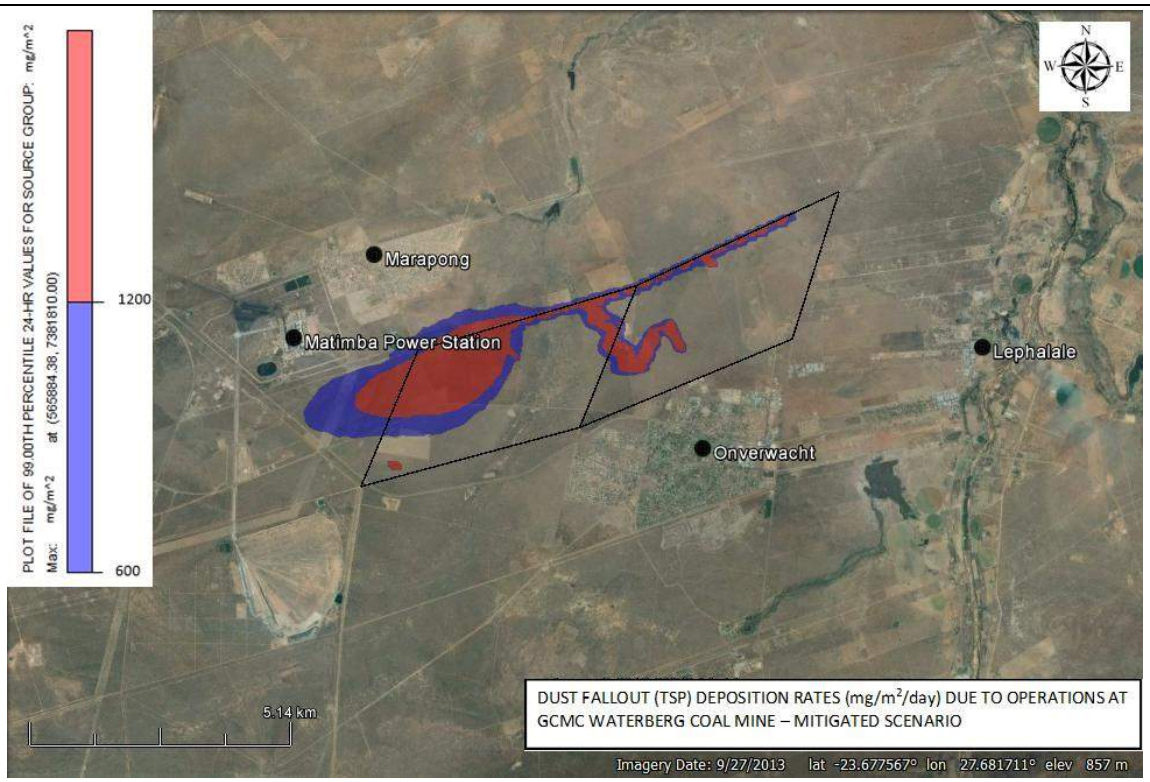
COMMENTS: Red Band – exceedance of non-residential area dust fallout standard of 1200 mg/m^3/day more than 10 times per annum. Blue Band – exceedance of residential area dust fallout standard of 600 mg/m^3/day.	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Deposition Rates
	NUMBER OF SOURCES: X 0 point sources (stacks) X 14 area sources X 26 volume sources X 2 line volume sources	ASSUMPTIONS: Worst case scenario – No dust suppression measures.
	EXCLUSIONS:	DUST FALLOUT STANDARD: 1200 mg/m^2/day (non-residential areas) 600 mg/m^2/day (residential areas)
		DATE: 23/10/2015

Figure 11: Predicted dust fallout rates due to the operation activities at GCMC Waterberg Coal Mine - UNMITIGATED

9.1.7.2.2 Mitigated Scenario

Predicted incremental dust fallout rates associated with mitigated operational activities at Waterberg coal mine exceed the dust fallout limit of 600 mg/m^2/day for residential areas and 1 200 mg/m^2/day for non-residential areas (Figure 12). For the mitigated scenario, high dust fallout concentrations are predicted to occur mostly within the mine boundary and to the west of the mine.

Predicted Dust Fallout (TSP) Deposition Rates - Operational Phase – Mitigated Scenario



COMMENTS: Red Band – exceedance of non-residential area dust fallout standard of 1200 mg/m^3/day more than 10 times per annum. Blue Band – exceedance of residential area dust fallout standard of 600 mg/m^3/day.	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Deposition Rates
	NUMBER OF SOURCES: X 0 point sources (stacks) X 14 area sources X 26 volume sources X 2 line volume sources	ASSUMPTIONS: Mitigated scenario – Dust control measures implemented.
	EXCLUSIONS:	DUST FALLOUT STANDARD: 1200 mg/m^2/day (non-residential areas) 600 mg/m^2/day (residential areas)
		DATE: 23/10/2015

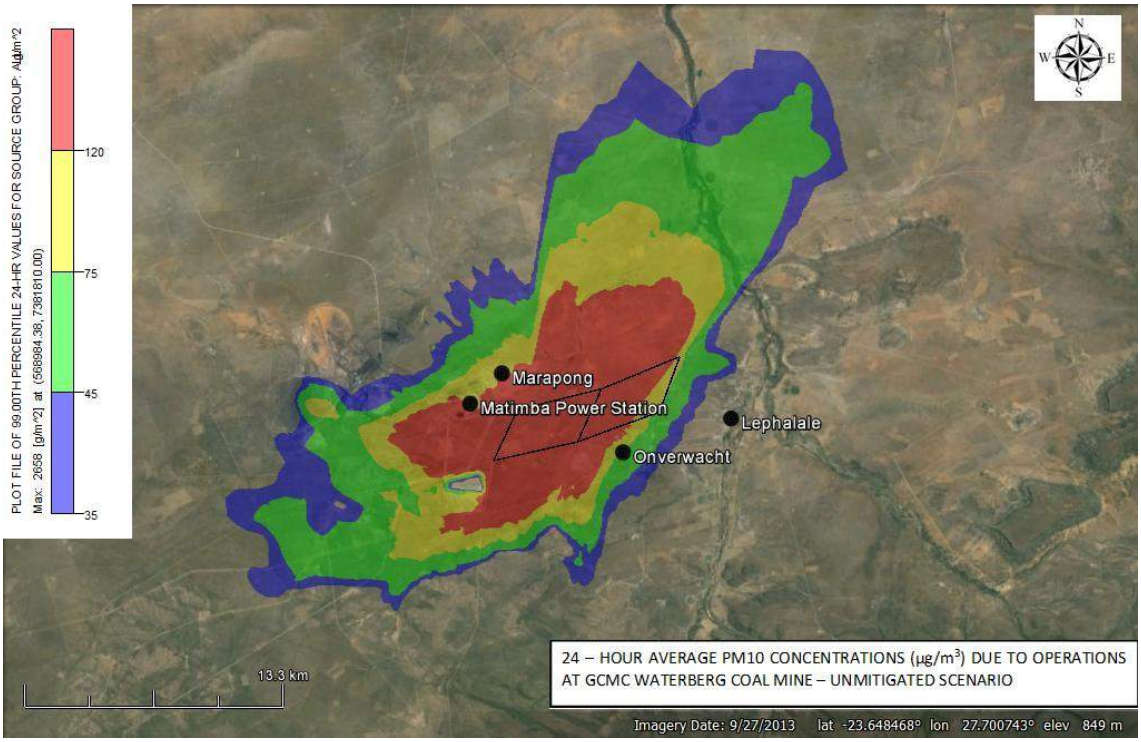
Figure 12: Predicted dust fallout rates due to the operation activities at GCMC Waterberg Coal Mine - MITIGATED

9.1.7.3 Operational Phase: PM10 Concentrations

9.1.7.3.1 Unmitigated Scenario

Predicted incremental PM10 concentrations associated with unmitigated operational activities at Waterberg coal mine are non-compliant with the daily average standard of 75 µg/m^3 (Figure 13). Incremental annual average PM10 concentrations are also predicted to be non-compliant with the annual average standard of 40 µg/m^3 (Figure 14). High PM10 concentrations are predicted to occur to the north, west and south of Waterberg coal mine, including sensitive receptors (Onverwacht, Marapong, Matimba Power).

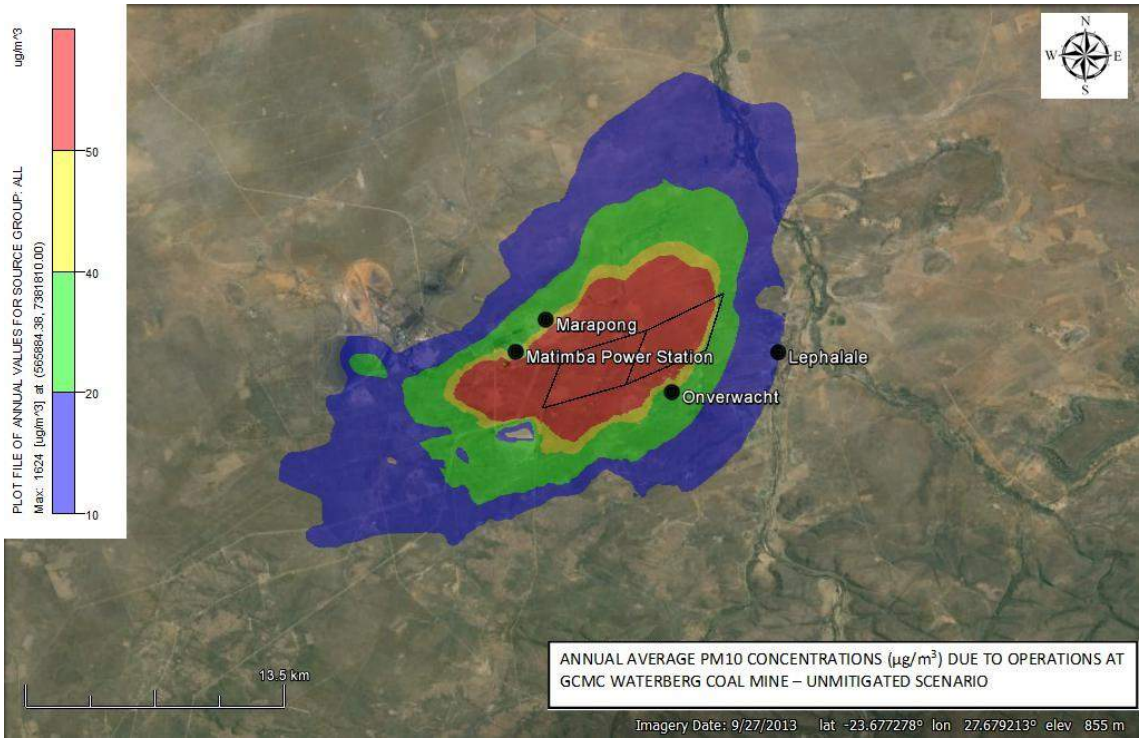
Predicted 24-Hour PM10 Concentrations – Unmitigated Scenario



COMMENTS: Yellow Band and Red Band – exceedance of SA 24-H PM10 standard of 75 µg/m^3 more than 10 times per annum.	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 0 point sources (stacks) X 14 area sources X 26 volume sources X 2 line volume sources	ASSUMPTIONS: Worst case scenario – No dust suppression measures.
	EXCLUSIONS:	AMBIENT STANDARD: 75 µg/m^3 (SA 24-Hour standard)
		DATE: 23/10/2015

Figure 13: Predicted 24-hour average PM10 concentrations due to the operation activities at GCMC Waterberg Coal Mine – UNMITIGATED

Predicted Annual PM10 Concentrations – Unmitigated Scenario



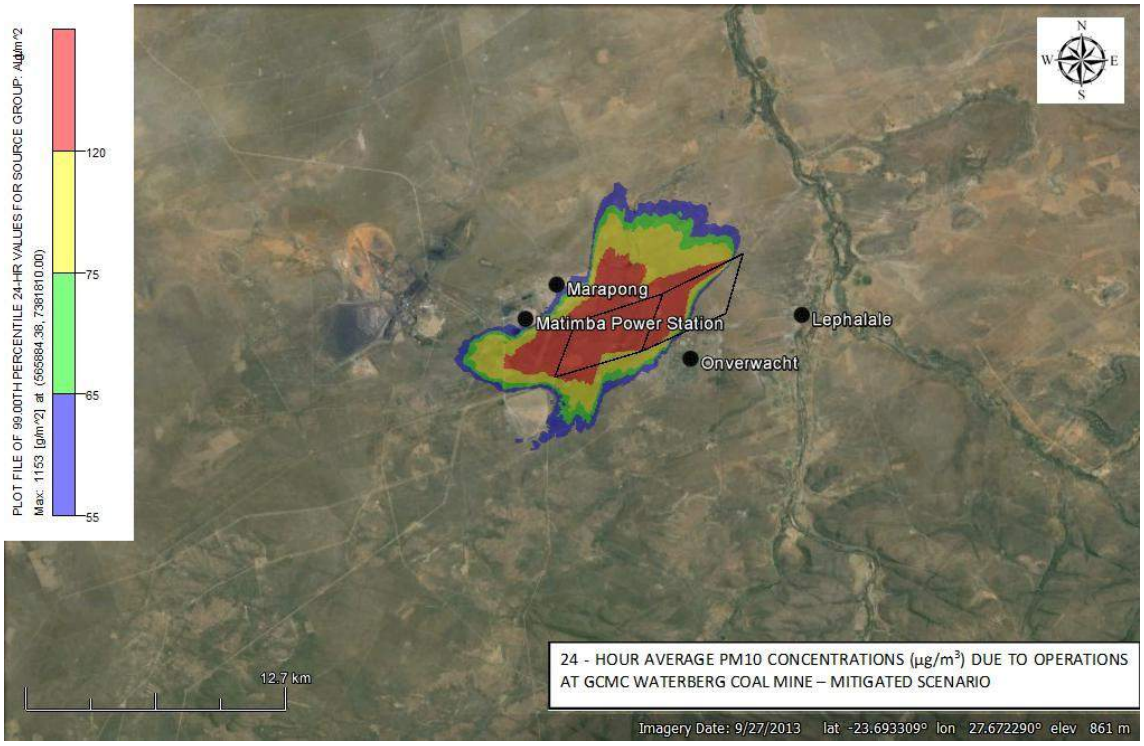
COMMENTS: Yellow Band and Red Band – exceedance of SA annual PM10 standard of 40 µg/m^3.	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: Rank 1 Ground Level Concentrations
	NUMBER OF SOURCES: X 0 point sources (stacks) X 14 area sources X 26 volume sources X 2 line volume sources	ASSUMPTIONS: Worst case scenario – No dust suppression measures.
	EXCLUSIONS:	AMBIENT STANDARD: 40 µg/m^3 (SA annual standard)
		DATE: 23/10/2015

Figure 14: Predicted annual average PM10 concentrations due to the operation activities at GCMC Waterberg Coal Mine – UNMITIGATED

9.1.7.3.2 Mitigated Scenario

Predicted incremental PM10 concentrations associated with mitigated operational activities at Waterberg coal mine exceed the daily average standard of 75 µg/m^3 (Figure 15). Incremental annual average PM10 concentrations are also predicted to be in non-compliance with the annual average standard of 40 µg/m^3 (Figure 16). For the mitigated scenario, high PM10 concentrations are predicted to occur to the north, west and south of Waterberg coal mine. Exceedances are predicted to occur over Matimba power station and to the south of Marapong.

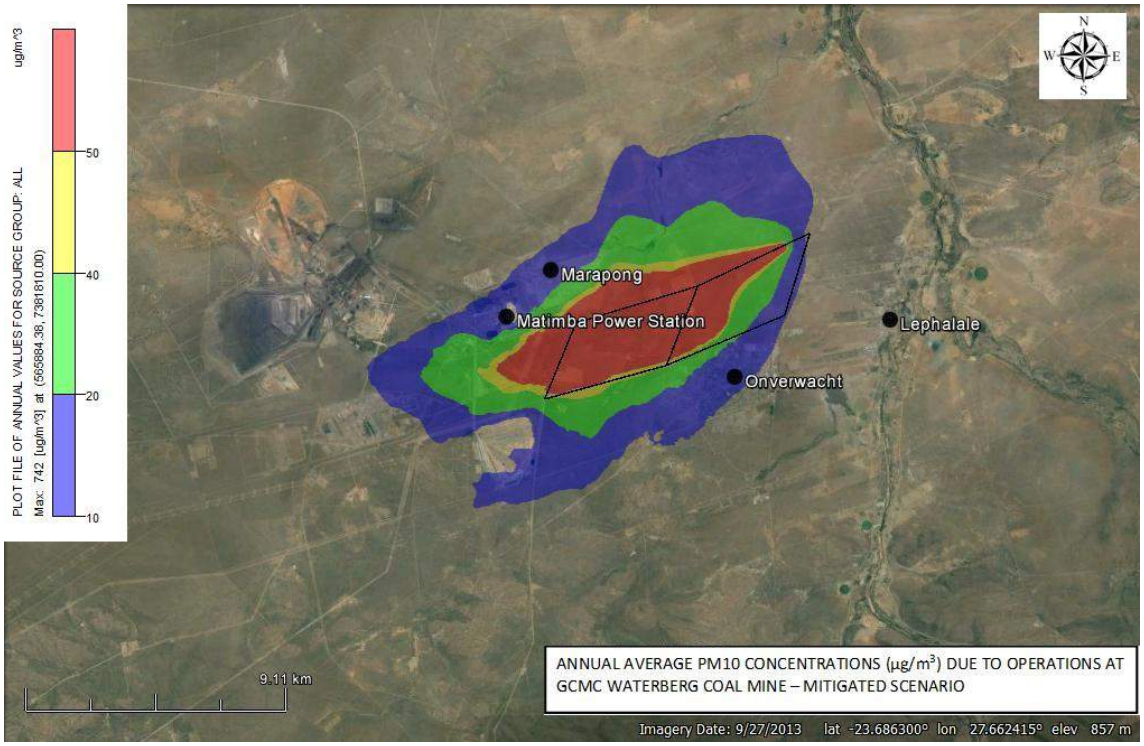
Predicted 24-Hour PM10 Concentrations – Mitigated Scenario



COMMENTS: Yellow Band and Red Band – exceedance of SA 24-H PM10 standard of 75 µg/m^3 more than 10 times per annum.	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 0 point sources (stacks) X 14 area sources X 26 volume sources X 2 line volume sources	ASSUMPTIONS: Mitigated scenario – Dust control measures implemented.
	EXCLUSIONS:	AMBIENT STANDARD: 75 µg/m^3 (SA 24-Hour standard)
		DATE: 23/10/2015

Figure 15: Predicted 24-hour average PM10 concentrations due to the operation activities at GCMC Waterberg Coal Mine – MITIGATED

Predicted Annual PM10 Concentrations – Mitigated Scenario



COMMENTS: Yellow Band and Red Band – exceedance of SA annual PM10 standard of 40 µg/m^3.	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: Rank 1 Ground Level Concentrations
	NUMBER OF SOURCES: X 0 point sources (stacks) X 14 area sources X 26 volume sources X 2 line volume sources	ASSUMPTIONS: Mitigated scenario – Dust control measures implemented.
	EXCLUSIONS:	AMBIENT STANDARD: 40 µg/m^3 (SA annual standard)
		DATE: 23/10/2015

Figure 16: Predicted annual average PM10 concentrations due to the operation activities at GCMC Waterberg Coal Mine – MITIGATED

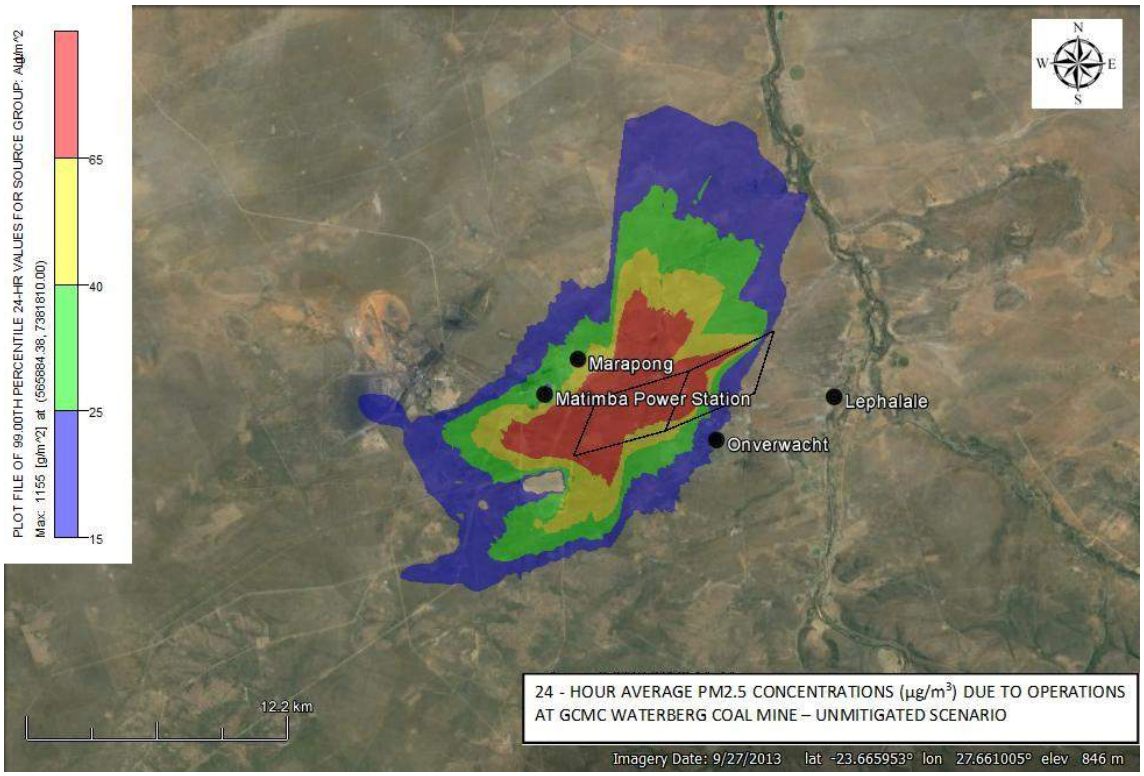
9.1.7.4 Operational Phase: PM2.5 Concentrations

9.1.7.4.1 Unmitigated Scenario

Predicted incremental PM2.5 concentrations associated with unmitigated operational activities at Waterberg coal mine are in non-compliance with the current daily average standard of 65 µg/m^3 and the future daily average standard of 40 µg/m^3 (by 1 January 2016) (Figure 17). Predicted incremental annual average PM2.5 concentrations are also in non-compliance with both the current and future annual average standards of 25 µg/m^3 and 20 µg/m^3 (by 1 January 2016) (Figure 18). High PM2.5 concentrations are predicted to occur to

the north, west and south of Waterberg coal mine and at surrounding sensitive receptors including Marapong, Matimba Power station and surrounding farms.

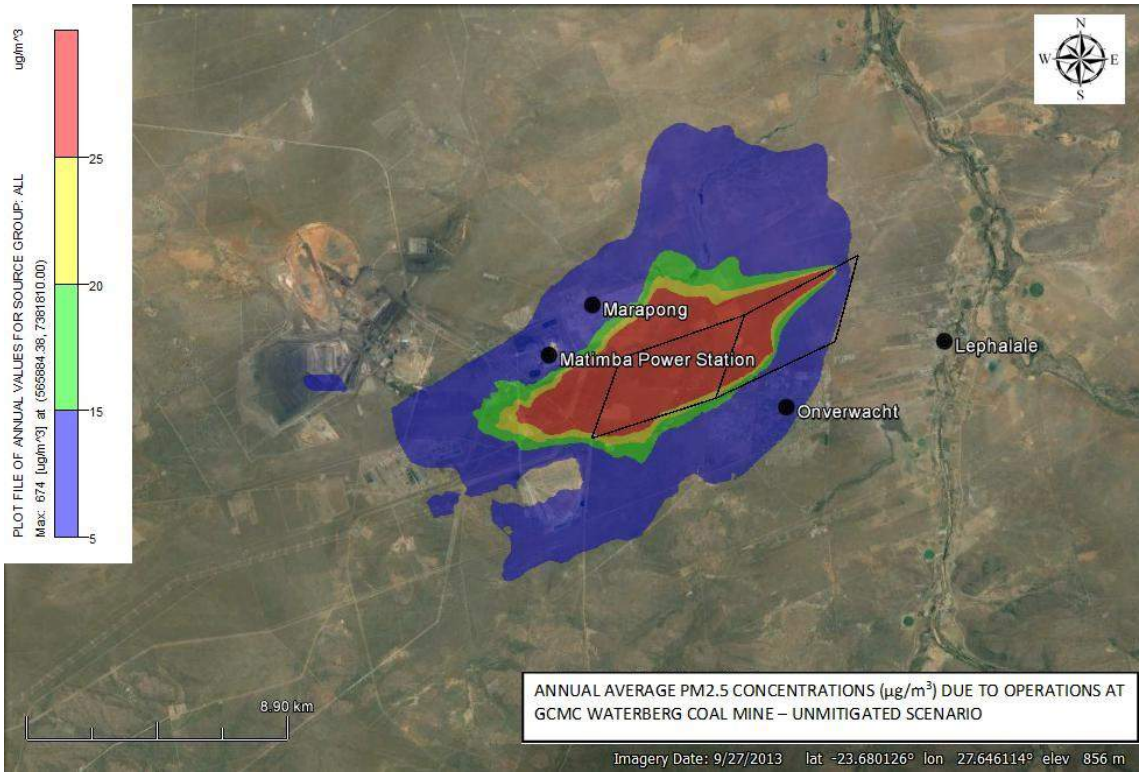
Predicted 24-Hour PM2.5 Concentrations – Unmitigated Scenario



COMMENTS: Red Band – exceedance of current SA 24-H PM2.5 standard of 65 µg/m^3. Yellow Band – exceedance of future SA 24-H PM2.5 standard of 40 µg/m^3 (By 1 Jan 2016) more than 10 times per annum.	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 0 point sources (stacks) X 14 area sources X 26 volume sources X 2 line volume sources	ASSUMPTIONS: Worst case scenario – No dust suppression measures.
	EXCLUSIONS:	AMBIENT STANDARD: 65 µg/m^3 (SA 24-Hour standard) (Current) 40 µg/m^3 (SA 24-Hour standard) (By 1 Jan 2016)
		DATE: 23/10/2015

Figure 17: Predicted 24-hour average PM2.5 concentrations due to the operation activities at GCMC Waterberg Coal Mine – UNMITIGATED

Predicted Annual PM2.5 Concentrations – Unmitigated Scenario



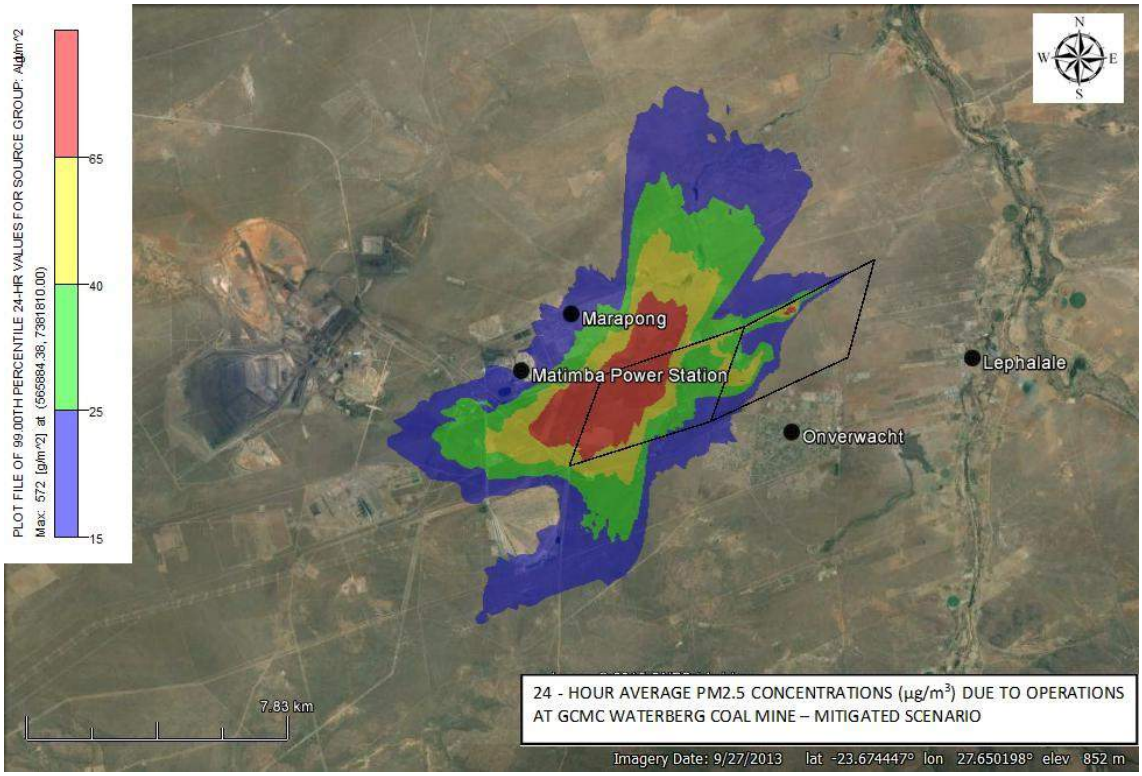
COMMENTS: Red Band – exceedance of current SA annual PM2.5 standard of 25 µg/m^3. Yellow Band – exceedance of future SA annual PM2.5 standard of 20 µg/m^3 (By 1 Jan 2016).	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: Rank 1 Ground Level Concentrations
	NUMBER OF SOURCES: X 0 point sources (stacks) X 14 area sources X 26 volume sources X 2 line volume sources	ASSUMPTIONS: Worst case scenario – No dust suppression measures.
	EXCLUSIONS:	AMBIENT STANDARD: 25 µg/m^3 (SA annual standard) (Current) 20 µg/m^3 (SA annual standard) (By 1 Jan 2016)
		DATE: 23/10/2015

Figure 18: Predicted annual average PM2.5 concentrations due to the operation activities at GCMC Waterberg Coal Mine – UNMITIGATED

9.1.7.4.2 Mitigated Scenario

Predicted incremental PM2.5 concentrations associated with mitigated operational activities at Waterberg coal mine are expected to exceed the current daily average standard of 65 µg/m^3 and the proposed daily average standard of 40 µg/m^3 (by 1 January 2016) (Figure 19).

Predicted 24-Hour PM2.5 Concentrations – Mitigated Scenario

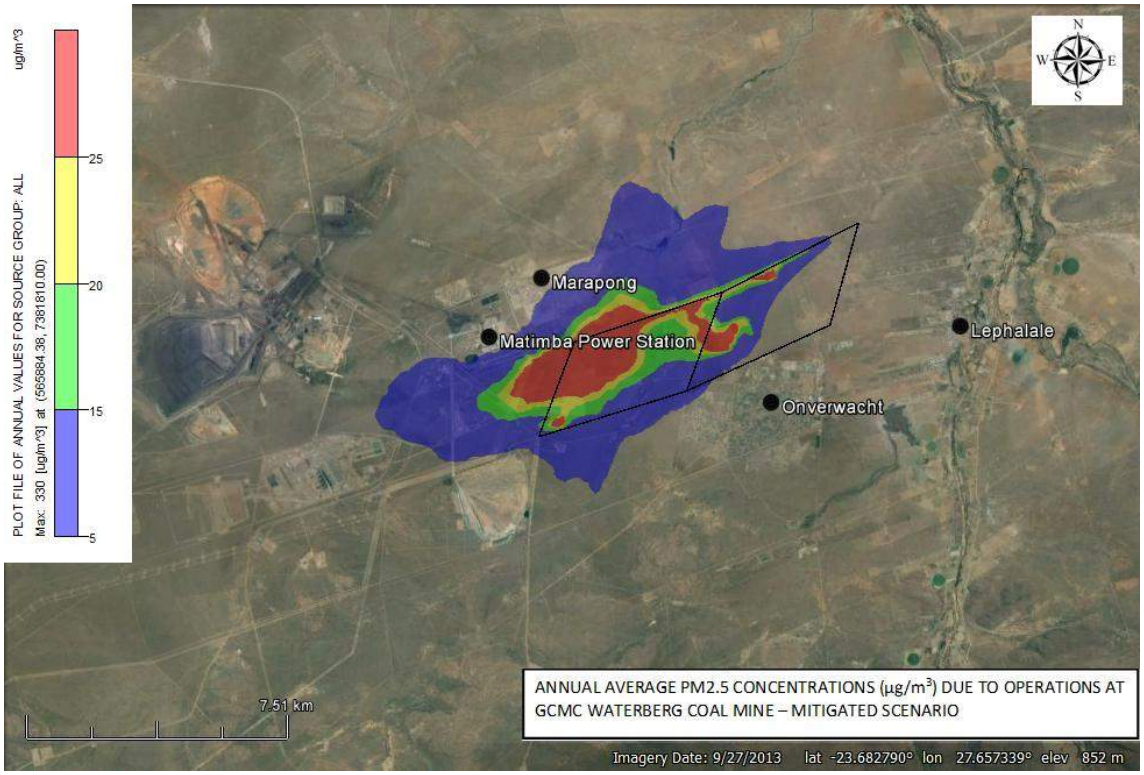


COMMENTS: Red Band – exceedance of current SA 24-H PM2.5 standard of 65 µg/m^3. Yellow Band – exceedance of future SA 24-H PM2.5 standard of 40 µg/m^3 (By 1 Jan 2016) more than 10 times per annum.	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 0 point sources (stacks) X 14 area sources X 26 volume sources X 2 line volume sources	ASSUMPTIONS: Mitigated scenario – Dust control measures implemented.
	EXCLUSIONS:	AMBIENT STANDARD: 65 µg/m^3 (SA 24-Hour standard) (Current) 40 µg/m^3 (SA 24-Hour standard) (By 1 Jan 2016)
		DATE: 23/10/2015

Figure 19: Predicted 24-hour average PM2.5 concentrations due to the operation activities at GCMC Waterberg Coal Mine – MITIGATED

Predicted incremental annual average PM2.5 concentrations are also in non-compliance with both the current and future annual average standards of 25 µg/m^3 and 20 µg/m^3 (by 1 January 2016) (Figure 20). For the mitigated scenario, high PM2.5 concentrations are predicted to occur to the north, west and south of Waterberg coal mine but in closer proximity to the mine boundary compared to the unmitigated scenario.

Predicted Annual PM2.5 Concentrations – Mitigated Scenario



COMMENTS: Red Band – exceedance of current SA annual PM2.5 standard of 25 µg/m^3. Yellow Band – exceedance of future SA annual PM2.5 standard of 20 µg/m^3 (By 1 Jan 2016).	GRID SIZE: 20 x 20 km	MODEL: AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: Rank 1 Ground Level Concentrations
	NUMBER OF SOURCES: X 0 point sources (stacks) X 14 area sources X 26 volume sources X 2 line volume sources	ASSUMPTIONS: Mitigated scenario – Dust control measures implemented.
	EXCLUSIONS:	AMBIENT STANDARD: 25 µg/m^3 (SA annual standard) (Current) 20 µg/m^3 (SA annual standard) (By 1 Jan 2016)
		DATE: 23/10/2015

Figure 20: Predicted annual average PM2.5 concentrations due to the operation activities at GCMC Waterberg Coal Mine – MITIGATED

The predicted incremental PM10, PM2.5 and dust fallout concentrations at sensitive receptors for operational activities at Waterberg coal mine are given in Table 28 and Table 29 for the unmitigated and mitigated scenarios. A summary of maximum predicted PM10, PM2.5 and dust fallout concentrations at the mine boundary line are given in Table 30 and Table 31 for the unmitigated and mitigated scenarios.

Table 28: Predicted incremental PM10, PM2.5 and dust fallout concentrations at sensitive receptors – UNMITIGATED

SENSITIVE RECEPTOR	PM10		PM2.5		DUST FALLOUT (MG/M2/DAY)	
	DAILY AVERAGE	ANNUAL AVERAGE	DAILY AVERAGE	ANNUAL AVERAGE		
STANDARD	75 µg/m^3	40 µg/m^3	65(1) & 40(2) µg/m^3	25(1) & 20(2)	Residential: 600 mg/m^2/day Non-residential: 1200 mg/m^2/day	
Normal Operating Conditions					Construction	Operation
Marapong	> 120	20 - 40	25 - 65	5 - 25	< 10	100 - 600
Lephalale	10 - 50	10 - 20	< 15	< 5	< 10	< 100
Onverwacht	45 - 75	20 - 40	15 - 40	5 - 15	< 10	100 - 300
Matimba Power Station	75 - 120	20 - 40	15 - 40	5 - 15	< 10	100 - 600
D'Nyala Nature Reserve	6 - 50	< 10	< 15	< 5	< 10	< 100

Table 29: Predicted incremental PM10, PM2.5 and dust fallout concentrations at sensitive receptors – MITIGATED

SENSITIVE RECEPTOR	PM10		PM2.5		DUST FALLOUT (MG/M2/DAY)	
	DAILY AVERAGE	ANNUAL AVERAGE	DAILY AVERAGE	ANNUAL AVERAGE		
STANDARD	75 µg/m^3	40 µg/m^3	65(1) & 40(2) µg/m^3	25(1) & 20(2)	Residential: 600 mg/m^2/day Non-residential: 1200 mg/m^2/day	
Normal Operating Conditions					Construction	Operation
Marapong	20 – 100	10 – 50	10 – 50	3 – 10	n/a	100 – 300
Lephalale	7 – 10	< 7	< 7	< 3	n/a	< 100
Onverwacht	20 – 70	7 – 50	7 – 20	< 5	n/a	< 100
Matimba Power Station	20 – 100	7 – 20	7 – 20	< 7	n/a	100 – 300
D'Nyala Nature Reserve	< 7	< 7	< 7	< 3	n/a	< 100

Table 30: Summary of predicted maximum modelled concentrations at Waterberg Coal Mine Boundary line – UNMITIGATED

POLLUTANT	AVERAGING TIME	MAXIMUM MODELLED CONCENTRATION (µG/M^3)	COMPLIANCE EXCEEDANCE	AIR QUALITY STANDARD (µG/M^3)
Operational Phase				
PM10	Daily	> 100	Yes	75
	Annual	> 100		40
PM2.5	Daily	> 100	Yes	65(2) & 40(3)
	Annual	> 50		25(2) & 20(3)
Dust Fallout(1)	daily	7000	Yes	1200(4)
Construction Phase				
Dust Fallout(1)	daily	< 10	No	1200(4)

Table 31: Summary of predicted maximum modelled concentrations at Waterberg Coal Mine Boundary line – MITIGATED

POLLUTANT	AVERAGING TIME	MAXIMUM MODELLED CONCENTRATION (µG/M3)	COMPLIANCE EXCEEDANCE	AIR QUALITY STANDARD (µG/M^3)
Operational Phase				
PM10	Daily	> 100	Yes	75
	Annual	> 50		40
PM2.5	Daily	> 50	Yes	65(2) & 40(3)
	Annual	> 50		25(2) & 20(3)
Dust Fallout(1)	daily	2000	Yes	1200(4)

Notes:

- Dust fallout given in mg/m2/day
- Current South African PM2.5 air quality standard
- Future South African PM2.5 air quality standard (by 1 Jan 2016)
- Non-residential area dust fallout standard

9.1.7.5 Cumulative Impacts

In determining the cumulative impacts, predicted incremental concentrations should be added to the measured concentrations for the applicable pollutant averaging periods. Ambient air quality monitoring is undertaken by the Department of Environmental Affairs at the Lephalale air quality monitoring station and has been reported under the baseline description above.

The predicted concentrations outside the mine boundary are added to the background concentrations for PM10, PM2.5 and dust fallout in order to compare against the acceptable

air quality standards. Based on the analyses of the background air quality data and the predicted concentrations it was observed, for both the mitigated and unmitigated scenarios, that the operation of the Waterberg coal mine will have a negative impact on air quality in terms of PM10, PM2.5 and dust fallout (Table 32 and Table 33). The sum of the background and predicted concentrations for PM10, PM2.5 and dust fallout are greater than the acceptable daily standards and dust fallout rates. The highest predicted annual PM10 and PM2.5 concentrations exceeded the acceptable annual standards.

However, it should be emphasized that the baseline concentrations of dust fallout, PM10 and PM2.5 beyond the mines boundary are already relatively high in relation to the air quality standards. The baseline assessment, indicated exceedances of the non-residential and residential dust fallout standards of 1 200 mg/m^2/day and 600 mg/m^2/day and the PM10 24-Hour standard of 75 µg/m^3 on several occasions beyond the mine's boundary.

Table 32: Summary of cumulative impacts associated with operations at Waterberg Coal Mine – UNMITIGATED

Pollutant	Averaging Period	Highest Concentration (µg/M3)		Sum of CB & CP	Air Quality Standard (µG/M3)
		Background (CB)	Predicted (CP)		
PM10	24 hours	86	100	186	75
	1 year	unknown	Exceeded annual standard		40
PM2.5	24 hour	50	100	150	65(3) & 40(4)
	1 year	unknown	Exceeded annual standard		25(3) & 20(4)
Dust Fallout (TSP)	daily	4000	3000	7 000	1200(5) mg/m^3/day 600(6) mg/m^3/day

Table 33: Summary of cumulative impacts associated with operations at Waterberg Coal Mine – MITIGATED

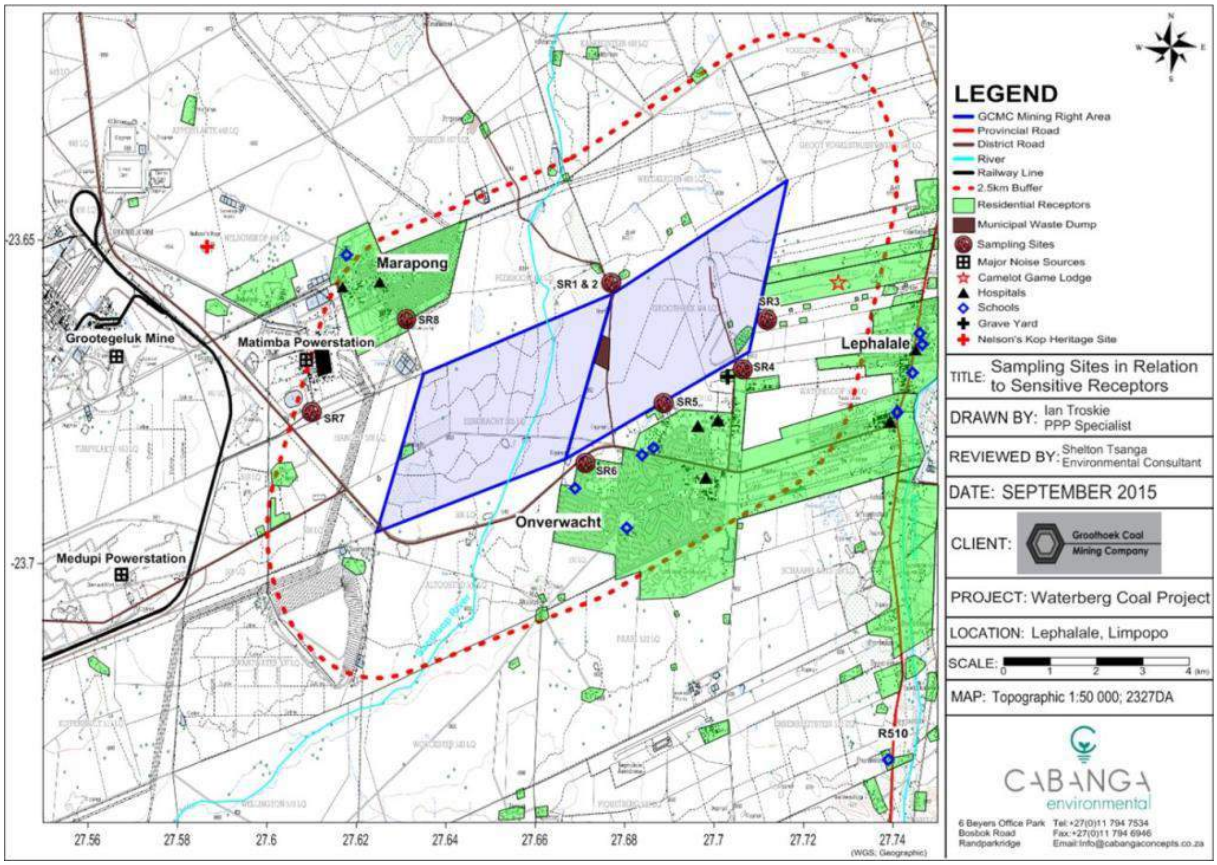
Pollutant	Averaging Period	Highest Concentration (µg/M3)		Sum of CB & CP	Air Quality Standard (µG/M3)
		Background (CB)	Predicted (CP)		
PM10	24 hours	86	100	186	75
	1 year	unknown	Exceeded annual standard		40
PM2.5	24 hour	50	50	100	65(3) & 40(4)
	1 year	unknown	Exceeded annual standard		25(3) & 20(4)
Dust Fallout (TSP)	daily	4000	2000	6000	1200(5) mg/m^3/day 600(6) mg/m^3/day

9.1.8 Noise

Plan 42 presents locations of nearby sensitive receptors where noise levels were metered. Three sites were identified to be of high concern and are also listed as points of interest in the blast study (Section 9.1.10). The following is of relevance in terms of baseline noise level readings:

- SR1 & SR2 indicate that baseline noise levels are low, only slightly exceeding (by 4.8dB) the SANS standards; therefore the site is more susceptible to elevated noise and of **high concern**. Mitigation must be applied during the operation of the east pit, which will be the greatest noise source for the site.
- SR3 indicated similar results to SR1 and SR2, and exceeded standards by 10.6dB. There are many other neighbouring farms and households in the area and the site is of moderate – high concern. The east material stockpile should provide a significant noise barrier to the site and it is expected that noise at site will not be significant once the stockpile is established. Site must be monitored.
- SR4 (SPCA) only slightly exceeded SANS limits by 5.8 dB during the day and 3.8 dB at night. This site is of **high concern**, with impact expected in the latter half of mining of the east pit. Site has also been identified as a point of interest in blasting (Section 9.1.10) and serious negotiations will need to be initiated with the SPCA and finalised before the east pit proceeds into the southern half of its mining area.
- The SR5 is the closest residential area in the town “Onverwacht”. Three complexes are located in this area housing potentially over a thousand residents and are only a little over 160 meters away from the proposed East mine pit on Groothoek 504 LQ. Average noise readings were 3dB above the standards. Potential future noise levels as a result of mining activities could result in major nuisance to these receptors and this site is of **high concern**. The main noise impact would be blasting and the site was also identified as a sensitive site regarding Blasting (Section 9.1.10).
- SR6, the next closest site to the West Pit in Onverwacht is near the intersection of the main road between Lephalale and Steenbokpan / Grootegeluk mine and already suffers traffic noise and SANS limits were exceeded by a maximum of 12.8 dB. These receptors are over 1.6km away from the proposed West Pit and site is regarded as low – moderate concern.
- SR7 is taken at the Eskom Matimba Power Station to the north-west of the site. Noise levels at this site were higher than other samples due to existing noise sources Site is of low concern and no management measures necessary.
- The final samples were taken at SR8, nearest Marapong community boundary to the proposed mine development, just less than 2km north of the proposed pit. 1.2 km from the process plan and around 900 meters from the proposed railway link and siding. The average background noise exceeded the SANS limits by 10.3 dB. The site is of moderate concern, although the western material stockpile will provide appropriate buffer from the opencast mining.
- Bauer (2006) completed noise assessments on coal processing facilities, with raw feed capacity ranging from 300 to 2 000tph and indicated that 90-95dB levels can be experienced in the immediate vicinity of a noisier plant facility. Assuming the Waterberg Project wash plant produces between 80dB at the nearest boundary, 190m north of site from the wash plant boundary, and the fact that noise levels will attenuate by 6dB for double the distance from a noise source (assuming flat open field and calm weather conditions), the expected noise levels experienced at

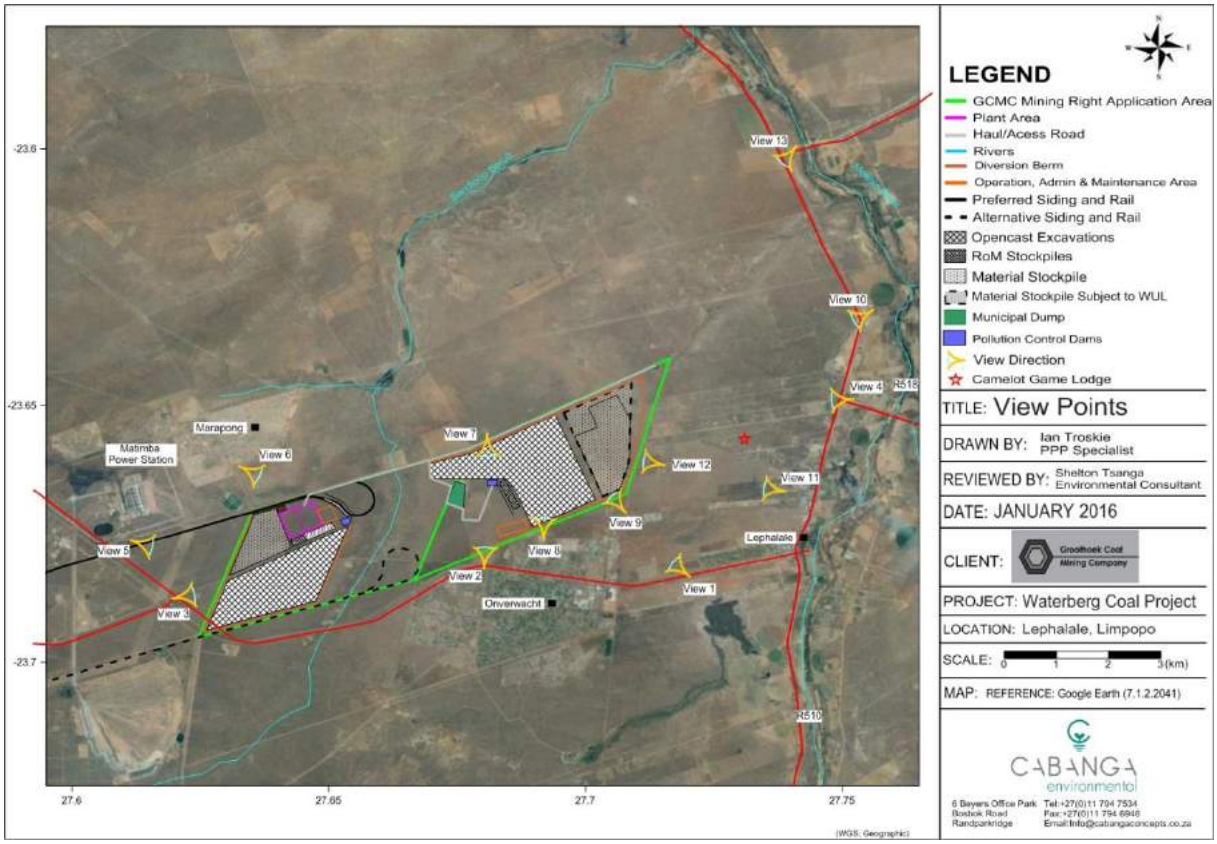
Marapong's southern boundary would be in the region of 70dB. The predominant wind direction is northeast to south west which will result in increased noise attenuation from Marapong, and the area between the wash plant and Marapong is well vegetated which will further attenuate the noise. The wash plant will therefore not contribute significantly to noise levels already measured at Marapong's southern boundary.



Plan 42: Noise sampling at nearby sensitive receptors around the GCMC mining right application area

9.1.9 Visual Exposure

Visual exposure relates to the distance of the view from the viewers. The increase in distance from the viewer decreases the impact that the development has on the viewer. The distance of the key viewpoints (Plan 43) from the site are summarised in Table 34. These key viewpoints signify the most important viewpoints in terms of visual impact as these viewpoints are either the most sensitive or have the highest incidence of sensitive viewers.



Plan 43: Viewpoints of sensitive receptors in the area

Table 34: Key viewpoint areas and approximate number of viewers in relation to distance from site

View Point	Description	View. No.	Distance	Potential Visual Exposure
7	Farm Welgelegen and Peerboom entrance	7	30m	Immediately visible
8	Complexes on Boundary	8	250m	Immediately visible
9	SPCA near Groothoek Gate	9	200m	Immediately visible
12	Farm Grootfontein (Camelot Game Reserve)	12	990m	Visible

9.1.10 Blast Impacts

Three main effects of blasting have been modelled and discusses, including ground vibration, which is the main effect that would cause structural damage, air blast, which may cause some damage at very nearby receptors, but is more likely to cause rattling of structures, without any damage, and finally fly rock.

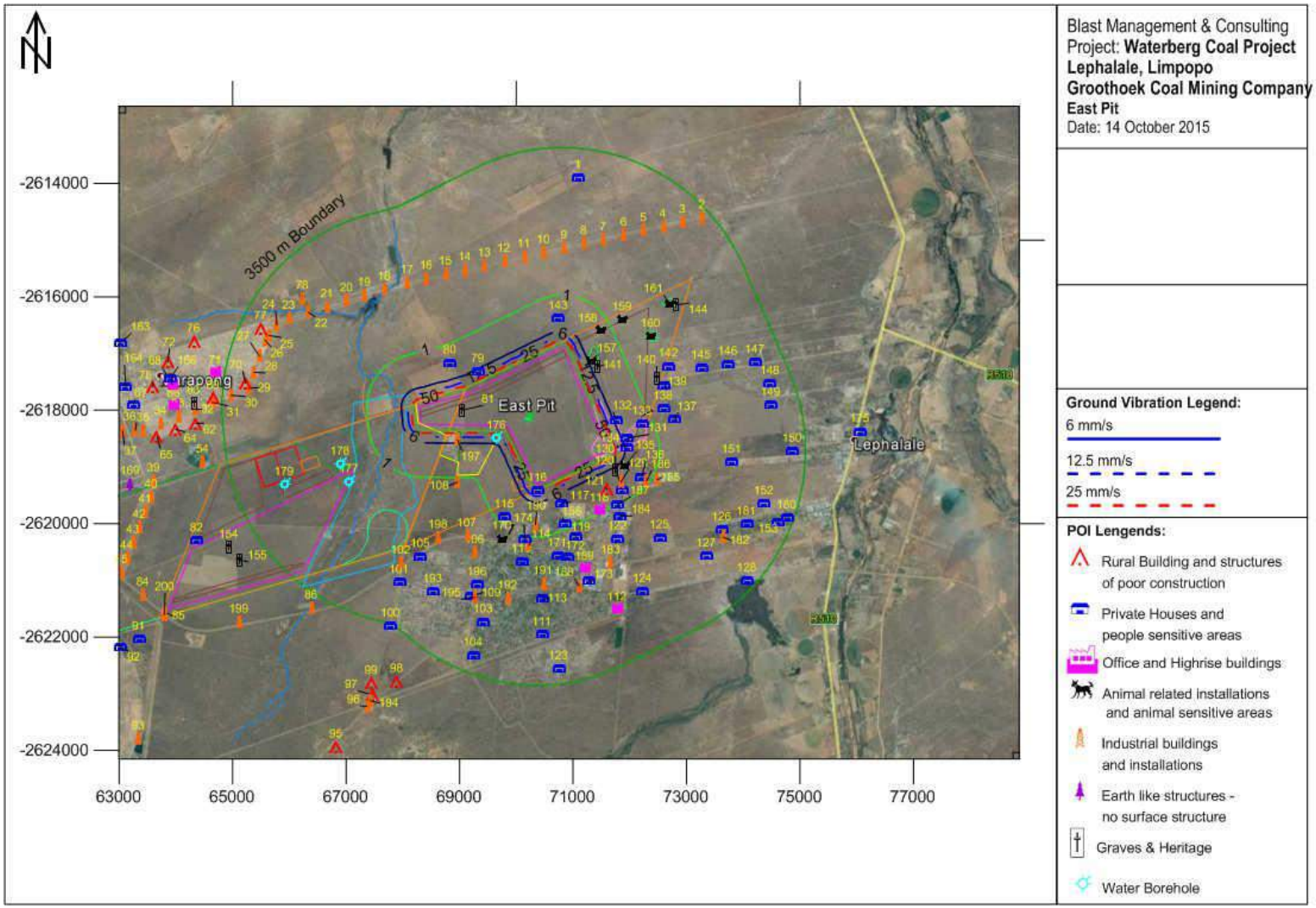
9.1.10.1 Ground Vibration

Ground vibration was calculated and modelled at the minimum (169kg) and maximum (2 045kg) charge mass at specific distances from the proposed opencast mining areas. Provided with each simulation and associated blast vibration plans are indicators of the ground vibration limits used in this assessment: 6 mm/s, 12.5 mm/s and 25 mm/s. This enables immediate review of possible concerns that may be applicable to any of the privately owned structures, social gathering areas or sensitive installations.

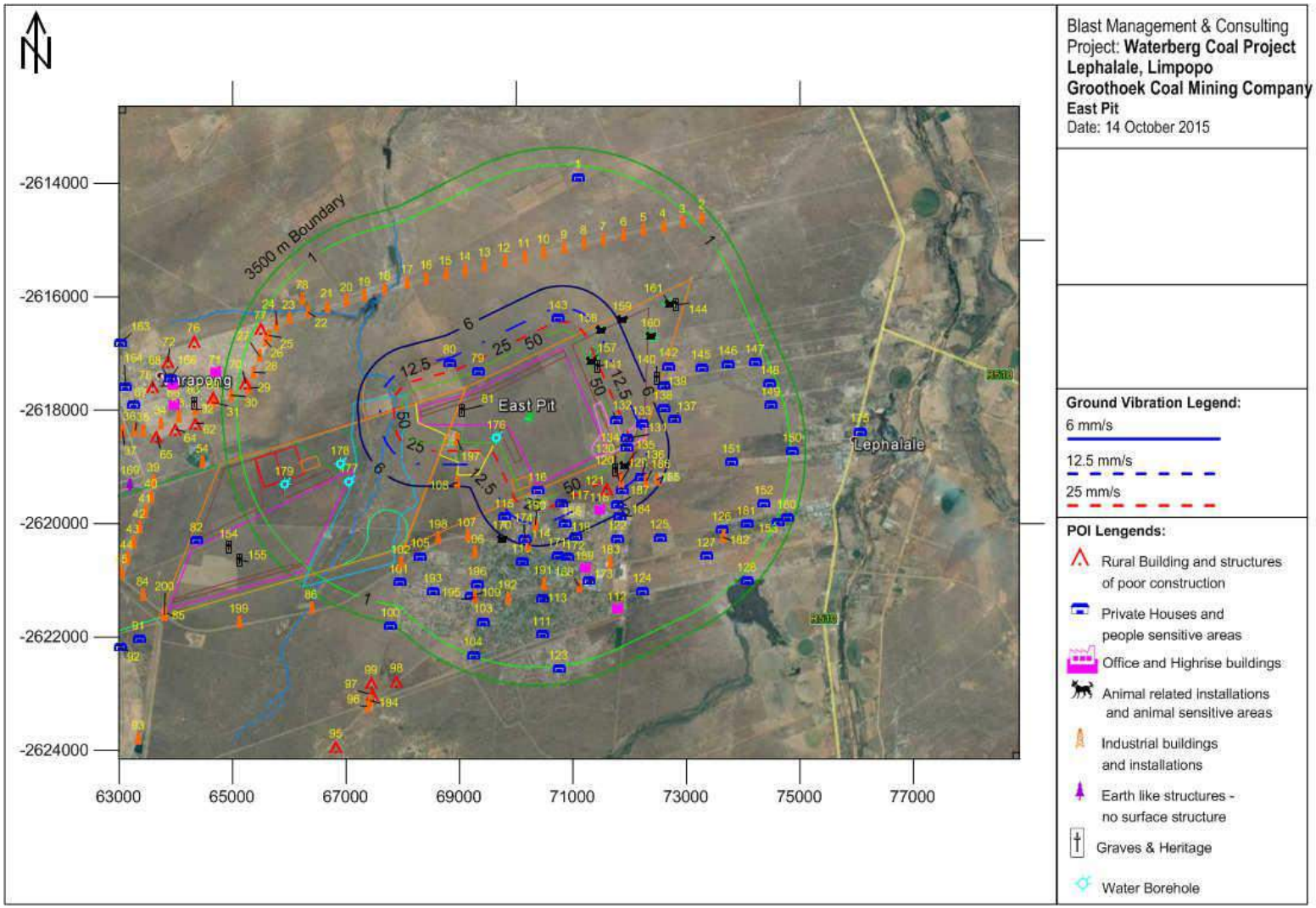
Plans 44 to 47 below were modelled for each charge mass and each pit, these are followed by Tables 35 – 36 which highlight the POIs where the effect of blasting is anticipated to be intolerable or problematic.

- The closest structures to the East Pit are at POI 79, 116, 121, 131, 132, 134, 135, 176 and 197. The planned minimum and maximum charges evaluated showed that it could be problematic in terms of potential structural damage and human perception. The potential Bull frog habitat at POI 157 at 383m is very close and could also be problematic. Water boreholes identified are at close proximity, 234m from the blasting operations, and ground vibration influences on these boreholes are foreseen.
- Problematic structures identified at the West Pit are at POI 82, 85, 177, 178, 179 and 200. These are mainly the Farm Buildings that are very close at 93m, the Communication Tower at 136m, the D1675 Road at 100m and various boreholes from 20m to 297m from the pit area.

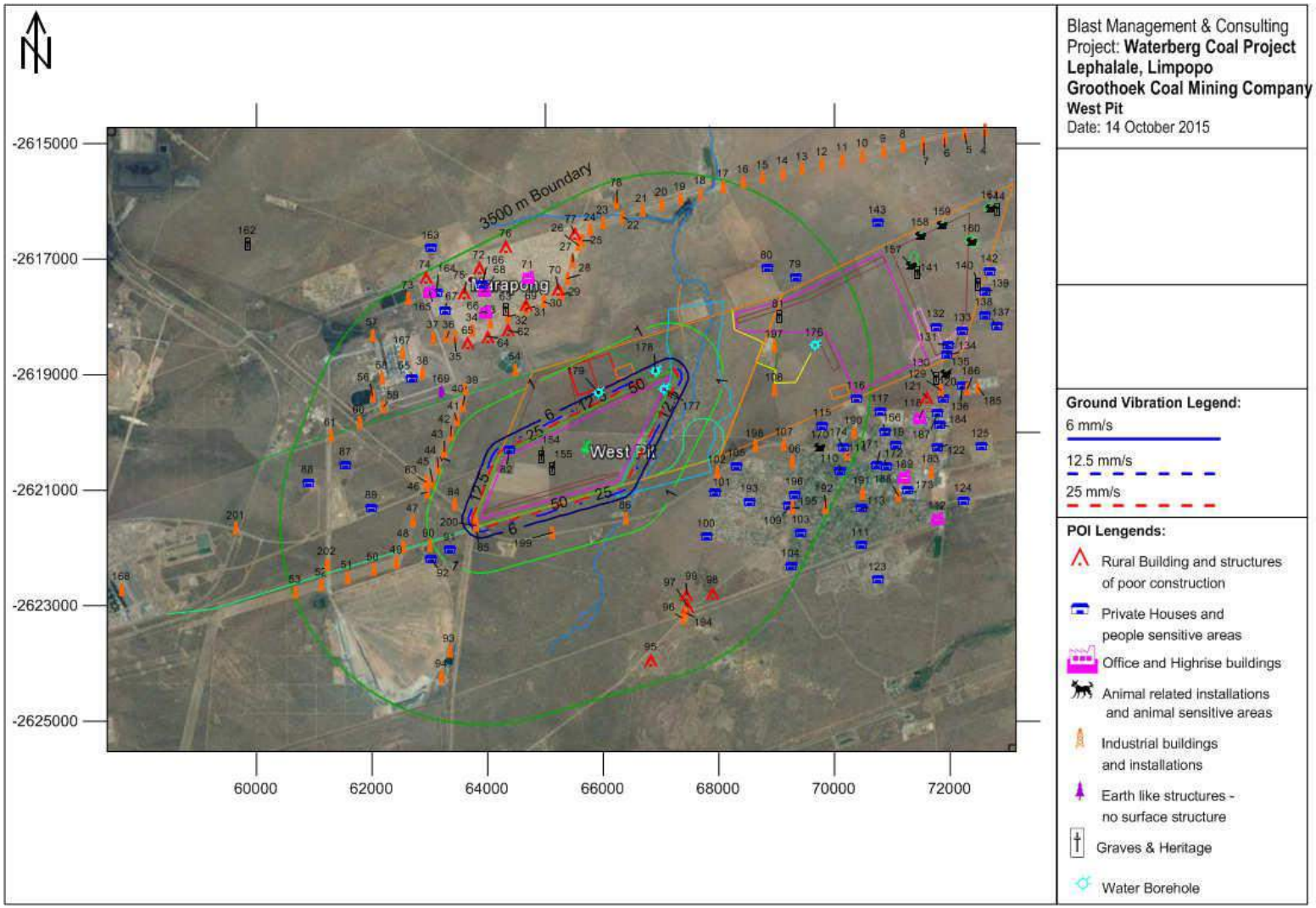
In view of the above, specific mitigations will be required near POIs (Plan 48) that have been identified as possible concerns including possible relocation of relevant households, reducing charge mass within specific distances to these structures or increasing blast distance from these structures.



Plan 44: Ground vibration influence from minimum charge for East Pit

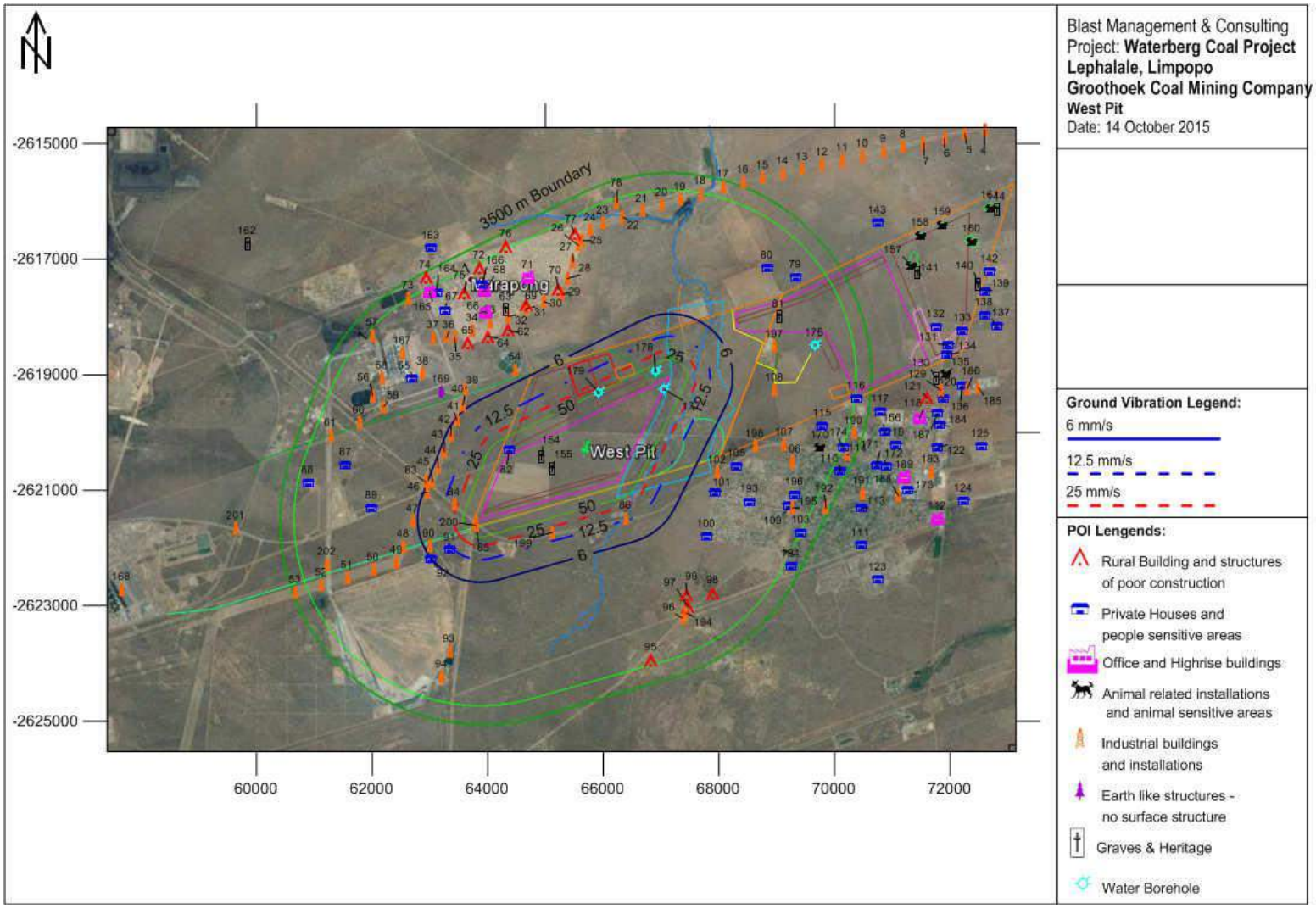


Plan 45: Ground vibration influence from maximum charge for East Pit



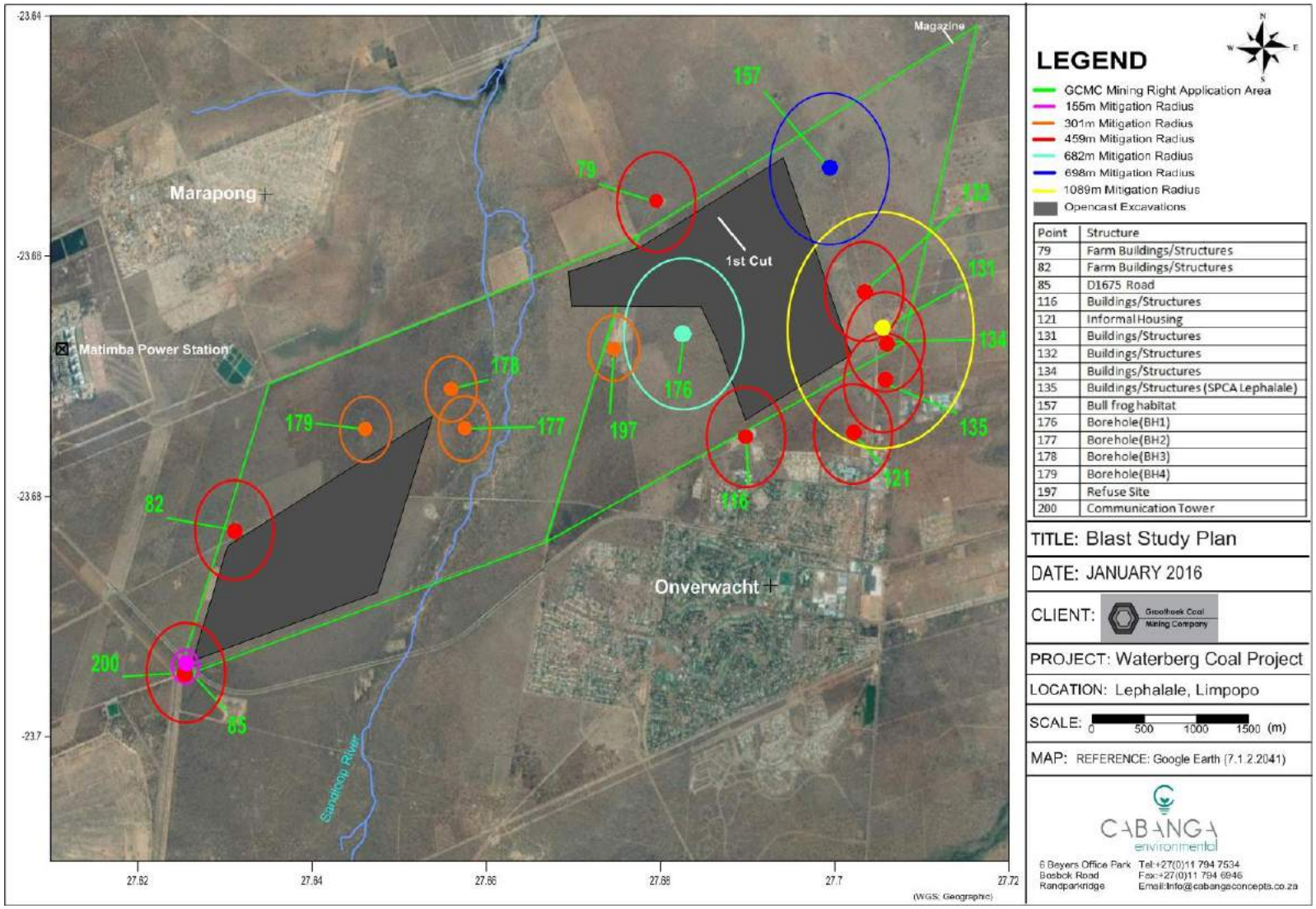
(**Note:** this plan still indicates the original extent of West Pit where the noise levels were recorded)

Plan 46: Ground vibration influence from minimum charge for West Pit



(**Note:** this plan still indicates the original extent of West Pit where the noise levels were recorded)

Plan 47: Ground vibration influence from maximum charge for West Pit



Plan 48: Sensitive points of interest in relation to blasting activities

Table 35: Ground vibration evaluations for East Pit – highlighted cells are problematic

Tag	Description	Specific Limit (mm/s)	Distance (m)	Predicted PPV (mm/s)	Structure Response @ 10Hz	Human Tolerance @ 30Hz
Minimum Charge						
116	Buildings/Structures	25	111	33.3	Problematic	Intolerable
Maximum Charge						
79	Farm Buildings/Structures	25	277	57.3	Problematic	Intolerable
116	Buildings/Structures	25	111	260.5	Problematic	Intolerable
117	Buildings/Structures	25	483	23.0	Acceptable	Intolerable
121	Informal Housing - Lephalale	6	617	15.3	Problematic	Unpleasant
131	Buildings/Structures	25	421	28.8	Problematic	Intolerable
132	Building/Structure	25	361	37.2	Problematic	Intolerable
134	Building/Structure	25	354	38.4	Problematic	Intolerable
135	Buildings/Structures(SPCA Lephalale)	12.5	414	29.6	Problematic	Intolerable
157	Potential Bull frog habitat	13	383	33.7	Problematic	Intolerable
176	Borehole(BH1)	50	234	76.1	Problematic	N/A
197	Refuse Site	25	263	62.5	Problematic	N/A

Table 36: Ground vibration evaluation for West Pit - – highlighted cells are problematic

Tag	Description	Specific Limit (mm/s)	Distance (m)	Predicted PPV (mm/s)	Structure Response @ 10Hz	Human Tolerance @ 30Hz
Minimum Charge						
82	Farm Buildings/Structures	25	93	44.8	Problematic	Intolerable
177	Borehole(BH2)	50	20	566.1	Problematic	N/A
Maximum Charge						
82	Farm Buildings/Structures	25	93	350.7	Problematic	Intolerable
85	D1675 Road	150	100	309.6	Problematic	N/A
177	Borehole(BH2)	50	20	4428.0	Problematic	N/A
178	Borehole(BH3)	50	187	110.2	Problematic	N/A
179	Borehole(BH4)	50	297	51.3	Problematic	N/A
200	Communication Tower	25	136	186.1	Problematic	N/A

9.1.10.1.1 Ground vibration and Human Perception

Considering the effect of ground vibration with regards to human perception, vibration levels calculated were applied to an average of 30Hz frequency and plotted with expected human perceptions on the safe blasting criteria graph (Figure 21 below). The frequency range

selected is the expected average range for frequencies that will be measured for ground vibration when blasting is done.

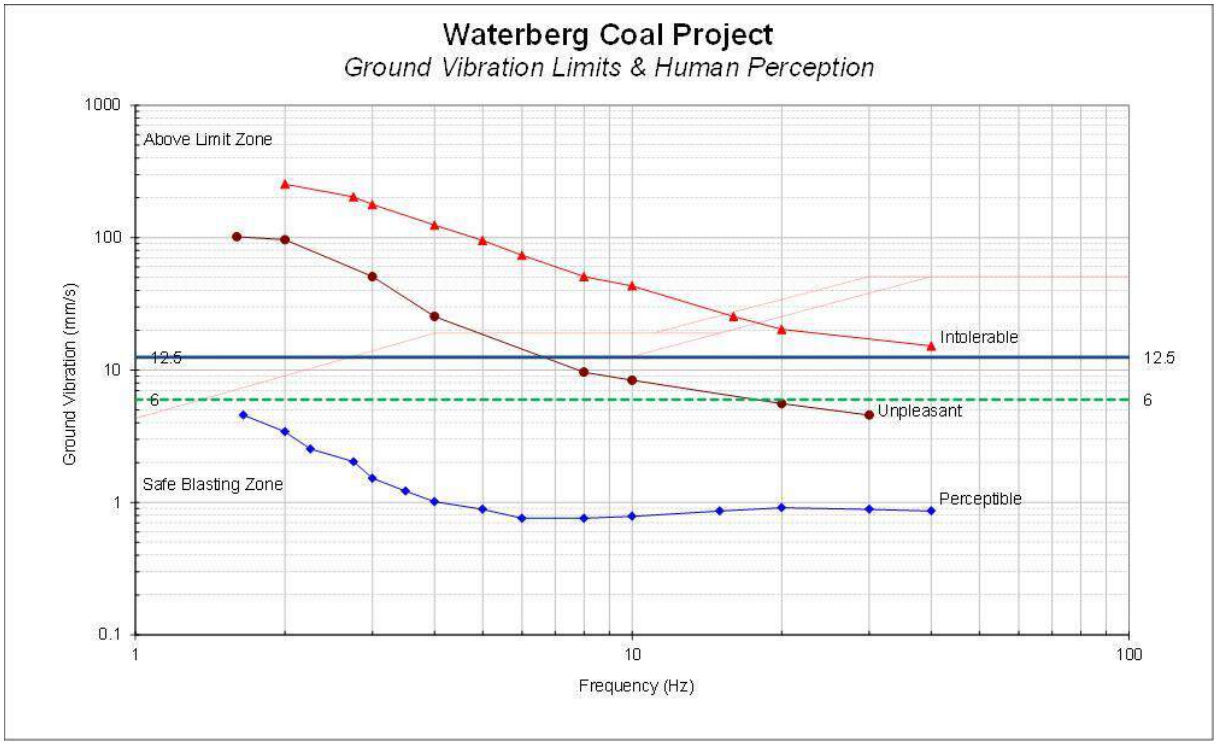


Figure 21: The effect of ground vibration with human perception and vibration limits

From Figure 21 it can be seen that within the 3 500 m area investigated people may experience levels of ground vibration as perceptible. At 1 250 m the expected ground vibration levels are still less than the lower safe blasting limit – less than 6 mm/s but will be experienced by people as “unpleasant”. Distances closer than 700 m will exceed the minimum 6 mm/s proposed safe limit for poorly constructed structures. At 700 m and closer, people will experience ground vibration as intolerable.

9.1.10.1.2 Vibration Impact on National and Provincial Road

There are no national and provincial roads in vicinity of the project area to be considered. The D1675 road is very close to the West Pit at 100m. This road is also the main road to Exxaro Grootegeluk mine, access road to Medupi Power station, Matimba Power station and Marapong Village. Expected ground vibration levels at this road are higher than the recommended limits and changed blasting parameters will have to be applied to ensure levels are within accepted norms.

9.1.10.1.3 Potential that Vibrations will Upset Adjacent Communities

Ground vibration and air blast generally upset people living in the vicinity of mining operations. There are communities, grazing areas and roads that are within the evaluated area of influence. There are structures in close proximity to the pit area. Structures are in some cases right next to the pit area. The closest houses in Lephalale are located such that

levels of ground vibration predicted are higher than allowed limits. Ground vibration levels at other houses may be perceptible and unpleasant but not damaging.

The importance of good public relations cannot be over-stressed. People tend to react negatively on experiencing effects from blasting such as ground vibration and air blast. Even at low levels when damage to structures is out of the question it may upset people. Proper and appropriate communication with neighbours about blasting, monitoring and actions done for proper control will be required.

9.1.10.1.4 Cracking of Houses and Consequent Devaluation

The structures found in the area of concern range from informal building styles to brick and mortar structures. There are various houses, industrial installations and village houses found within the 3 500 m area. Building style and materials will certainly contribute to additional natural cracking apart from potential influences from blasting operations.

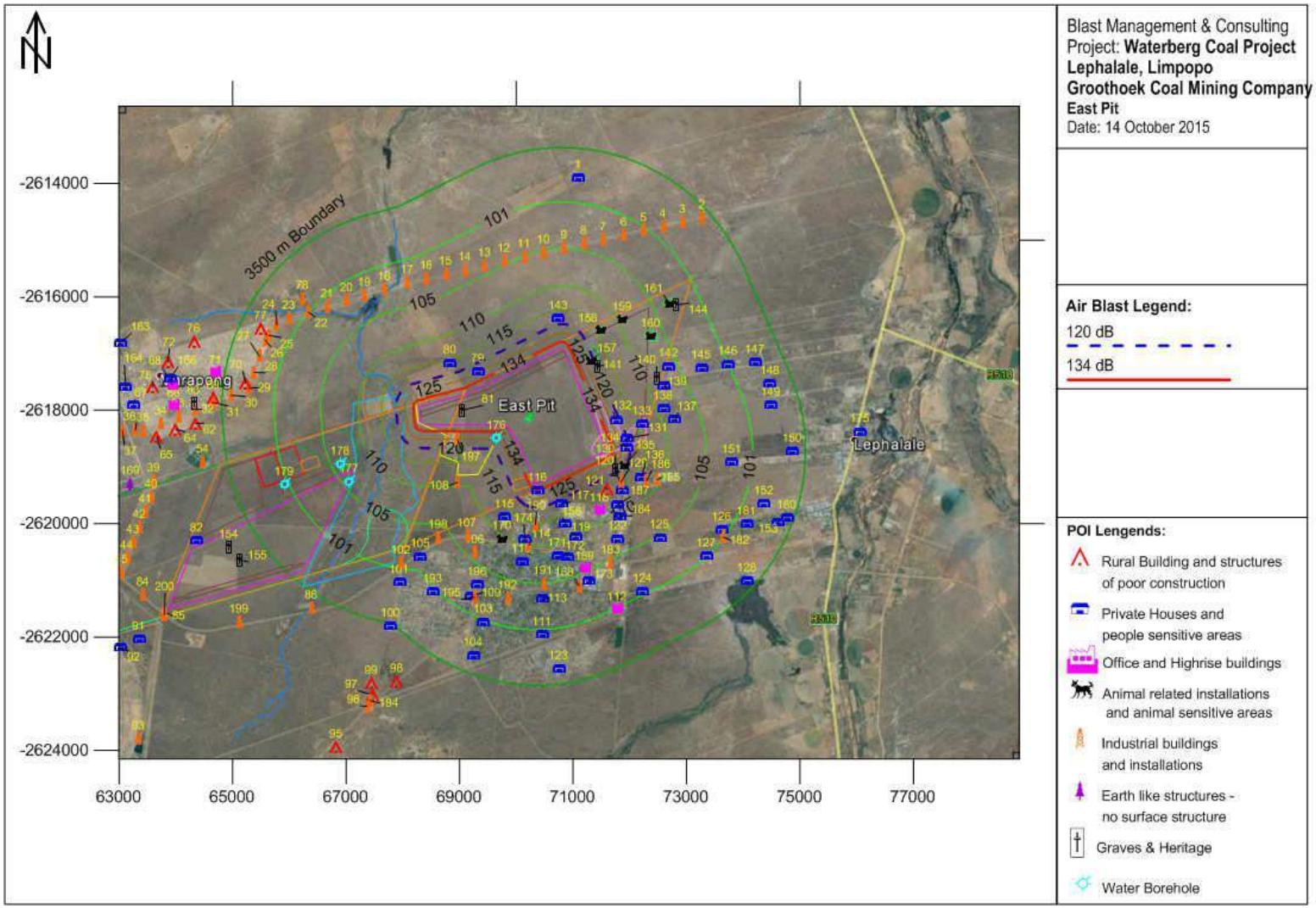
The presence of general vertical cracks, horizontal and diagonal cracks that are found in all structures does not need to indicate devaluation due to blasting operations but rather devaluation due to construction, building material, age of structure, standards of building applied. Thus damage in the form of cracks will almost always be present. Exact costing of devaluation for normal cracks observed is difficult to estimate. Mining operations may not have influence to change the status quo of any property if correct precautions are considered. The proposed limits should be considered as the applicable precautions. The limits as applied in this document i.e. 6 mm/s, 12.5 mm/s and 25 mm/s are considered sufficient to ensure that additional damage is not introduced to the different categories of structures. It is expected that, should levels of ground vibration be maintained within these limits, the possibility of inducing damage is limited and status quo of current structures not changed.

9.1.10.2 Air Blast

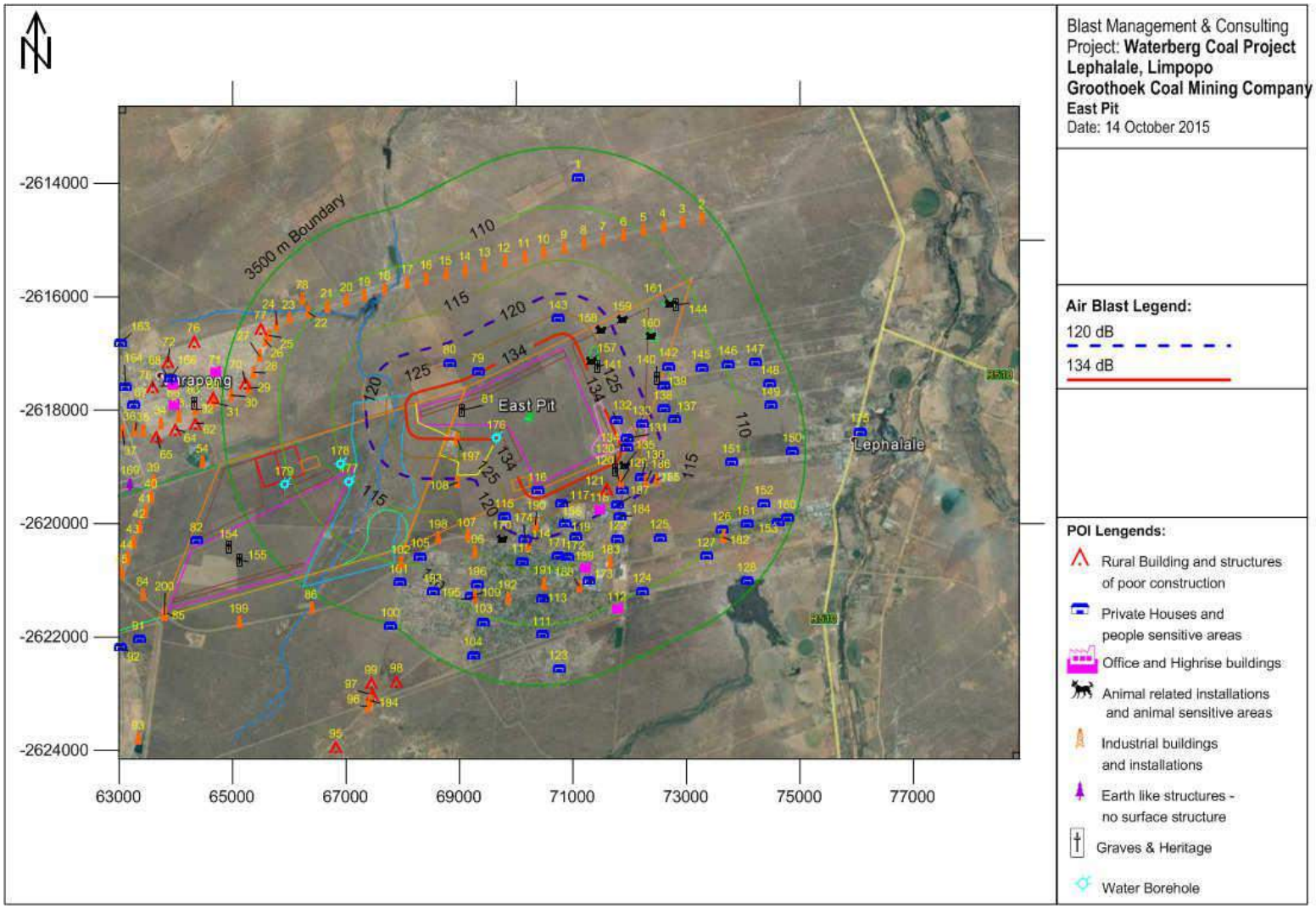
The effect of air blast, if not controlled properly, is in the author's opinion a factor that could be problematic. Maybe not in the sense of damage being induced but rather having an impact – even at low levels roofs and windows could rattle - resulting in complaints from people. In more than one case air blast effect is misunderstood and people consider this effect as being ground vibration and damaging to their houses / structures. The plans (Plan 49 to Plan 52) modelled are provided below for each charge mass and each pit, followed by tables (Table 37 and Table 38) highlighting only the POIs where the effect will be intolerable or problematic.

Air blast levels indicate similar concerns as with ground vibration. Air blast predicted for the maximum charge ranges between 98.0 and 142.4 dB for East Pit and 96.7 and 144.3 dB for West Pit where structures are of concern. As indicated above there is a high probability that influence that could lead to complaints can expected up to a 1 000 m from the pit boundaries. The possibility of exceeding the limits could extend up to 250 m from the pit boundaries.

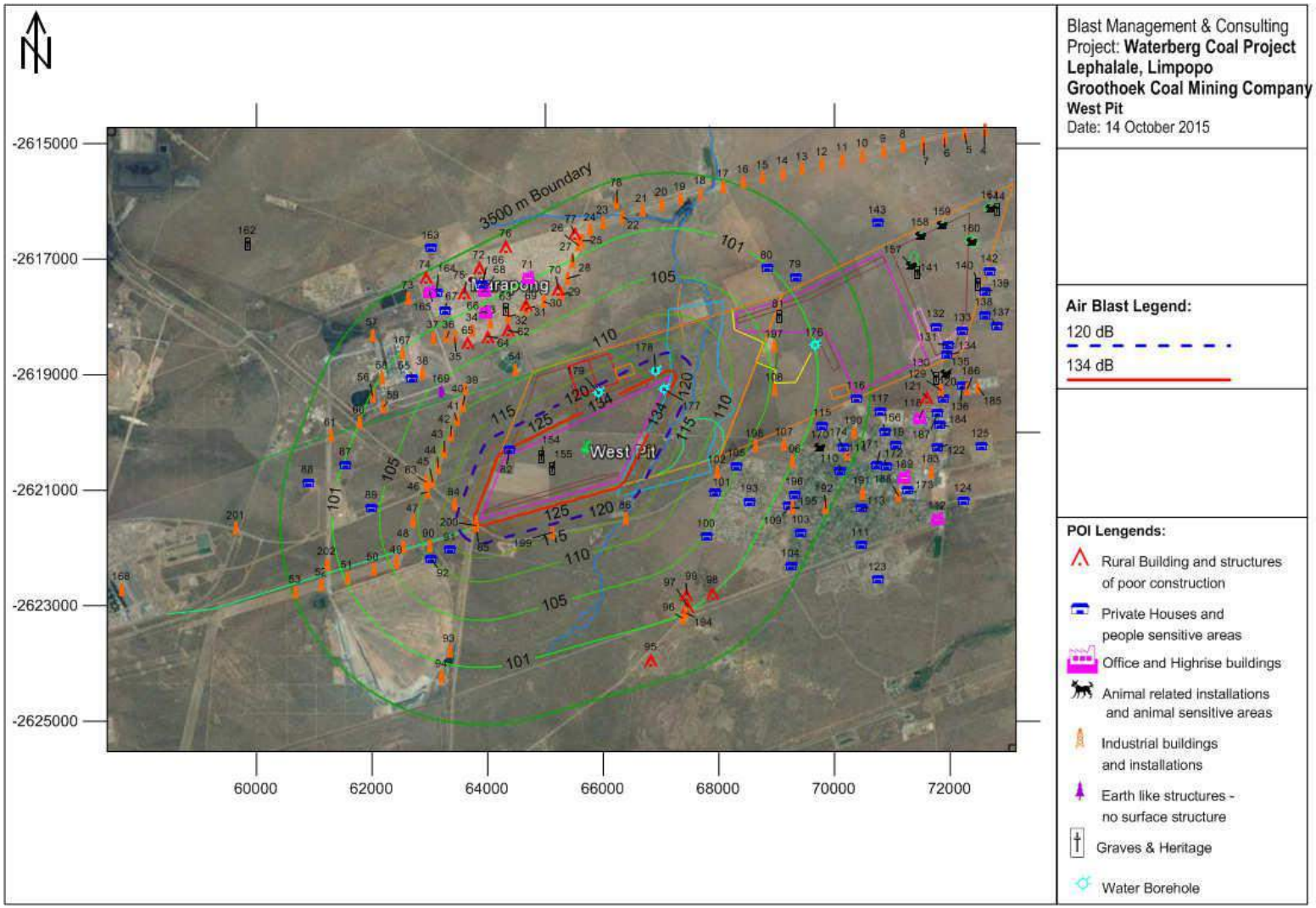
The possible negative effects from air blast are expected to be less than that of ground vibration. It is maintained that if stemming control is not exercised this effect could be greater with greater range of complaints or damage. The pits are located such that “free blasting” – meaning no controls on blast preparation – will not be possible.



Plan 49: Air blast influence from minimum charge for East Pit

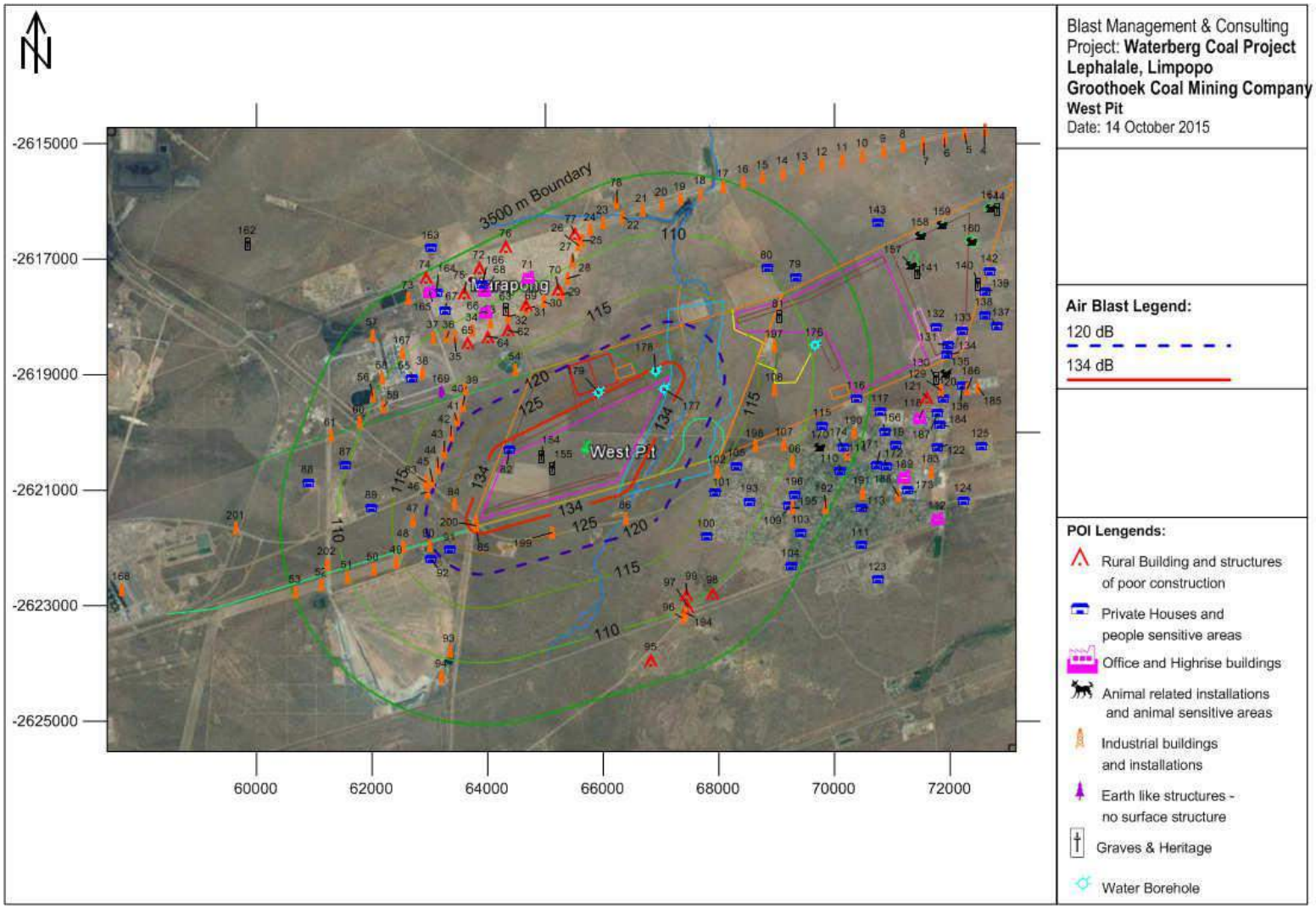


Plan 50: Air blast influence from maximum charge for East Pit



(**Note:** this plan still indicates the original extent of West Pit where the noise levels were recorded)

Plan 51: Air blast influence from minimum charge for West Pit



(**Note:** this plan still indicates the original extent of West Pit where the noise levels were recorded)

Plan 52: Air blast influence from maximum charge for West Pit

Table 37: Air blast evaluation for East Pit – highlighted cells are problematic

Tag	Description	Distance (m)	Air blast (dB)	Possible Concern?
Minimum Charge				
79	Farm Buildings/Structures	277	124.2	Complaint
116	Buildings/Structures	111	133.8	Problematic
132	Building/Structure	361	121.5	Complaint
134	Building/Structure	354	121.7	Complaint
135	Buildings/Structures(SPCA Lephalale)	414	120.0	Complaint
157	Bull frog habitat	383	120.8	Complaint
Maximum Charge				
79	Farm Buildings/Structures	277	132.9	Complaint
80	Farm Buildings/Structures	610	124.6	Complaint
115	Buildings/Structures	805	121.8	Complaint
116	Buildings/Structures	111	142.4	Problematic
117	Buildings/Structures	483	127.1	Complaint
118	Lephalale Hospital	877	120.9	Complaint
120	Buildings/Structures	749	122.5	Complaint
121	Informal Housing - Lephalale	617	124.5	Complaint
131	Buildings/Structures	421	128.5	Complaint
132	Building/Structure	361	130.1	Complaint
133	Buildings/Structures	758	122.4	Complaint
134	Building/Structure	354	130.3	Complaint
135	Buildings/Structures(SPCA Lephalale)	414	128.7	Complaint
136	Buildings/Structures	766	122.3	Complaint
143	Farm Buildings/Structures	522	126.3	Complaint
156	School	838	121.3	Complaint
157	Bull frog habitat	383	129.5	Complaint
158	Bull frog habitat	742	122.6	Complaint
187	Buildings/Structures	938	120.2	Complaint

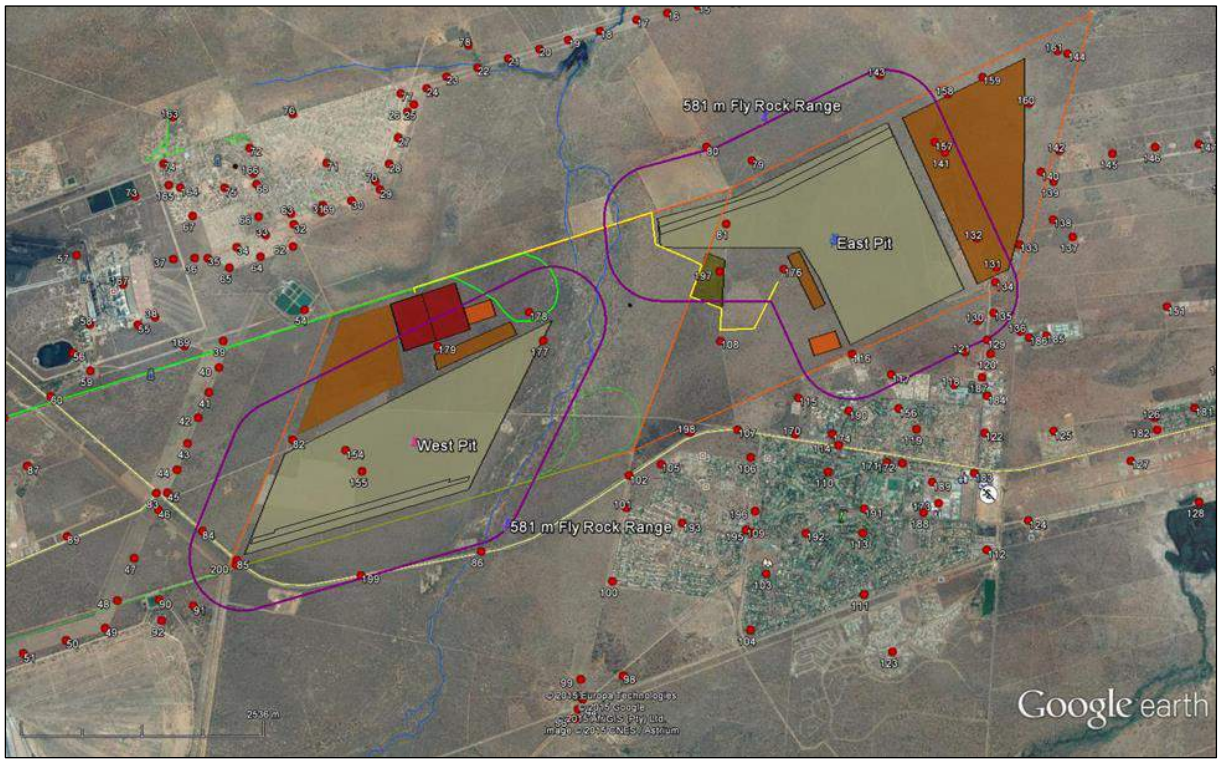
Table 38: Air blast evaluation for West Pit– highlighted cells are problematic

Tag	Description	Distance (m)	Air blast (dB)	Possible Concern?
Minimum Charge				
82	Farm Buildings/Structures	93	135.6	Problematic
Maximum Charge				
82	Farm Buildings/Structures	93	144.3	Problematic
91	Buildings/Structures	749	122.5	Complaint

9.1.10.3 Fly Rock

If no stemming control is exerted there will be fly rock. A stemming length of 5 m is expected to yield fly rock that could travel as far as 581 m (Plan 53). Further reduction of stemming length will certainly see fly rock travelling further.

At a distance of 581 m as the minimum exclusion zone the following POIs are of concern for the East Pit: 79, 81, 116, 117, 130, 131, 132, 134, 135, 141, 143, 157, 176 and 197 and for the West Pit: 82, 84, 85, 155, 179, 199 and 200. These POIs include houses, housing complexes and busy roads. Careful attention will need to be given to stemming control to ensure that fly rock is minimised as much as possible.



(**Note:** this plan still indicates the original extent of West Pit where the noise levels were recorded)

Plan 53: Predicted Fly rock Exclusion Zone

9.1.10.4 Noxious Fumes

The occurrence of fumes in the form the NOx gas is not a given and very dependent on various factors. However the occurrence of fumes should be closely monitored. Furthermore, nothing can be stated as to fume dispersal to nearby farmsteads, but if anybody is present in the path of the fume cloud it could be problematic.

9.1.10.5 Water well Influence from Blasting

Boreholes for water were also evaluated for possible influence from blasting. There are various boreholes in the area. Four boreholes were identified that could possibly be influenced due to excessive ground vibration at minimum and maximum charge. The

expected levels of ground vibration are significantly greater than the limit applied for water boreholes. It must be stressed that these boreholes have been drilled as monitoring boreholes and will have to be maintained by the mine for monitoring purposes.

9.1.10.6 Potential for Vibrational Impacts on Animals

This section provides review of possible vibration impacts at installations or areas where animals are specifically known to occur.

It is assumed that equestrian club will be relocated to an area where blasting impacts will not be applicable and is not discussed further.

Biodiversity specialist will need to provide guidance on how the manage the possible bullfrog habitat. The stockpile may be (dependent on IWUL) placed on this area and thus effects from blasting will not be applicable. The stock pile location will also create a buffer towards eastern side that will assist in reducing the effects of air blast and noise in general.

The next nearest POI would be the SPCA. The SPCA is just outside of the mine boundary but the expected ground vibration levels are greater than the recommended limit. Mitigation will be required regarding ground vibration levels. It is expected that there will be a strong objection from the SPCA regarding blasting operations and the effect on animals. It is certain that levels will not cause death but there is no certainty to what levels animals will react or what influence blasting operations will have on animals at the SPCA. There is to the author's knowledge no scientific data available for animals in a setup such as the SPCA that gives guidelines or information on the reaction of animals. The Mogol Animal Clinic is located further than 1 000 m from any of the two pit areas and is not expected to be problematic.

There are other areas where cattle farming are conducted within the area and in the surrounding areas. It is further expected that the cattle farming on the mining area will be relocated. The cattle farming in other areas are expected to be at 500 m away from the pit areas. It is the author's experience that cattle habituate reasonably well to blasting activities and under the circumstances, cattle will be at greatest risk from fly rock. Relocation will be required.

It is also expected that some wildlife will be present on the eastern side of the mining area. The Camelot Game Lodge is located east of the mine. No specific game was observed during the site visit. The possible influence is considered to be low due to the stockpile location that will act as a buffer. This area where wildlife is expected is located more than 1 300 m away from the eastern pit area. It is expected that wildlife will habituate to the operations. There are a significant number of mines that have successful game farm areas on the mine premises. The biggest concern is rather the effects from fly rock than ground vibration and air blast, where again the eastern stockpile will provide adequate barrier for protection from fly rock to the east.

There is a possibility of cattle and goats roaming freely in the vicinity of the mine. The mine area is expected to be fenced off which will reduce the possibility of cattle and goats accessing and roaming on site.

The influence on productivity of animals over period of time due to blasting operations is not clearly defined and difficult to estimate. Animal social behaviour and change of social behaviour is unfortunately problematic. It is however the author's opinion that influence will be experienced when animals are located permanently in close proximity to blasting operations. At larger distances, estimated in the region of 500m and greater, cattle or game will get accustomed to the blasting and related noise. This is based on observations made personally when blasting is done and cattle are present nearby.

9.1.11 Heritage Sites

No sites were observed around the sidings and railway links. The following is relevant to the mineral boundary:

- Opencast mining will impact on three sites directly:
    - Loss of and disturbance to structures associated with the old mine and recent historical farm which are on areas targeted for opencast mining. Impact will be permanent, definite and significance is moderate to high, although the sites appear not to hold major scientific value. Permits for destruction will be required.
    - Loss of and disturbance to cemetery with two graves. Impact will be permanent, definite and significance is high. Permits for relocation will be required.
- Eastern material stockpile area:
    - Loss of and disturbance to structures associated with the recent historical farm which is on an area targeted for stockpiling. Impact will be permanent, definite and significance is moderate to high, although the sites appear not to hold major scientific value. Permits for destruction will be required.
- Blasting:
    - Vibrations / fly rock may damage nearby heritage sites, such as the Lephalale Cemetery. Impact will be of medium-term duration, highly probable and significance is moderate. A management plan must be compiled and implemented specifically for the heritage site.

9.1.12 Socio-economic Cost Benefit Analysis

In assessing the overall confidence level in the impact assessment, the purpose of the ethical consideration is to consider the proposed development from a perspective of "doing the right thing". The Velasquez's (1985) ethical framework uses a values driven, holistic approach to assess the development, to ensure that the qualitative and quantitative measurements are weighted. The four questions posed, require a positive answer to ensure confidence in motivating for the development to go ahead. Negative outcomes either require serious mitigation or a no-go option to be considered.

Do the social and environmental benefits outweigh the costs?	No	Current information does not show that benefits outweigh the costs from a socio-economic perspective.
Does the development respect the rights of stakeholders?	Yes	This PPP and SEIA form part of the process of acknowledgement of rights of identified stakeholders.
Do the rewards from the development extend to marginalized stakeholders?	Yes	The intention of GCMC is to create employment opportunities which will extend to vulnerable and marginalised communities.
Is a measurable degree of care shown towards the environment and identified stakeholders?	TBC	This will only be determined once development is approved and GCMC commences with operations.

The above questions are indicative of the complexity of understanding the benefit and need for economic growth, whilst showing due care to humans and the environment.

For the proposed GCM, this study included the assumptions on the capital expenditure. The environmental cost and benefit was derived from the Scoping Report (2015) which included various specialist inputs, PPP and site visits concluded in August 2015.

The DEA&DP guidelines on economic specialist input to EIA processes which are broadly based on a cost-benefit approach to assessment (van Zyl et al., 2005) will inform the EIA process. These guidelines stipulate the appropriate level of detail required for the assessment, in order to be adequate for informing decision-making. While these guidelines were developed as part of a Western Cape government initiative, they are equally applicable to other parts of South Africa and were endorsed at a national level by the then Department of Environment Affairs.

The basic calculation is a form of environmental economic assessment, taking into consideration the factor of time, so that development impact assessments can be carried out for future, as well as present scenarios.

Without having the final quantifiable numbers at time of publication (cost of managing pollution; roads infrastructure etc.), or access to the other specialists' final reports, the following costs and benefits were observed and/or documented:

- Costs:
    - The obvious environmental impact (pollution etc.).
    - Impact on agriculture & tourism sectors through affecting the land use and sense of place.
    - Health and safety risks associated with open cast coal mining.
    - Additional health risks due to the close proximity of the residential areas.
    - Impact on current agricultural activity, neighbouring and on site, as well as the affected farm related jobs.
    - Increase in traffic and the impact on the roads infrastructure.

  - Effect on the housing market of Altoostyd and Onverwacht property owners, which is less than 1km from the mining site, and in some cases within the 500m buffer zone.
  - Possible damage to property as a result of blasting.
  - The risks associated with Eskom's Matimba power stations ACC.
  - The impact on the LLM SDF to establish the development area as an integrated residential zone.
- Benefits:
  - Support to national and regional IDP, by supporting SA economic development.
  - Supply of coal for local power generation.
  - Direct benefit of employment through the implementation of the SLP.
  - Multiplier effect and benefit to local business.
  - Increase in rates and municipal taxes.
  - Increase in need for housing which should boost the local real estate market.

$Bt - Ct - Et (1 + r) - t \geq 0$ or < 0,

When ≥ 0 (greater or equal to zero) then **positive impact**; and when <0 (smaller than zero) then **negative impact.**

- Bt is the benefit in time t
- Ct is the cost in time t
- Et is the environmental damage done by the project (if there is an environmental improvement, the -E is replaced by +E)
- t is the referred timeframe
- r is the discount rate (suggested at 8%)

As can be seen, the socio-economic cost-benefit analysis is a snapshot in a particular time, and can vary with additional input values. In order to show a positive cost-benefit impact, the equation should result in a greater than 0 value, and with the indicators currently at hand at the time this study was undertaken, the result favours the negative. The cost-benefit analysis is however inconclusive as the benefits value cannot offset the perceived costs, which have not been finalised.

9.2 Impact Assessment and Ranking Methodology

The impact identification process commenced by identifying all environmental aspects on site, whether sensitive or not. General environmental aspects that were considered include:

- Topography
- Geology
- Soil & Associated Land Capability
- Surface Water, Associated Wetlands and Aquatic Ecosystems
- Groundwater
- Floral and Faunal Ecosystems
- Air Quality
- Ambient Environmental Noise
- Archaeological and Cultural Sites
- Visual Aesthetics
- Land Use
- Local Traffic and Safety
- Socio-Economics, Health and Safety

All potential impacts that may occur to the various environmental aspects as a result of the activities and sub-activities listed in Section 2 of the report were listed under each of the aspects.

As the specialist studies were completed, any additional impacts identified through the specialist investigations were added, including impacts identified from the modelling exercises reported above. All specialists utilise some form of impact rating similar to the process detailed below. The impact rating completed by the specialists was as far as possible translated into the impact assessment process detailed below. As far as practically possible, considering variations in impact assessment methodology by different specialists, the specialist impact assessment is therefore duplicated within a single unified impact assessment process, to allow for all impacts to be assessed in the same way, reducing subjectivity and allowing for direct comparative ranking of all the impacts identified during the environmental process.

Through the PPP, any issues or potential impacts identified by the I&APs were added to the list of potential impacts.

All these impacts were then assessed as per the methodology described below and their significance determined. Impact identification will therefore be a consolidated approach based on Cabanga's professional experience, specialist expertise and I&AP (including organs of state involved in the PPP) input.

The impact table (Appendix 16), formulated by Cabanga Concepts, includes mitigation measures and a post-mitigation assessment of impact significance. In this way, the mitigation measures proposed by specialists can also be directly transferred to the impact

assessment process and the expected degree of success of mitigation is represented by the reduced significance of the impact where applicable.

The full impact assessment methodology utilised is described below. Impact assessment methods were developed to: (1) identify the potential impacts of a proposed development on the social and natural environment; (2) predict the probability of these impacts and (3) evaluate the significance of the potential impacts. The methodology used by Cabanga is as follows:

The status of the impact		
Status		Description
Positive:		a benefit to the holistic environment
Negative:		a cost to the holistic environment
Neutral:		no cost or benefit
The duration of the impact		
Score	Duration	Description
1	Short term	Less than 2 years
2	Short to medium term	2 – 5 years
3	Medium term	6 – 25 years
4	Long term	26 – 45 years
5	Permanent	46 years or more
The extent of the impact		
Score	Extent	Description
1	Site specific	Within the site boundary
2	Local	Affects immediate surrounding areas
3	Regional	Extends substantially beyond the site boundary
4	Provincial	Extends to almost entire province or larger region
5	National	Affects country or possibly world
The reversibility of the impact		
Score	Reversibility	Description
1	Completely reversible	Reverses with minimal rehabilitation & negligible residual affects
3	Reversible	Requires mitigation and rehabilitation to ensure reversibility
5	Irreversible	Cannot be rehabilitated completely/rehabilitation not viable
The magnitude (severe or beneficial) of the impact		
Score	Severe/beneficial effect	Description
1	Slight	Little effect – negligible disturbance/benefit
2	Slight to moderate	Effects observable – environmental impacts reversible with time
3	Moderate	Effects observable – impacts reversible with rehabilitation
4	Moderate to high	Extensive effects – irreversible alteration to the environment
5	High	Extensive permanent effects with irreversible alteration
The probability of the impact		

Score	Rating	Description
1	Unlikely	Less than 15% sure of an impact occurring
2	Possible	Between 15% and 40% sure of an impact occurring
3	Probable	Between 40% and 60% sure that the impact will occur
4	Highly Probable	Between 60% and 85% sure that the impact will occur
5	Definite	Over 85% sure that the impact will occur
The Consequence		= Magnitude + Spatial Scale + Duration + Reversibility.
The Significance		= Consequence x Probability.

The rating is described as follows:

Score out of 100	Significance
1 to 20	Low
21 to 40	Moderate to Low
41 to 60	Moderate
61 to 80	Moderate to high
81 to 100	High

Will mitigation be possible? Yes or no?

Finally the negative impacts are rated according to the degree of loss of a resource due to the particular impact. This is only assessed from the pre-mitigation perspective of the impact. The degree of loss of a resource is evaluated in terms of:

- Low degree of loss: where the resource will recover on its own with no/limited rehabilitation over an observable period of time;
- Moderate degree of loss: where the resource will recover over extended period or with rehabilitation or remedial measures to assist recovery of resource; and
- High degree of loss: Where the resource cannot be recovered, or the resource will recover over extended time periods.

9.3 Impacts of Proposed Activity and Alternatives

As stipulated under the alternatives assessment, site layout and associated design is limited due to limited space on site where mining is not proposed. A summary discussion is provided in Table 39 in terms of advantages and disadvantages of the initial site layout compared to the final layout as presented within this EIA / EMP report (mine plan, Appendix 2) so as to accommodate impacts identified by specialists and concerns raised by affected parties where possible.

Table 39: Impact assessment of mine infrastructure and layout options

Alternatives	Advantages	Disadvantages
Alterations to mine plan as result of specialist studies		
Northern Siding and railway link – is preferred	Less Sensitive and Less unique floral habitats will be disturbed. Less wetland areas and buffer zones will be disturbed. No river crossings are required and therefore less physical disturbance to the Sandloop River. Due to the proximity of the Northern siding to the processing plant, the cost of transport to the siding is reduced which has obvious economic benefits. Furthermore, as the siding is closer to the processing plant, the impacted footprint is more localised and therefore can be managed as a single mine footprint area rather than two separate sites. Due to the fact that the siding and processing sites can be managed as a single dirty footprint rather than two isolated sites there will be less cumulative edge effects. Specialist studies either indicated that the Northern Siding is preferred or no preference was expressed. No specialist indicated a preference for the southern siding and railway link.	Northern Siding creates limited space for beneficiation and coal product stockpiling area. Northern siding still infringes the riverine area (approximately 400m of railway) of the Sandloop River. Final layout and siding size (dependent on final wagon feed to site) must be investigated to see if the area and 100m buffer zone can be fully avoided. If not IWUL is required to construct the section of the siding in the riverine area.
West Pit	The eastern boundary of the West Pit has been reduced in order to fully preserve the riverine area and 100m buffer zone, and allow the establishment of a protective berm just outside the 100m buffer zone (to act as buffer demarcation and additional protective measure for the wetland area). Riverine area will therefore be preserved and protected in situ.	Reduced coal resources which has overall financial reductions for the mine.
Magazine	Magazine has been relocated approximately 250m west of its original location to ensure the magazine is outside identified 100m buffer zones of pans and drainage area identified in the area. Therefore far north eastern pan and drainage line and associated 100m buffer zones will be preserved. Travel distance to the magazine reduced.	None
Eastern Material Stockpile	The mine will attempt to limit the eastern stockpile area to the extent south of the pans (Mine Plan – Appendix 2) if the site can accommodate the volume of material needed for storage. Preserve all pans and 100m buffer zones in situ.	Stockpile area may not accommodate the volume of material.
	If the pans are required for stockpiling, no activity will take place in any of the pans until the necessary IWUL is obtained to do so. Stockpile area will accommodate the volume of material.	Damage and permanent loss of one pan and sever edge effects to three other pans.
Other alternatives proposed by I&APs		
I&APs are either in full support or completely against the mining development in general. I&APs generally have only raised concerns about impacts and problems, but very little has been offered in terms of actual mitigation measures or alternatives to the proposed development and activities. Proposed mitigation measures for issues identified by I&APs are detailed below.		

Temporary discard disposal to surface	As it will take some years to attain backfilling, temporary disposal to surface is required. Facility must be engineer designed and spontaneous combustion maintained by maintaining discard moisture, applying sealing layer, especially on the side facing the dominant wind direction.	Additional financing will be required.

9.4 Possible Mitigation Measures for I&AP-Identified Impacts

The proposed mitigation measures or alterations that could be implemented specifically to address issues and concerns raised by I&APs are summarised below and discussed in terms of overall risks if these mitigation measures are implemented on site.

Issue raised	Mitigation measures considered including alternatives	Risks associated with proposed mitigation measure
Increased traffic and associated safety risk to road users. Damage to public roads.	Access to the mine will be via existing roads located near Onverwacht. Access will be via Nelson Mandela Drive and no residential roads will be utilised by mine vehicles. The road on Groothoek will need to be diverted around the East Pit and any farmers utilising this road will still have access along this road. Coal transport off-site will be via rail. This means that once machinery and trucks are on site, they will remain on site for the duration of construction and/or operations and will not move to and from site. Mine personnel driving normal vehicles will access town and residential areas as they are likely to be residents in the area. A traffic impact assessment is being completed to determine the extent of impact on traffic. This will be made available as soon as it is completed. If there is a need to utilise the road in future, the land owners / users will be consulted further. Mitigation measures included to date include: • Speed limits will be established on the dirt road. Drivers, contractors and visitors will enforce speed limits. • Intersections with main tarred roads will be clearly signposted. • Trucks will be in road-worthy condition with reflective strips. • A fund will be set aside to maintain the serviceability of the road verge where the trucks approach or depart from the main road.	No risk at this stage. The traffic assessment is however still outstanding.
Water quality and quantity (boreholes and rivers) in the area.	Groundwater assessment indicated that existing baseline groundwater quality exceeded SANS Drinking Water Quality Guidelines for some parameters. These are largely due to the geology of the area, although	No risk at this stage other than the cost of replacing

Issue raised	Mitigation measures considered including alternatives	Risks associated with proposed mitigation measure
	some coal related contamination was observed due to exiting mining and power generation activities. Groundwater contamination transport model indicates that only the mine monitoring boreholes will be impacted at the end of operations. After closure these plumes will continue to develop. After 50 years this plume will still remain very localised. Leach test results show that no element concentrations are expected to exceed the IFC effluent quality guidelines, or the GN635 (2013) Leach Test LCT0 quality guideline. The only borehole that may be affected is the borehole on the far south eastern corner of the farm Peerboom. This borehole will also suffer from dewatering. This is an Eskom monitoring borehole and discussions will need to be held with Eskom regarding their need to relocate this monitoring borehole. The Plume from the West Pit may seep into the Sandloop River, but baseflow that seeps into the stream will not exceed the IFC effluent quality guidelines, or the GN635 (2013) Leach Test LCT0 quality guidelines and will be diluted by the stream water, thereby further reducing the element concentrations below the water quality guidelines. Surface water quality was within standards except for sample in Sandspruit downstream of Eskom Matimba PowerStation. As GCMC is not currently active in the area, they cannot be held responsible for the current status of water quality in the area and cannot be expected to mitigate this at this stage. Water quality management has been included in the EMPr and focusses around GN704 mine water management principals where relevant, which includes containment of mine water. Groundwater and surface water monitoring and biomonitoring has also been included within the EIA/EMPr under Section 29.1.	borehole BH8.
Socio-economic impacts on local businesses and livelihoods	The socio-economic impact assessment has been completed. As much as individual existing businesses were not evaluated, local business development will experience a positive impact from the development of mining activities in the area, as long as mines support local services and suppliers. GCMC will make every effort to maintain open negotiations to come to a mutually agreed upon solution with local businesses and try to maintain sensitivity to local business development, particularly any businesses being operated on the proposed mine	The main risks will be legal and financial in nature if agreements cannot be reached.

Issue raised	Mitigation measures considered including alternatives	Risks associated with proposed mitigation measure
	property. GCMC will need to consider mutually agreed compensation for the properties and businesses on those properties directly affected by mining.	
Impacts on fauna and flora, specifically with regards to the nearby SPCA	The SPCA has been identified as a sensitive receptor with regards to noise and blast impact and will be a key I&AP to maintain discussions with. It must be stated that blast impacts can be mitigated and noise is not deemed to be excessive compared to current baseline readings, but the site will continue to be monitored. The site is predominantly upwind and dust impacts will be intermittently experienced when wind direction changes, although the north westerly winds are less strong. As far as blast impacts to animals, it is generally stated that most of the common animals and wildlife will habituate to the noise and blasts. The main impact to flora that will require serious mitigation is the removal / destruction of protected plants on site. A permit will need to be obtained and other mitigation measures could include collecting seeds (also requires a permit) of protected plants before removing these and establishing a nursery to try and replace some of the species during rehabilitation and transplanting any young saplings where it is feasible to do so. GCMC will make every effort to be sensitive to local organisations operating in the area.	Change in blast designs requiring reduced charges may slow down mining progress. Additional costs will be required to properly plot all protected species for which a permit for removal / destruction will be required. The nursery would also be an additional cost but will create additional employment and could be established as an SMME.
Blasting and associated property damage; as well as issues regarding the dust and related health issues. Furthermore the poor foundations of RDP housing, specifically in Marapong, were brought up for consideration in blast and vibration assessments.	Blast study has indicated the following points as areas where blasting needs to be mitigated (reduced charge must be applied; distance of blasting must be considered; or the mine must consider relocating individuals where feasible): • Farm Buildings/Structures (Point 79 in Plan 48) adjacent to the northern boundary – all blasting within 459m of the site must be conducted at reduced charge of 748kg/charge. • Farm Buildings/Structures (Point 82 in Plan 48) on Eendracht – cannot be mitigated by reduced charge, however GCMC will purchase this property and buildings. • D1675 Road (Point 85 in Plan 48) adjacent to the southwestern corner of the West Pit – all blasting within 155m of the site must be conducted at reduced charge of 850kg/charge. • Buildings/Structures (Point 116 in Plan 48) adjacent to the southern boundary – all blasting within 459m of the site must be	As can be seen, the blast impact can be mitigated in all circumstances by reducing blast charge within the specified diameters. The only instance where this is not the case is the farm house on Eendracht and the boreholes which will be owned and operated by GCMC and will not affect other I&APs. Change in blast

Issue raised	Mitigation measures considered including alternatives	Risks associated with proposed mitigation measure
	conducted at reduced charge of 119kg/charge. • Informal Housing (Point 121 in Plan 48) south of the East Pit – all blasting within 459m of the site must be conducted at reduced charge of 655kg/charge. • Buildings/Structures (Point 131 in Plan 48) east of East pit – all blasting within 1089m of the site must be conducted at reduced charge of 1723kg/charge. Area shielded from air blast by East Material Stockpile. • Buildings/Structures (Point 132 and Point 134 Plan 48) east of East pit – all blasting within 459m of the site must be conducted at reduced charge of 1264 / 1216kg/charge respectively. • Buildings/Structures (SPCA Lephalale) (Point 135 in Plan 48) southeast of East pit – all blasting within 459m of the site must be conducted at reduced charge of 719kg/charge respectively. • Potential Bull frog habitat (Point 157 in Plan 48) – all blasting within 682m of the site must be conducted at reduced charge of 646kg/charge respectively. It must be stressed that after 2012 and 2015 surveys these species are still unconfirmed and are unlikely to be associated with these pans. • 4 mine boreholes (Points176-179 in Plan 48) have been identified as sensitive points for blasting. It must be stressed that these boreholes are mine monitoring boreholes and will be maintained by the mine throughout operations. Blasting impacts to these sites will result in the mine re-drilling the sites and bears financial implications to GCMC only. • Refuse Site (Point 197 in Plan 48) – all blasting within 301m of the site must be conducted at reduced charge of 674kg/charge respectively. • 200 -Communication Tower (Point 200 in Plan 48) adjacent to the southwestern corner of the West Pit – all blasting within 459m of the site must be conducted at reduced charge of 179kg/charge respectively. Health issues are assessed in the socio-economic assessment, to be addressed through the implementation of a Health & Safety Orientation Programme. It must be stressed that health impacts	designs requiring reduced charges may slow down mining progress. Implementing a Health & Safety Orientation Programme would be required in terms of the MHSA regardless. So no additional risks. Additional financing and infrastructure may be required to manage dust more effectively.

Issue raised	Mitigation measures considered including alternatives	Risks associated with proposed mitigation measure
	will occur with any other mining development in the greater area and is not an isolated impact associated with GCMC' s proposed Waterberg Project. The air quality dispersion assessment is presented in Section 9.1.7. The mitigated scenario indicates very standard and basic road wetting and water spraying practices only. Areas where exceeded levels were noted in the mitigated scenario (excluding cumulative dust levels based on current levels which already exceed threshold levels) and where additional mitigation may be required includes: • Northern and western boundaries of Eendracht for dust and PM2.5 during operations, but does not reach Marapong or Matimba where levels remain at baseline. Dust source is predominantly processing area and stockpiles. • PM10 shows similar trends as above with the additional exceedance at the northern boundary of Groothoek. • Additional mitigation can include mist sprays at crushing facility, screens from prevailing wind directions around dust generating stockpiles, dust binding agents on regularly used roads, vegetating all exposed soils.	
Potential depreciation in the value of property.	This area has been targeted as a power generation / coal mining hub and development over the last 5 to 10 years has been geared towards this industrialisation. Furthermore property throughout South Africa has gone through severe fluctuations over the last 10 years and is currently on the lower end of the market due to economic uncertainty. Lastly, as per the integrated development plan (IDP) report (2014-2016) for Lephalale, the property development exceeded requirements for the upper market housing segment, meaning that there are more properties available on the market than current need dictates. This will negatively affect housing prices, which can only be negated by creating development in the town that will bring new home buyers into the area. The 2013 CBD Plan states that the council should monitor residential expansion to ensure that leapfrog development is strongly discouraged and that infill residential development is consolidated within the existing urban footprint. The 2014/15 development plan goes on to state that lower income housing and rental property availability is low and therefore there is higher demand for these in the area. This should drive prices up in both these sectors. This is somewhat confirmed in the article in the Business Day Live (24	No risk as GCMC cannot mitigate property value, especially seeing as they are not yet an active entity in the area.

Issue raised	Mitigation measures considered including alternatives	Risks associated with proposed mitigation measure
	February 2014) which stated that Lephalale is one of the most expensive rental areas in South Africa, likely due to the high demand and low availability of property (http://www.bdlive.co.za/business/property/2014/02/24/lephalale-landlords-in-the-pound-seats). As much as the mine may reduce property value to very nearby properties, it is expected that the proposed town growth will bring an influx of buyers that may negate the depreciation to some extent.	
Proximity of the mine to the town and residential areas	The main proximity issue identified was blasting and air quality. Air quality is discussed above and areas identified above will require additional mitigation measures as stipulated above. The blast and vibration impact assessment is detailed above and can be mitigated for all identified points of interest. It must be stated that Lephalale is a focus area for coal and power generation development, which is iterated in the EMF and CBD Plan, where town and mining development areas neighbour each other.	Change in blast designs requiring reduced charges may slow down mining progress. Additional dust management measures will require additional operational budget.
Potential isolation of Marapong.	The municipality has plans to create a link to Marapong from Onverwacht as indicated in the SDF Plan. The mine infrastructure will not affect the proposed link as can be seen in the SDF Plan, Plan 21. GCMC would also be happy to assist with any diversions that may be required.	No risks anticipated. GCMC will support the municipality with the development of the link where possible.
Impact on the tranquillity and visual aesthetics of the Camelot Estate. The town, including Camelot, will experience a lot of dust due to mining and the wind direction.	The East Overburden Stockpile will create a visual, noise and airblast screen for the Camelot Game Lodge residents as well as a noise and air blast buffer. As per the blast design, ground vibration in this area will not be problematic and can be mitigated where needed. Furthermore, Camelot is upwind and will experience little dust impact as supported by the air quality impact assessment. Mitigation has included for vegetating of the stockpile on the eastern side which faces Camelot, or planting indigenous trees to block the view.	Potential additional costs associated with reducing visual impact of the overburden stockpile, such as seed netting.
Spon. com – burning coal and stockpiles.	GCMC is planning to backfill discard. Discard dumps are the highest risk for spontaneous combustion and by backfilling at the base of pits, the risk for spontaneous combustion is greatly reduced. Backfilling is seen to pose a greater risk to groundwater by many individuals, but these impacts also exist with surface dumps as water percolates through the dump into the groundwater table, and is then more likely to affect the shallower aquifers utilised by farmers.	The risk at this time is difficult to quantify. If DWS do not permit backfilling, then surface dumps will be required, which will require space and

Issue raised	Mitigation measures considered including alternatives	Risks associated with proposed mitigation measure
	The EMPr specifically stipulates to ensure quick turn-around of ROM and product coal on site to prevent burning coal on site. Temporary discard disposal to surface will be done in an area sheltered from wind as far as possible. The side of the dump will continuously be cladded with subsoil, especially sides exposed to wind. These measures should reduce the risk of spontaneous combustion as the discard will only be on site for 3-5 years once backfilling activities can commence. Furthermore the site will be very regularly inspected for signs of spontaneous combustion.	additional finances and a spontaneous combustion management plan will need to be implemented.
Noise and associated impacts.	Main noise receptors identified include the SPCA, the farm property adjacent to the northern boundary of Groothoek and the residential structures due south and immediately adjacent to Groothoek East Offices. Mitigation measures must be implemented to reduce excessive noise levels at these points, such as operating during specific hours of the day when activity is within 500m of these sites, using quitter equipment and considering noise screens.	May be additional financial implications to GCMC to implement additional noise reducing measures.
Heath risks associated with mining.	Health risks are directly associated with dust and water quality, elevated noise levels, especially at night, and direct danger to a person through fly rock, traffic incidence or negligent behaviour by the mine or the affected person. The environmental issues (dust, noise, traffic) have already been detailed in the table. The mine will follow the necessary industry best-practice evacuation procedures for blasting to reduce risk to human life. The mine will apply environmental awareness training and induction on site to prevent negligent behaviour by persons on site. The mine will prevent access to dangerous areas and will include relevant signposts at dangerous areas to reduce the possibility of negligent behaviour by other persons.	No additional risk to GCMC at this stage.
Possible impact on nearby cave paintings at Klip Koppie.	Assumed to be Nelson's Kop, which is a small Heritage Site near the Exxaro Coal Grootegeluk Mine in Lephalale. Nelson's Kop includes engravings of small animal spoors, cupules and other incisions on the faces of the koppie. This has been identified and is highlighted in the proximity plan – Plan 3 and Plan 4.	No additional risk to Heritage Site as the site is approximately 5.46km away from the proposed mine.
Impacts to the Lephalale Cemetery.	The cemetery has been identified as a sensitive receptor. A management plan must be compiled and implemented for this site as per the heritage specialists.	Additional financial implications to GCMC to compile a PHASE II Heritage Site Conservation and

Issue raised	Mitigation measures considered including alternatives	Risks associated with proposed mitigation measure
		Management Plan.
Concerns raised regarding the on-site municipal dump and the proposed expansion of the dump by the municipality.	GCMC has been in regular communications with the municipality and is aware of the proposed expansion. The mine will in no way impact on the dump and associated activities and the proposed expansion. Dust levels and noise levels at the site will be elevated. Additional dust management measures may need to be applied as stipulated above, although it is expected that the staff working the facility are already provided with PPE for dust, fumes and odours.	May be additional financial implications to GCMC. Through its SLP, GCMC has proposed the fencing of the current dump and support of recycling SMMEs around it, and the establishment of a new dump at an alternative site.
Concern raised about the equestrian club and its possible relocation.	GCMC is aware of the issue and has held discussions with relevant parties as part of the public consultation process. Exxaro will most likely look after the future of the equestrian facility.	No risks identified at this stage.
Potential sewage impacts on the Sandloop River and the community.	Sewage system will be an enclosed system, with only a minimal amount of sludge created annually which will be disposed of at approved waste facility. Water effluent from the sewage treatment facility will be recycled to process water.	No risks identified at this stage.
Potential impacts on the air flow of the air cooling condensers located at the Matimba power station. Impacts to Eskom's 22kV power line traversing the properties.	Due to the predominant wind direction, Matimba Power Station should be minimally impacted and development and activity in Marapong will impact more so than the proposed mine development if dust mitigation measures are properly implemented on site. This is supported by the air quality dispersion modelling as already addressed above. Dust monitoring will be undertaken as described in section 29.1 to monitor actual dust levels in comparison to the model findings and to determine if management measures as described above need to be implemented on site or if existing dust management measures need to be applied more frequently. The power lines are indicated in the locality plan (Plan 2). The power lines abut the south western corner of Eendracht and will not be directly affected. They will also not be impacted by blasting as per the blast impact assessment.	Legal contraventions in terms of hindering the objectives of NEMA and MPRDA if coal resources are sterilised and not secured for national energy demands.
Potential impacts with regards to the change in land use – specifically with regards to the SDF, Waterberg EMF and	Section 8.1.1.14 details these issues. Plan 22 of the EIA/EMPr includes the mine area overlaid onto the SDF (2012) and the Waterberg EMF (2011) and also included is the latest Lephalale CBD	Monetary losses for GCMC should mining be prohibited on the property.

Issue raised	Mitigation measures considered including alternatives	Risks associated with proposed mitigation measure
Limpopo Conservation Plan (C-Plan). The Municipal councillor is concerned with the proximity of the mine to the proposed Altoostyd development.	Plan (2013) which indicates the municipality's acknowledgement that the area may be developed into mining land. The Limpopo Conservation Plan (specifically termed Version 2 and not yet available on the SANBI website) is assumed at this stage to be a draft version. Furthermore, the C-Plan essentially omits the entire area from either mining or residential development and has therefore not considered the Waterberg EMF or the municipal SDF. This is in contradiction to Section 48(1) of NEM:BA, a bioregional plan (the main purpose of the Limpopo Conservation Plan) may not be in conflict with: (b) Any integrated development plans adopted by municipalities in terms of the Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000); (c) Any spatial development frameworks in terms of legislation regulating land-use management, land development and spatial planning administered by the Cabinet member responsible for land affairs; and (d) Any other plans prepared in terms of national or provincial legislation that are affected.	Legal contraventions to future land developer in terms of NEA and MPRDA if coal resources are sterilised without necessary permissions. Legal compliance with the NEA and the MPRDA if mining is allowed.
The Municipal Manager is concerned that Lephalale has been selected as a distressed mining town which forms part of the Special Presidential Package and Human Settlement Plan. Air pollution is a major concern and the mine will alienate Marapong from Onverwacht.	The air quality assessment (Appendix 3) acknowledges that the area is within an air quality priority area due to the existing air quality problems in the area. The air quality dispersion modelling shows that with just basic dust management on site, dust levels and PM10 can largely be contained on site (considering emissions from site alone and not the cumulative air quality, which would be exceeded as the site already exceeds limits without the proposed development plan). Sections 26 to 29 detail the air quality management plan which considers additional management measures over and above the basic wetting of roads as modelled in the dispersion assessment. Furthermore, the Municipal Air Quality Management Plan, once promulgated will be implemented on site as needed. Additional management measure that will be considered at sensitive sites where excessive dust may occur includes: • Manage dust through water carts or sprinklers. • Speed limits must be established on roads to reduce dust. • Stockpile heights must not exceed 2m for topsoil, 3m for coal stockpiles, 6m for subsoil and 25m for overburden, ensuring lower heights for finer-particle stockpiles, thereby	Additional budgetary requirements from running costs to implement any additional measures that may be needed as per the Municipal Air Quality Management Plan.

Issue raised	Mitigation measures considered including alternatives	Risks associated with proposed mitigation measure
	reducing dust dispersion distance. • Vegetate soil stockpiles and all exposed areas. • Manage dust through water carts or sprinklers. • Consider reducing activities when windy. • Consider windbreaks, enclosures, shelters or misting of very dusty areas. • Screens from prevailing wind directions around dust generating stockpiles can be considered. • Dust binding agents on regularly used roads can be considered. NOTE: Predominant wind direction will ensure that most dust deposition will be immediately west of the western boundary of the proposed Waterberg Project and will not directly affect communities. Additional measures are proposed for additional particulate emissions that may impact the western sections of Onverwacht, including possible mist spraying and screens if recorded data indicates issues.	
The Municipal Manager highlighted that Lephalale does not have a licensed hazardous landfill site.	The hazardous waste generated at the proposed mine will be disposed of at a registered disposal facility.	GCMC accepts the additional costs that may be associated with transportation of such waste to the relevant facility.

9.5 Motivation where no Alternative Sites were Considered

As stipulated above, the extent of mining and the type of mining is limited by the extent and depth of the coal resource, which has limited space on site for other infrastructure.

As much as it is a requirement under GNR632 of NEM:WA to complete an alternatives assessment for mine residue stockpiles, in this case the area is very limited, and as per standard industry practice, the material stockpiles have been located at the final void where the said material will be utilised in the rehabilitation of the final void. This reduces material transport costs and impacts associated with material transport and handling over distances. Therefore, no further assessment of alternatives has been completed regarding the location of the stockpiles for the East and West Pits. The slurry dam will be located in close proximity to the beneficiation plant as this again reduces potential impacts with slurry pumping, handling and transport over distances. Furthermore dried slurry will be stockpiled temporarily in the product stockpile area for blending into coal product. It must be stressed that no

permanent residue deposits are anticipated and all mine residue stockpiles will be re-used for rehabilitation purposes (backfilled) or, in the case of slurry, sold as product.

9.6 Statement Motivating the Alternative Development Location within the Overall Site

As stipulated above, the extent of mining and the type of mining is limited by the extent and depth of the coal resource, which has limited space on site for other infrastructure.

Northern Siding and railway link – is preferred:

- Less Sensitive and Less unique floral habitats will be disturbed.
- Less wetland areas and buffer zones will be disturbed.
- No river crossings are required and therefore less physical disturbance to the Sandloop River.
- Due to the proximity of the Northern siding to the processing plant, the cost of transport to the siding is reduced which has obvious economic benefits.
- Furthermore, as the siding is closer to the processing plant, the impacted footprint is more localised and therefore can be managed as a single mine footprint area rather than two separate sites.
- Due to the fact that the siding and processing sites can be managed as a single dirty footprint rather than two isolated sites there will be less cumulative edge effects.
- Specialist studies either indicated that the Northern Siding is preferred or no preference was expressed. No specialist indicated a preference for the southern siding and railway link.

The eastern boundary of the West Pit has been reduced in order to fully preserve the riverine area and 100m buffer zone, and allow the establishment of a protective berm just outside the 100m buffer zone (to act as buffer demarcation and additional protective measure for the wetland area). Riverine area will therefore be preserved and protected in situ.

Magazine has been relocated approximately 250m west of its original location to ensure the magazine is outside identified 100m buffer zones of pans and drainage area identified in the area. Therefore far north eastern pan and drainage line and associated 100m buffer zones will be preserved. Travel distance to the magazine reduced.

The mine will attempt to limit the eastern stockpile area to the extent south of the pans (Mine Plan – Appendix 2) if the site can accommodate the volume of material needed for storage. If the pans are required for stockpiling, no activity will take place in any of the pans until the necessary IWUL is obtained to do so.

As it will take some years to attain backfilling, temporary disposal to surface is required. Facility must be engineer designed and spontaneous combustion mitigated by maintaining

discard moisture, applying sealing layer, especially on the side facing the dominant wind direction.

9.7 Assessment of Each Identified Potentially Significant Impact and Risk

Where an impact is as a result of overall surface activities as a whole, then this has been discussed once under “all infrastructure areas”. Where impacts are specific to the footprint development or activity then this is discussed under the specific activity / infrastructure (Table 40). The full impact assessment table is presented in Appendix 16 and as per the requirements of this section, only impacts of moderate, moderate to high and high significance are summarised below. It must also be stressed that the pre-mitigation impact significances as reported by the specialists have not been altered, despite the fact that the mine plan has been changed in certain circumstances to reduce impact. Instead this has been included as part of the mitigation measures within the impact table and the post-mitigation significance has then been altered where relevant.

Table 40: Summary impact assessment table

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
All infrastructure areas, development footprints and associated activities	Excavation and creation of infrastructure foundations and servitudes will alter the topographical nature of the site and associated drainage.	Topography	Construction Operational Decommissioning	Moderate	**REMEDY** Rehabilitate all disturbed areas when they are no longer needed, including contouring areas properly to ensure no pooling of water on site. **CONTROL** Complete pre-mining topographical surveys to aid in compilation of rehabilitation plan. Demarcate designated activity area as small as possible and maintain activity within this area only. Establish approved erosion control measures to reduce the risk of formation of erosion gullies. Install flow dissipaters in any areas where concentrated runoff flow is experienced, including silt traps in areas where flow becomes laden with sediment.	Moderate-Low
Opencast excavations	Altered topographical nature and associated drainage.	Topography	Operational Decommissioning	Moderate	**REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as soon as steady state mining is achieved. **CONTROL.** Compile a full rehabilitation model before any mining commences on site and apply on site throughout life of mine. Demarcate designated activity area. Conduct soil handling as per soil utilisation guide in the soil report. Rehabilitated areas must be contoured and free draining to prevent ingress and pooling of water.	Moderate
ALL material stockpile areas	Stockpiles will change the topographical nature of the area.	Topography	Construction, Operation, Decommissioning	Moderate	**REMEDY** Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berms to shield visual impacts or divert clean water runoff from site. Ensure rehabilitation is continuously completed in a roll over fashion as soon as steady state mining is achieved to reduce need and extent for surface material stockpiles. **CONTROL** Stockpile heights must not exceed 2m for topsoil, 3m for coal stockpiles, 6m for subsoil, 25m for overburden. Move coal stockpiles on a first-in-first-out basis to reduce extent of coal stockpile areas. Coal stockpile and handling must be in designated areas only. Demarcate stockpile areas and strip soil from these areas. Conduct soil handling as per soil utilisation guide in the soil report.	Moderate-Low
Water storage (dams / reservoirs / tanks) & Slurry dam	Excavation of dams will alter topography and drainage patterns.	Topography	Construction, Operation, Decommissioning	Moderate	**REMEDY** Ensure dams are adequately sized and inspect, maintain and repair all water management features. **CONTROL** Necessary measure to ensure water separation and dirty water containment on site as per GN704 requirements. Slurry dam is a necessary measure to ensure slurry can be reclaimed for blending.	Moderate-Low
Opencast excavations	Alteration of the geological nature and sequence.	Geology	Construction, Operation, Decommissioning	Moderate-High	Nature of mining developments.	Moderate-High
Blasting	Cracks and disruption to	Geology	Operation	Moderate-High	**MODIFY** Alternative blasting methods will be considered to reduce outward impact.	Moderate

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	geological layers.				**CONTROL** Blasting specialists must be contracted. Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	
Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Alteration of the geological nature and sequence.	Geology	Operation, Decommissioning, Closure, Post closure	Moderate-High	**MODIFY** Alternative would be a permanent discard dump facility which would impact negatively on topography and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on visual aesthetics.	Moderate-High
All infrastructure areas, development footprints and associated activities	Loss in grazing potential, loss of soil and deterioration of soil characteristics.	Soil & Land Capability	Construction, Operation, Decommissioning, Closure	Moderate	**REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required and cordon off areas until vegetation has established. Revegetate all bare soils. Incorporate herbaceous vegetation into soil stockpiles. Ameliorate soils as needed to establish stable vegetation communities on rehabilitated areas. **CONTROL** Demarcate designated activity area and keep as small as possible. Strip topsoil from all activity areas and stockpile as berms as per mine infrastructure plan. Conduct soil handling as per soil utilisation guide in the soil report. Construct drainage and erosion controls in advance of mining activities. These can include gabion baskets, levees and reseeding of areas not being used. Divert storm water runoff away from areas with high erosion potential. Install silt traps and/or flow dissipaters as needed to prevent erosion and associated silt loading.	Moderate-Low
Topsoil & subsoil stripping & stockpiling	Loss of fertile topsoil layer.	Soil & Land Capability	Construction, Operation, Decommissioning	Moderate	**REMEDY** Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berm to shield visual impacts. As far as possible, plan soil stripping activities in the dry season. **CONTROL** Minimize the area which is disturbed at any one time. Topsoil and underlying material should be stored separately as per stripping guidelines. All excavated topsoil will be stored for use during rehabilitation of the mine. Topsoil should be stripped and stockpiled with herbaceous vegetation to retain organic content. All stockpiles / berms which will be in place for more than 6 months must be vegetated to reduce risk of erosion. Topsoil stockpiled as perimeter berms must not exceed 2 m. Subsoil stockpiles must not exceed not exceed 6 m in height. All stockpiles must have an outer slope of approximately 1 V: 3 H (to limit the potential for erosion of the outer pile face). Construct top perimeter berms on subsoil stockpiles. Cut off drain must be constructed upslope of all stockpiles. Seed all stockpiles - Seeding must be completed within seven (7) days of stockpiling.	Low
All infrastructure areas, development footprints and associated activities	Increased runoff and associated potential silt-loading and contamination of downstream water bodies and associated wetlands.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	Moderate	Apply soil management measures as stipulated above. **REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. **CONTROL** Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Clean and dirty water separation and dirty water containment features must be established on site. This will include upslope berms to divert clean water around the site of activity into	Low

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
					natural drainage lines and internal channels to drain dirty water from the active footprint to lined containment dams. Line all dirty water dams to prevent seepage. Line all trenches carrying high or continuous loads of dirty water runoff to prevent seepage. Establish protective berms between active areas and wetlands, outside wetland buffer zones, where activity is near to such areas. Road surfaces must be compacted in order to increase stability. Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed. Install flow dissipaters where rapid flow of diverted clean storm water runoff occurs as necessary. Install silt traps / flow dissipaters if necessary to trap silt in highly silt-laden runoff. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained where necessary.	
All infrastructure areas, development footprints and associated activities	Downstream water quantity of catchment reduced.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	Moderate	**REMEDY** Keep dirty water runoff areas as small as possible to increase clean water runoff footprint area. Runoff from the rehabilitated areas must be allowed to flow naturally to the environment as soon as such areas become stable. Upstream dewatering boreholes should be considered in order to minimise the creation of dirty water within the opencast pit, and this clean water should be used to recharge the natural systems downstream of the mining rights areas at a rate similar to the volume being contained in the dirty footprint. **CONTROL** Necessary measure to contain dirty water runoff.	Moderate
Infrastructure area & Opencast excavations.	Destruction of Sandloop River riparian wetland habitat and loss of wetland ecological status and functioning.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	High	**CONTROL** Demarcate designated activity area and demarcate 100m buffer zone from wetlands and rivers as no-go areas. Establish protective berms outside wetland buffer zones between wetlands and active areas. Where the riparian wetland will be impacted (section of the loop siding), the activity will only commence once all authorisation are in place to do so and activity will proceed as per the approved IWWMP. Area activity within the wetland will be maintained as small as possible Berms will be erected on the immediate downslope side of the loop siding where this infringes into the wetland area. The trains entering the wetland area will be empty (trains will enter the siding clockwise) to prevent potential coal spillages in the wetland area. Area will be kept clear of rubble, waste, spills at all times and vegetation within the area will be maintained as far as possible to reduce impact on ecological functioning. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**)	Moderate-Low
All Material stockpiles	Increased runoff and associated potential silt-loading of downstream water bodies and associated wetlands.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	Moderate	**REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. Apply soil management measures as stipulated above. **CONTROL** Conduct soil handling as per soil utilisation guide in the soil report. Vegetation removal must be over a minimal area as possible. All bare surface areas must be re-vegetated. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish approved erosion control measures such as top and toe berms around stockpiles. All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities.	Moderate-Low

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
					Stockpile heights must not exceed 2m for topsoil, 6m for subsoil and 25m for overburden. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes. All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities. Vegetate soil stockpiles.	
East Overburden stockpiles (non-carbonaceous & carbonaceous)	Destruction of pans.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	Moderate-High	**MODIFY** The eastern stockpile area should occupy the southern area (as indicated in the latest mine plan) in order to preserve the pans in the far north until such time that an IWUL is issued for activity in the pans. **CONTROL** Pans and 100m buffer zones should be preserved if IWUL to conduct activities in these areas is not granted. The following is relevant if pans remain in situ: Establish storm water control measures before any other activities commence to ensure clean water diversion around the pans. Establish approved erosion control measures such as top and toe berms around stockpiles to prevent sedimentation into the pans. **STOP** The pans can only be disturbed / destroyed once an IWUL is issued. Until such time, the eastern stockpile area must remain outside the pans and their 100m buffer zone.	Moderate-Low
Overburden stockpiles (carbonaceous) & RoM and product coal stockpiles	Increased risk of contamination through contaminated runoff to downstream water bodies and associated wetlands.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	Moderate	**CONTROL** Demarcate stockpile areas and manage as dirty footprint. Stockpile areas must be adequately prepared and compacted and be managed as part of the dirty water footprint area. Coal stockpile area will have a Class C lining system. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment from stockpile area.	Low
ALL coal handling, storage, processing and conveyance areas	Generation of coal dust and coal spillages could contaminate water bodies in neighbouring areas.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation	Moderate	**REMEDY** Coal spillages must be cleared. **CONTROL** Coal stockpile and handling must be in designated areas with compacted base and must form part of the dirty water footprint. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes. Manage dust through water carts or sprinklers. Wagons must not be overloaded and must be covered with tarpaulin. Trucks must not be overloaded.	Low
Water storage (dams / reservoirs / tanks) & Slurry dam	Contamination of surface water features with contaminated water runoff, ruptured dam walls.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation	Moderate	**REMEDY** Inspect, maintain and repair all water management features. Follow emergency response plan for spills. Keep back-up pumps and pipes on site. **CONTROL** Ensure water separation and dirty water containment on site as per GN704 requirements. Ensure all dirty water containment facilities are adequately sized, designed and constructed. All dams will be constructed and lined as per designs and managed with a 0.8m freeboard. All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs Slurry removed from dams will be stockpiled in the dirty footprint area and be blended into product or disposed of onto the discard dump in compacted layers.	Low
Water & slurry pipelines	Potential contamination of surface water features with burst pipelines.	Surface Water & Associated Wetlands & Aquatic	Construction, Operation	Moderate	**REMEDY** Inspect, maintain and repair pipelines and pumps. Follow emergency response plan for spills. Keep back-up pumps and pipes on site.	Low

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
		Ecosystems			**CONTROL** Pipelines should be laid in paddocks which will serve to contain any leaks. Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur. **STOP** Dirty water pipelines will remain outside 100m buffer zones / 1:100 year floodlines until authorisations under NWA have been obtained where needed.	
Stores, workshops & washbays & Hardpark & Fuel Storage	Potential hydrocarbon contamination of surface water. Potential contamination of surface water with indiscriminate use of contaminating materials (cement, chemicals, etc.).	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation	Moderate	**REMEDY** Oil from oil traps will be removed to the used hydrocarbon drum for removal from site by a reputable hydrocarbon waste contractor. Spill kits must be available on site and personnel trained to utilise these to clear spills. **CONTROL** Areas will be treated as a dirty areas and any runoff from sites must be contained. Maintenance of vehicles must be conducted on a demarcated area with a concrete slab and oil collection system. Cement will be handled over protected ground or sheeting. Chemicals will be stored as per requirements with the MSDS. Wet and dry chemicals, reducing and oxidising agents, will be stored separately. All diesel storage must be within concrete bunded areas that contain 110% of storage capacity if roofed or 120% storage capacity if not roofed; must be to SANS standards, refuelling areas will be over concrete platform. Bunds in workshop, washbay and fuel storage facility will be fitted with an outlet valve or drain to an oil trap. The outflow will flow through an oil trap and water component will be treated and recycled as process water. Oil from oil traps will be removed to the used hydrocarbon drums which will be temporarily stored in concrete bunded areas prior to removal from site by a reputable hydrocarbon waste contractor. All vehicles / machinery on site will be up-to-date with their service and maintenance plans. The use of persistently leaky equipment will be discontinued until repairs are made. Equipment will not be parked over bare ground; where unavoidable, drip trays will be placed under the equipment to collect potential leaks.	Low
Ablutions & change house with sewage treatment plant	Potential contamination of surface water bodies with sewage.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation	Moderate	**MODIFY** Alternative to utilise existing municipal facilities not feasible as these facilities are already highly stressed due to the growth of Lephalale. **REMEDY** Inspect and repair all aspects of the sewage treatment facility as needed, including any plumbing associated with the bathrooms and toilets. **CONTROL** Package Sewage treatment plant must be designed to have enough capacity. Standard operating procedure (SOP) will be devised and implemented for the sewage treatment facility. Bacterial assessment of all monitoring points downstream of the sewage treatment plant.	Low
All infrastructure areas, development footprints and associated activities	Increased risk of contamination through seepage from any contaminating surface material.	Groundwater	Construction, Operation	Moderate	Apply all surface water management measures as containment of dirty water on site within lined facilities will prevent seepage of contaminants to groundwater. **REMEDY** Keep all materials within properly prepared and designated areas and apply good housekeeping practices by keeping surface clear of all materials. **CONTROL** Ensure all storage areas for potentially contaminating material (coal, carbonaceous material, hydrocarbons, chemicals and various wastes) are designed and appropriately lined to reduce seepage.	Low
Opencast excavations	Alteration of weathered aquifer flow dynamics and reduction of local	Groundwater	Construction, Operation, Decommissioning	Moderate	**REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as per the rehabilitation plan. Ensure registered affected water users are compensated in some way with alternative water supply.	Moderate

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
	groundwater levels.				**CONTROL** Seal off individual seepage zones in the fractured rock. Reduce vertical flows into the underlying aquifers: seal floor using concrete lining; compact floor area.	
Opencast excavations & Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Generation of Acid Mine Drainage (AMD)	Groundwater	Operation, Decommissioning, Closure, Post-Closure	High	**MODIFY** Alternative would be a permanent discard dump facility which would still impact negatively on groundwater and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on topography and visual aesthetics. Treatment options for contamination plume: utilisation of a proposed water treatment plant; a pump and treat system to continuously pump the water from the rehabilitated workings to surface dams to keep the water levels below decant level; cut-off intercept drain installed until the hard rock is exposed to capture any seepage/decant and drain water to the PCD; retaining a final void. Passive treatment can also be investigated and the mine can establish passive water ponds/wetlands. Specific trees can be planted over the opencast working to keep water levels low and to take up contaminants. **REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as per the rehabilitation plan. Ensure registered affected water users are compensated in some way with alternative water supply. **CONTROL** Keep mining areas as dry as possible and replace and compact carbonaceous material at the bottom of the pit during rehab to ensure early flooding and oxygen displacement. Seal off individual seepage zones in the fractured rock. Rehabilitated areas must be free draining to prevent ingress of water.	Moderate-High
All infrastructure areas, development footprints and associated activities	Alien invasive establishment and bush encroachment.	Flora & Fauna	Construction, Operation, Decommissioning, Closure	Moderate	**REMEDY** Rehabilitate all disturbed areas and seed with local indigenous species. **CONTROL** Clear all vehicles coming to site of any vegetative material to prevent introduction and spread of potential alien and invasive species. Eradicate and control all alien invasive species, removing those identified during the specialist study before construction commences to prevent spread of these species. Mechanical methods should be utilised in preference to chemical methods. Dispose of the eradicated plant material at an approved solid waste disposal site. Compile and implement an alien and invasive species management plan. Leave as much natural vegetation intact as possible. Do not disturbed soil unnecessary. Ensure that areas outside of the operational footprint that were disturbed, are adequately rehabilitated and that dense stands of encroacher species are prevented. Develop a burning, cutting and/or grazing management plant with an ecologist which takes into account safety of the operation, local by-laws and national legislation, in order to effectively manage veld areas.	Low
All infrastructure areas, development footprints and associated activities & Opencast excavations	Loss of biodiversity, degradation of vegetation and fragmentation and loss of ecological corridors through vegetation clearance and activity in pans.	Flora & Fauna	Construction, Operation	Moderate-High	**REMEDY** Rehabilitate all disturbed areas. Revegetate all bare soils. Consider establishment of a nursery in which to store some of the local indigenous flora for use during rehabilitation. Incorporate herbaceous vegetation into soil stockpiles. **CONTROL** Demarcate designated activity area to ensure only flora in that area is affected. Prioritise low sensitivity areas and then conduct activities in medium sensitivity areas. An independent Ecological Control Officer (ECO) should be appointed to oversee construction. The ECO should be knowledgeable on the protected species that may occur within the development footprint as per the identification guide (Appendix D of the ecological report attached as Appendix 9). Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new	Moderate-Low

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
					routes through naturally vegetated areas. Prevent access to sensitive environs, particularly pans and the Sandloop River. Apply soil management measures to provide adequate substrate for vegetation establishment and growth. Apply surface water management measures to ensure ecosystems associated with wetlands and streams are maintained. Maintain connectivity of ecological corridors as far as possible by protecting the Sandloop River and associated riverine vegetation. Staff / contractors may not tamper or remove these trees where they are not within the construction footprint. No open fires must be allowed on site such as for cooking. Prohibit the harvesting of trees for firewood. Do not hinder, harm, trap animals. Noise control measures will be applied. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**). Pans will be preserved in situ until IWUL is obtained to conduct activities in these areas.	
All infrastructure areas, development footprints and associated activities	Destruction of protected species.	Flora & Fauna	Construction, Operation	High	**REMEDY** As far as possible species (such as young saplings) should be transplanted or placed into nursery and replanted on site. A permit to collect the seeds of these trees could be obtained from DAFF and seeds can be grown in a small nursery on site to be replanted as part of rehabilitation. **CONTROL** Demarcate designated activity area and only remove species from the active area. Specialist will have to walk area and plot all protected species. Preserve all other species in situ. Staff / contractors may not tamper or remove these trees where they are not within the construction footprint. No open fires must be allowed on site such as for cooking. Prohibit the harvesting of trees for firewood. **STOP** Protected species cannot be removed until the necessary permits are obtained under NEM:BA. Northern rail link will affect fewer protected species.	Moderate-Low
All infrastructure areas, development footprints and associated activities	Alienation of, and disturbance to, animals and loss of roost and foraging sites for birds and bats.	Flora & Fauna	Construction, Operation, Decommissioning	Moderate	**CONTROL** Maintain connectivity of ecological corridors. Keep areas of tree clearance to a minimal in opencast areas and include a tree-planting in the rehabilitation plan. Do not hinder, harm, trap animals. Animals or protected flora under threat from the development will be relocated from site by specialists Noise control measures will be considered.	Moderate-Low
All water management features	Potential harm to sensitive flora in the riparian habitats associated with the Sandloop River through contaminated runoff and poor rehabilitation	Flora & Fauna	Operation, Decommissioning, Closure	High	**REMEDY** Contain all dirty water on site by establishing appropriately sized, designed and lined mine water dams on site. Line all dirty water dams to prevent seepage. Line all trenches carrying high or continuous loads of dirty water runoff to prevent seepage. **CONTROL** Demarcate designated activity area. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish protective berms / fence outside wetland buffer zones between wetlands and active areas. Establish clean water diversion berms upslope of activity footprint to prevent clean water runoff flowing onto site. Drain all water runoff on activity area to PCDs and dirty water containment features. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction /	Low

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
					earthworks in that area. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**). The northern rail way link and siding is preferred due to much smaller footprint encroaching into the buffer zone.	
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Lack of functional vegetation due to poor rehabilitation and associated downstream impacts on riparian vegetation	Flora & Fauna	Operation, Decommissioning, Closure	Moderate	**REMEDY** Rehabilitation must be on-going. Soil must be ameliorated in order to sustain a vegetative cover. Local indigenous species must be utilised during rehabilitation. AMD management plan must be implemented as per the groundwater management measures. The area should be re-landscaped and resemble the land form prior to the open cast activities. The areas should be planted with indigenous vegetation typical of the area and monitored to ensure that the vegetation progress through succession stages. Runoff water needs to be trapped by either the mechanical breaking of the soil surface to trap water, packing of stones, tyres or brush along contours to trap mulch, slow down water movement and reduce the impact on bare soil. Pitter basins work well on fine textured soil and must be orientated and shaped to face upslope. The basins trap seeds, organic matter and water which could lead to rapid colonisation after rains. Mulch and brush also reduces the force of raindrops, limiting the dispersion of clay and the extent of mineral crusting. It also traps dust, sand and seeds to ensure plant establishment. Monitoring of the rehabilitation success should take place for at least five years and include corrective follow-up action. It is recommended that Landscape Functional Analysis (LFA) forms part of the rehabilitation and monitoring process.	Low
All infrastructure areas, development footprints and associated activities	Dust generation and particulate matter.	Air Quality	Construction, Operational Decommissioning	Moderate-High	**REMEDY** Ensure rehabilitation and seeding is continuously completed in a roll over fashion. **CONTROL** Wagons must not be overloaded and must be covered with tarpaulin. Speed limits must be established. Stockpile heights must not exceed 2m for topsoil, 6m for subsoil and 25m for overburden. Vegetate soil stockpiles and all exposed areas. Manage dust through water carts or sprinklers. Consider reducing activities when windy. Consider windbreaks, enclosures, shelters or misting of very dusty areas.	Moderate-Low
Blasting	Dust generation.	Air Quality	Operation	Moderate-High	**MODIFY** Alternative blasting methods will be considered to reduce outward impact. **CONTROL** Blasting specialists must be contracted who are fully compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015). Blasts methods used to reduce outward impact radius. Blasting should not be conducted when it is very windy. Utilise free-digging as far as possible.	Moderate-Low
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Dust generation associated with material handling.	Air Quality	Operation, Decommissioning	Moderate	**REMEDY** Ensure rehabilitation and seeding is continuously completed in a roll over fashion. **CONTROL** Manage dust through water carts or sprinklers.	Moderate-Low

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
Opencast excavations	Loss of and disturbance to archaeological / heritage sites (Historic farmstead & Abandoned mine).	Archaeological/ Cultural Sites	Construction, Operational Decommissioning	Moderate-High	**CONTROL** Site must be properly document by specialists and permit must be obtained from SAHRA prior to destruction of site. **STOP** Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained. Should other sites / graves be uncovered on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialists will need to be consulted and responsible action considered, whether destruction / grave relocation / ceasing activity completely and maintaining site in situ.	Moderate
Opencast excavations	Loss of and disturbance to 3 graves associated with Site 5.	Archaeological/ Cultural Sites	Construction, Operational Decommissioning	High	**CONTROL** Permits must be obtained prior to relocation of sites (cemetery area with minimum of 2 graves). Site must be properly documented by a specialists and once permits are obtained the site can be exhumed and remains reburied. **STOP** Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained. Should other sites / graves be uncovered on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialists will need to be consulted and responsible action considered, whether destruction / grave relocation / ceasing activity completely and maintaining site in situ.	Moderate-High
Overburden stockpiles	Loss of and disturbance to archaeological / heritage sites (Site 3 - Historic farmstead / school Foundations).	Archaeological/ Cultural Sites	Construction, Operation Decommissioning	Moderate-High	**CONTROL** Site must be properly document by specialists and permit must be obtained from SAHRA prior to destruction of site (recent farm structure / school). **STOP** Consideration should be given to adjusting stockpiling areas to preserve site and 50m buffer in situ where possible. Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained.	Moderate
Overburden stockpiles	Loss of and disturbance to archaeological / heritage sites (Site 1 and 2 - stone age findings).	Archaeological/ Cultural Sites	Construction, Operation Decommissioning	Moderate	HIA report to be approved by SAHRA. No mitigation or permit required.	Moderate
Blasting	Vibrations may damage nearby heritage sites and the Lephalale Cemetery (Site 6).	Archaeological/ Cultural Sites	Operation	Moderate-High	**MODIFY** Alternative blasting methods will be considered to reduce outward impact. **REMEDY** A conservation management plan will be compiled for all sites that are not targeted for destruction or relocation and sites will be fenced off. Ensure heritage management plan includes procedures to compensate for damage. Ensure baseline photographs are taken of all structures within 1500m of the mine pits which may be impacted for photographic evidence prior to any blasting. **CONTROL** Evacuate 600m radius prior to blasting. Blasting specialists must be contracted. Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Moderate
All infrastructure areas, development	Deterioration in visual aesthetics.	Visual Aesthetic	Construction, Operation, Decommissioning	Moderate	**REMEDY** Visual screens (vegetated berms, trees or wind breaks) will be considered where necessary. All berms and soil stockpiles will be vegetated.	Moderate-Low

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
footprints and associated activities					Apply dust control measures and other environmental measures to ensure impact area is contained. Apply good housekeeping practices.	
Lighting	Increased visibility of the site.	Visual Aesthetic	Construction, Operation	Moderate	**REMEDY** Utilise lights in the orange and yellow light ranges rather than white. This has the added benefit of reducing strong light and dark contrasts which also has safety benefits for staff. **CONTROL** Conduct activities during day as far as possible. Ensure directional floodlights are utilised to reduce light pollution to surrounds and prevent these from shining directly on adjacent land users and road users.	Moderate-Low
Blasting	Ground vibration and airblast impact on houses (including SPCA)	Nearby Structures	Operation	Moderate	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area OR increase blast distance. **REMEDY** Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures. **CONTROL** Stemming control and audit, use proper stemming materials, Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Low
Blasting	Ground vibration impact on boreholes	Nearby Structures	Operation	Moderate	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area OR increase blast distance. **REMEDY** Drill new boreholes at similar locations and similar depths to continue with groundwater monitoring. **CONTROL** Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Low
Blasting	Ground vibration impact on roads	Nearby Structures	Operation	Moderate	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area. **REMEDY** Reroute the road if damage to the road is severe. **CONTROL** Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Low
Blasting	Fly Rock Impact on houses	Nearby Structures	Operation	Moderate	**REMEDY** Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures. **CONTROL** Stemming control and audit, use proper stemming materials, re-design of blasts.	Low
Blasting	Fly Rock Impact on roads	Nearby Structures	Operation	Moderate	**REMEDY** Reroute the road if damage to the road is severe. **CONTROL** Stemming control and audit, use proper stemming materials, re-design of blasts.	Low
All infrastructure areas, development footprints and associated	Change in land use to mining.	Land Use	Construction, Operation, Decommissioning	Moderate	Nature of mining activities. A change in land use rezoning to mining must be applied for with the municipality.	Moderate

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
activities						
All footprints & All activities	General health and safety - Air Quality.	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	Moderate	Apply management measures for air quality	Moderate-Low
All footprints & All activities	General health and safety - Noise	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	Moderate	Apply management measures for Noise & Nearby Structures (blast).	Moderate-Low
All footprints & All activities	Social ills - Disease	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	Moderate	**MODIFY** Ensure workers have information available and sign a “code of conduct” at the start of employment which gives an overview of acceptable behaviour and information regarding health & safety on the site. **CONTROL** GCMC should appoint a service provider or local NGO to develop, implement and manage a “Health & Safety Orientation Programme” which must include information on HIV/AIDS, TB, and alcohol abuse prevention, with all temporary and permanent workers on the site. This must include encouragement to connect with local community programmes and NGO’s, health training and information which can be provided on-site to workers at the start of the project.	Moderate-Low
All footprints & All activities	Proximity of mine to residential areas	Socio-economic, Health & Safety	Construction, Operation	Moderate-High	Apply management measures for Nearby Structures (blast) **REMEDY** Should any of these activities prove ineffective, and in the case of scientifically proven health and safety risks, the last resort would be to negotiate resettlement with the affected residents. **CONTROL** GCMC to continuously engage with affected communities regarding mitigation practices.	Moderate
All footprints & All activities	Property value	Socio-economic, Health & Safety	Construction, Operation,	Moderate	Note that mitigation would not be possible in this instance. Should GCMC decide to negotiate a buyout of affected properties as part of a mining housing scheme, this concern would effectively be managed. This option has however not been raised by any of the parties involved and as such, no mitigation measures are presented. NOTE: This area has been targeted as a power generation / coal mining hub over the last 5 to 10 years. Furthermore property in South Africa has gone through severe fluctuations over the last 10 years. Lephalale's development plan report states that the property development exceeded requirements, which will negatively affect housing prices in the area. There are many factors that will play a role in overall property value.	Moderate
All footprints & All activities	Sense of Place	Socio-economic, Health & Safety	Operation	Moderate	Apply management measures for visual aesthetics	Moderate-Low
All footprints & All activities	Impact on road infrastructure	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	Moderate	**MODIFY** Preference should be given to rail transport where ever possible **REMEDY** Part of the construction phase needs to include the continuous maintenance of the road to be able to handle the increase in traffic and excessive dust and noise as a result of the gravel roads. **CONTROL** Limit traffic to roads indicated specifically for the project. Limit use of unimproved roads to emergency use only. Instruct and require all personnel and contractors to adhere to speed limits to ensure safe and efficient traffic flow. Limit mine-related vehicle traffic on public roadways to off-peak commuting times to minimize impacts on local commuters.	Moderate-Low
All footprints & All activities	City development	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	Moderate-High	No mitigation can be applied. See Section 7.4.1.1.14 of the EIA report for full detailed discussion of municipal development plans. Communication with LLM must continue.	Moderate-High
All footprints & All activities	Matimba power station ACC's	Socio-economic, Health & Safety	Construction, Operation,	Moderate	Apply management measures for air quality	Moderate-Low

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE if not mitigated	MITIGATION TYPE	SIGNIFICANCE if mitigated
			Decommissioning			

The supporting impact assessment conducted by the EAP must be attached as an appendix, marked **Appendix 16.**

10 SUMMARY OF SPECIALIST REPORTS

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS INCLUDED	REFERENCE TO APPLICABLE SECTION OF REPORT
Soil, land capability & land use (Cabanga Concepts, 2015) Appendix 4	Land capability should be returned to Grazing on the proposed mining area; however a final post-mining land capability assessment and post rehabilitation performance assessment must be done progressively (annually) during the operational phase. Recommendations in the soil rehabilitation plan are to be strictly followed. Soil fertility status should be assessed through representative soil sampling and analyses in order to ensure optimal post-reclamation vegetative growth on reclaimed soils. The proposed opencast mining and either of the proposed railway links can proceed provided that all mitigation measures and monitoring actions in terms of soils, land capability, and land use are executed to ensure minimal degradation on the soil resource so as to restore productivity.	X	Section 28.1.1.3 for soil utilisation and rehabilitation Section 29.1.1 for soil monitoring Generally included in Sections 26-29.
Flora assessment (Dimela, 2015 & AGES, 2012a) Appendix 9 & Appendix 8 respectively	Although the southern link corridor includes a slightly higher percentage of transformed areas, it will traverse the Sandloop River, as well as *Spirostachys africana* (tamboti) stands that are considered as unique landscapes. By contrast, the northern railway link is shorter and will not traverse the Sandloop River. Although the northern link will traverse a larger section of CBA1 area, this area will also be affected by the mining processing plant and material stockpile and the vegetation in this area was classified as being of a medium sensitivity. Thus if the mining is approved, the northern railway link will concentrate the impacts and is therefore the preferred route. Mitigation measures in the report must be applied throughout the life of mine.	X	Section 28.1.1.3.4 for rehabilitation Section 29.1.2 for monitoring Generally included in Sections 26-29.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS INCLUDED	REFERENCE TO APPLICABLE SECTION OF REPORT
Fauna assessment (AGES, 2012a) Appendix 8	Floral mitigation measures must be applied to preserve faunal habitat and refuges. Detailed ecological impacts assessment of the proposed mining footprint (layout plan) on the fauna and flora of the area for the construction, operational and closure phases of the mine. Potential alternatives such as diversion of the Sandloop River or underground mining through shafts should form part of a more detailed investigation during the EIA phase. Rehabilitation and biodiversity monitoring programme	X X No longer relevant as Sandloop River, floodlines and riverine wetland and 100m buffer will be largely preserved and protected in situ. X	Section 9.1 for impact assessment. Generally included in Sections 26-29. Section 28.1.1.3.4 for rehabilitation Section 29.1.2 for monitoring
Wetland delineation and characterisation (SAS Environmental, 2015) Appendix 11	It is recommended that the extent of the western pit should be reduced in order to avoid encroaching on the Sandloop River. The location of the proposed materials stockpile in the eastern portion of the subject property will result in the irrevocable loss of some wetland habitat. Whilst this does not present a “fatal flaw” since the wetlands in question are not considered to contribute significantly to provincial conservation targets, it is highly recommended that very strict mitigation measures are implemented to ensure that the remaining wetland habitat is conserved.	X	Infrastructure plan (Plan 2) indicates the altered western pit and proposed alteration to the eastern material stockpile should IWUL not be granted to conduct stockpiling across the pans. Section 29.1.3 for monitoring Generally included in Sections 26-29.
Aquatic ecology	Study is still outstanding and will be made available as soon as it is completed.	N/A	N/A

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS INCLUDED	REFERENCE TO APPLICABLE SECTION OF REPORT
Hydrological assessment (LWES, 2015) Appendix 6	Only environmentally friendly materials must be used during the construction phase to minimize pollution. Vegetation stripping must be limited to the minimum width required. The topography of all disturbed areas must be rehabilitated, in such a manner that it blends with the surrounding natural area. This will reduce soil erosion and improve natural re-vegetation. Storage of Contaminated Water is deemed a water use and the Department of Water and Sanitation must be consulted for an authorisation prior to the construction phase. Concurrent rehabilitation must be implemented in order to reduce desertification. The final landform of the rehabilitated pits must be sustainable, free draining, minimize erosion and avoid ponding. Where final voids are maintained, these must be properly sloped to ensure a safe landscape. The disturbed area and footprint of the mine's operations must be kept as small as possible by mining strips. During the operational phase, uncontaminated surface water from the site must be allowed to freely flow to the environment.	X	Section 3.1.7 for sizing of water management features. Section 29.1.5 for monitoring Generally included in Sections 26-29.
Floodline delineation (PG Consulting Engineers, 2013) Appendix 5	With reference to GN 704, the required 100m minimum buffer zone as specified was delineated; however the 100 year floodline was found to be the wider of the two. As such the 1:100 year floodline should be applied.	Not incorporated as the riverine wetland area and 100m buffer zone has been designated as the outer developmental limit regarding GN704 which encompasses the floodline.	Plan 11
Geohydrological assessment (Future Flow, 2015)	It is recommended that a groundwater level and quality monitoring program be implemented, monthly for the first year and quarterly thereafter. Hydrocensus boreholes BH6, BH8, BH9, BH13, BH22, BH23, BH24, BH25. BH26 and the newly drilled monitoring boreholes (MBH1 to MBH4) installed	X	Section 29.1.5 for monitoring Generally included in

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS INCLUDED	REFERENCE TO APPLICABLE SECTION OF REPORT
Appendix 7	around the mine areas should be used to monitor changes in groundwater level and quality due to the proposed development. Chemical elements that should be analysed for are detailed in the report. In summary, it includes: pH, TDS, EC, calcium, magnesium, sodium, potassium, sulphate, nitrate, and an ICP scan of minor elements including aluminium, manganese, cadmium, mercury, chromium, vanadium and zinc. The water requirements and source must be finalised. Several management actions can be implemented: Good housekeeping rules with regard to diesel, oil and other potential contaminants. Proper sizing of all water management infrastructure to ensure a closed system. Implementation of a proper water monitoring system on site to ensure management of water levels in the water management infrastructure and adherence to freeboard specifications, general maintenance etc. Proper construction, and possible compaction, of surface stockpile footprints. Installation of additional groundwater level and quality monitoring boreholes in the vicinity of strategic points such as overburden stockpiles, water management dams, coal stockpiles etc. Regular monitoring of groundwater and surface points. Performing additional geochemical analysis and waste classification testing once mining starts. Regular (2 yearly) updates of the numerical groundwater flow and contaminant transport models. Compensation of surrounding landowners for loss of water supply, or water quality, due to the mining activities.		Sections 26-29.
Phase I heritage and archaeological	A Palaeontological Impact Assessment should be considered and, should fossil remains such as fossil fish, reptiles or petrified wood be exposed	Not included in this assessment due to the	Summary in section 21.1.2

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS INCLUDED	REFERENCE TO APPLICABLE SECTION OF REPORT
assessment (Kruger, 2012) Appendix 13	during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately. A careful watching brief monitoring process is recommended for all stages of the project. GH01 and GH02 are of low heritage priority and it is recommended that the sites be monitored if any construction takes place in the vicinity of the sites. Site GH03, Site GH04 are of medium-low significance and site monitoring of these structures are recommended when development commences. Destruction permits should be obtained from SAHRA. Site GH07 is of medium significance and should be carefully documented. A destruction permit should be obtained from SAHRA. All cemeteries and burials in and around the Groothoek Coal Mine Study Area (Site GH04, Site GH05) are of high significance and will require management or mitigation if impact cannot be avoided. A conservation buffer zone of at least 20m around the graves, as well as the fencing off of all cemeteries and graves are recommended. Should any of the burial places or graves be impacted, full grave relocations are recommended. Due cognisance should be taken of the larger palaeontological, archaeological and historical landscape of the area in order to avoid the destruction of previously undetected heritage sites in the area.	low palaeontological sensitivity of rocks in the area. If the assessment is requested by SAHRA, such study will be conducted. As per Archaetnos (2015), these sites could not be confirmed and have low significance and the heritage report is considered adequate record. X	Generally included in Sections 26-29.
Phase I heritage and archaeological assessment (Archaetnos, 2015) Appendix 12	The two Stone Age sites could not be verified, but are not seen to be of any value. It may therefore be demolished. Should this report be approved by SAHRA, no permit would be required. The other sites identified by Kruger should be dealt with in accordance to his report. No sites of significance were identified on any of the two proposed railway	X	Summary in section 21.1.2 Generally included in Sections 26-29.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS INCLUDED	REFERENCE TO APPLICABLE SECTION OF REPORT
	links. The proposed development may therefore continue and this report is seen as ample mitigation. It should be noted that the subterranean presence of archaeological and/or historical sites, features or artefacts is always a distinct possibility. Care should therefore be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence and adapt this report. Both siding and rail alternative can be considered as neither will significantly impact on heritage resources.		
Air quality assessment (Rayten, 2015) Appendix 3	Fugitive Dust: A fugitive dust management plan will need to be developed prior to the commencement of any onsite activities. Dust control measures need to be assessed in detail and incorporated into the design. The plan must include appropriate mitigation measures for all dust emission sources. The plan should be implemented once activities commence. All main hauling roads should be treated for dust suppression. It is recommended that a detailed dust management plan is developed and incorporated into the design stages of the mine. The mitigated scenario presented in the report is hypothetical and excludes any other potential control measures that the mine could implement as further elaborated in the report. Therefore the mitigated scenario presented only provides an indication of the level of mitigation that is required for dust suppression. The AERMOD model can then be re-run to include dust control measures that are more specific to the project.	X	Summary of impact on social areas in Section 11.1 Section 29.1.7 for monitoring Generally included in Sections 26-29.
Noise level readings (Cabanga Concepts, 2015). No separate report compiled; findings included directly in this EIA/EMPr report	The nearby SPCA was identified and deemed to be of great concern, as well as the residents within 500 meters of the proposed pits. It would be greatly beneficial for the mine to obtain noise readings at regular intervals to the SPCA and immediately adjacent residents within 500 meters, including complexes, northern farmers and eastern famers (Camelot Game Lodge) to determine the extent of elevated noise and the degree of attenuation. These sensitive receptors need to be monitored closely and the affected party	X	Section 29.1.5 for monitoring Generally included in Sections 26-29.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS INCLUDED	REFERENCE TO APPLICABLE SECTION OF REPORT
	consulted with on a regular basis. SR6 & SR8 which are of moderate concern should also be consulted with on a regular basis to ascertain as to whether the mine vehicles are causing a problem in terms of noise generated. SR8 is the town of Marapong, so it is advised that the mine consult with the relevant Ward Councillor. If there are concerns, applicable mitigation measures will need to be implemented. Recommendations are provided regarding the types of mitigation measures that can be considered to reduce noise at source, to attenuate noise to acceptable levels outside the mineral boundary and / or to ensure noisy activities are conducted at appropriate times.		
Air blast and vibration impact assessment (Blast Management & Consulting, 2015) Appendix 14	It is highly recommended that this blast design be reviewed and a detail blasting code of practice be prepared and accepted for daily operations on the mine. Calculated minimum safe distance is 581 m. The final blast designs that may be used will determine the final decision on safe distance to evacuate people and animals. If the parameters provided in the blast designs remains similar then recommended minimum distance will be 600 m for evacuation of people and animals. Road closure will be required when the particular blast being done will be within 600 m of any road. The D1675 road is very close to the West Pit at 100m. The option of photographic survey of all structures up to 1 500 m from the pit areas is recommended. This process can only succeed if done in conjunction with a proper monitoring program. The final design should address best stemming length to be used in order to control fly rock and air blast. It is recommended not to blast too early in the morning when it is still cool or when there is a possibility of atmospheric inversion or too late in the afternoon in winter. Do not blast in fog. Do not blast in the dark. Refrain from blasting when wind is blowing strongly in the direction of an outside	X	Summary of impact on social areas in Section 11.1 Section 29.1.6 for monitoring Generally included in Sections 26-29.

<table>
<tr><th>LIST OF STUDIES UNDERTAKEN</th><th>RECOMMENDATIONS OF SPECIALIST REPORTS</th><th>SPECIALIST RECOMMENDATIONS INCLUDED</th><th>REFERENCE TO APPLICABLE SECTION OF REPORT</th></tr>
<tr><td></td><td>receptor. Do not blast with low overcast clouds.
It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community of blasting dates and times.
Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work.
The ground vibration and air blast levels limits recommended for blasting operations in this area are:
<table>
<tr><th>Structure Description</th><th>Ground Vibration Limit (mm/s)</th><th>Air Blast Limit (dBL)</th></tr>
<tr><td>National/Tar Roads:</td><td>150</td><td>N/A</td></tr>
<tr><td>Electrical Lines:</td><td>75</td><td>N/A</td></tr>
<tr><td>Railway:</td><td>150</td><td>N/A</td></tr>
<tr><td>Transformers</td><td>25</td><td>N/A</td></tr>
<tr><td>Water Wells</td><td>50</td><td>N/A</td></tr>
<tr><td>Telecoms Tower</td><td>50</td><td>134</td></tr>
<tr><td>General Houses of proper construction</td><td>USBM Criteria or 25 mm/s</td><td rowspan="3">Shall not exceed 134dB at point of concern but 120 dB preferred</td></tr>
<tr><td>Houses of lesser proper construction</td><td>12.5</td></tr>
<tr><td>Rural building – Mud houses</td><td>6</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>Socio-economic impact assessment (Zone Land Solution, 2015)
Appendix 10</td><td>Should GCMC receive environmental approval, it must be subject to the implementation of the recommended mitigation measures and environmental management actions contained in the specialist reports.</td><td>X</td><td>Generally included in Sections 26-29.
Also addressed through addressing blast, dust and water quality.</td></tr>
</table>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS INCLUDED	REFERENCE TO APPLICABLE SECTION OF REPORT
Traffic impact assessment	Study is still outstanding and will be made available as soon as it is completed.	N/A	N/A
Visual & aesthetic characterisation (Cabanga Concepts, 2015) No separate report compiled; findings included directly in this EIA/EMPr report	No specific recommendations provided, but proposed mitigation measures that should be considered to reduce visual impact where possible.	All proposed mitigation measures have been included.	Generally included in Sections 26-29.

11 ENVIRONMENTAL IMPACT STATEMENT

11.1 Summary of the Key Findings of the Environmental Impact Assessment and Positive and Negative Impacts Identified

The impact assessment in Section 9 above discusses impacts in terms of specialist findings, in terms of issues raised by I&APs and provides an overall impact assessment. Although some impacts of high significance have been identified no fatal flaws have been identified. The biggest constraint to the Proposed Waterberg Project is water availability for processing requirements which is still being investigated and thus an IWULA has still not been submitted.

Impacts of high significance as identified by the specialists include:

- Destruction of Sandloop River riparian wetland habitat and loss of wetland ecological status and functioning.
- Generation of Acid Mine Drainage (AMD)
- Destruction of protected species.
- Potential harm to sensitive flora in the riparian habitats associated with the Sandloop River through contaminated runoff and poor rehabilitation
- Loss of and disturbance to 3 graves associated with the West Pit.

The mine plan has been altered since the specialist studies were completed to avoid the riparian area from mining and has included protective soil berms between opencast areas and the riparian area around the Sandloop River which will act as demarcation and protection measures to prevent runoff to the riparian area. It is proposed that the downslope sides of these berms be kept shallower than 1:3 and that these slopes be full vegetated so that these berms do not erode and impact on the riparian area through sedimentation. The impacts can therefore be seen to be mitigated to acceptable levels if:

- The mine plan as indicated in the EIA/EMPr (Appendix 2) is properly implemented,
- If soil utilisation and rehabilitation as reported in the EIA/EMPr (Section 28.1.1.3) is undertaken responsibility from the onset and throughout the life of mine,
- The mine rehabilitation model (must be compiled and implemented from the onset) is fully implemented, and
- Management and monitoring as proposed in Sections 26 to 29 is applied on site as stipulated in order to ensure immediate detection of potential problem areas which will allow for immediate action before major impact can take place.

Acid Mine drainage has been identified as a long term impact. Mining and rehabilitation must be completed responsibly and specifically discard backfilling must be completed with due diligence as reported in the EIA/EMPr (Section 26.2.3.5). According to modelled leach tests water quality is not expected to exceed IFC effluent quality guidelines, or the GN635 (2013)

Leach Test LCT0 quality guideline and impact to the Sandloop River at this stage is considered moderate to low. Regardless monitoring boreholes must be located in downstream locations of rehabilitated areas to determine the extent of groundwater contamination plumes and water quality in these plumes. The Sandloop River must also be monitored as these plumes may daylight into this river. Depending on water qualities recorded during the post closure phases, additional measures to manage plumes may be required, such as pump and treat systems.

Permits will be sought for the destruction of protected plant species (provincial, national and protected trees) prior to removing / destroying these species. Management has considered the relocation of these species where feasible, or collecting seeds (also subject to permits) and establishing a nursery to supply the site during rehabilitation.

Permits will be sought to relocate the cemetery but the context of the site will be lost.

The social response to the proposed development, although positive with job-seekers, has in general been very negative. It is therefore also pertinent to include an impact assessment on the various sensitive receptors identified around site. The following is relevant:

- Marapong: no significant impact is expected at this community as per the following studies:
    - Elevated noise levels due to the processing facility may be experienced at Marapong. The level may be tolerable and comparable to current baseline levels for the day, but may cause nuisance at night. This is based on the plant producing 80dB at the northern boundary. Noise mitigation measures at the processing facility must be implemented to ensure that the noise at this northern boundary is reduced to less than 70dB.
    - PM10 daily average may exceed limits on some days, but annual PM10 concentrations are well within limits if dust suppression is not applied on site. With at least basic dust suppression, water sprays and wetting of roads, all parameters at Marapong will be within limits. It must be stressed that limits in the region are already elevated and exceed most limits and the assessment above looks at the proposed GCMC development only.
    - Although assessed as part of the blast study no blast impact related to vibrations is expected at Marapong. The blasts may be perceptible but are not expected to cause any damage due to the low frequencies expected at Marapong. The Eastern Material Stockpile will further provide a barrier to air blast to the areas north of the East Pit.
    - No spills on site will impact Marapong as drainage on site is towards the Sandloop River on site. Furthermore, the storm water management plan (Plan 6) has provided capacity and design to contain all on-site spills.
    - No groundwater contamination will reach Marapong in the form of a contamination plume.
- Matimba: no significant impact is expected at this community as per the following studies:

  - PM10 daily average may exceed limits on some days, but annual PM10 concentrations are well within limits if dust suppression is not applied on site. With at least basic dust suppression, water sprays and wetting of roads, all parameters at Marapong will be within limits. It must be stressed that limits in the region are already elevated and exceed most limits and the assessment above looks at the proposed GCMC development only.
  - It must be stressed that an artificial seep draining west from, Matimba's dams (neighbouring the northwest corner of Eendracht) into the downstream pan was identified during the wetland assessment. The salt levels in this pan, not observed in the other pans visited in the area, suggests that the pan is receiving water with a higher salt load than typical for the area. The clean water diversion berm, which cannot be relocated, proposed on the western boundary of Eendracht will flow into this seep, and although it will cause dilution of this water, it will concurrently cause contamination of the clean water diverted from site. The potential source and potential contamination in this seep must be investigated and rectified if found to be from Matimba's dams. This is not on GCMC's property, and as GCMC is not yet active in the area, any contamination is not GCMC's responsibility.
- Farmstead on the northern boundary of GCMC's mineral boundary on the farm Welgelegen 469 LQ, occupied by Mr. Alan Pugh's farm manger: identified as a sensitive receptor based on the findings below:
  - Site has been identified as a sensitive receptor for noise and blasting.
  - Blast mitigation measures must be applied, such as reducing charge of explosives used (748kg/per charge or less) within a 459m buffer from the farmstead.
  - Noise reduction measures must be considered, such as conducting activities at a time more acceptable to the occupants while activities proceed within 500m of the site. On-going negotiations must be held with the occupants.
  - Visual screens must be considered at the site.
  - A replacement borehole will need to be drilled for their borehole closets to the mine property which will experience dewatering impacts as well as some contamination post mining.
- Camelot Game Lodge, properties on Grootfontein and other properties east of the Eastern Material Stockpile: Visual impact and minimal blast impact expected as detailed below:
  - Eastern Material Stockpile will cause a visual impact to residents in this area, however will at the same time provide a good noise and air blast barrier and therefore noise and blast impacts will be negligible.
  - The stockpile must be vegetated to reduce negative visual impact.
  - Ground vibration will be experienced at some of the sites, but can be very easily mitigated by using reduced explosive mass per charge as reported in the Blast study (Appendix 14).

  - No dust impacts are expected at the site under unmitigated and mitigated scenarios as the site is upwind of the predominant wind direct. In the isolated incidences when the wind blows from the opposite direction, the dust from site will be impeded by the Eastern material stockpile and only some dust from the stockpile itself may affect the area. Overall no major or frequent dust impacts are expected.
  - Boreholes will not be impacted by dewatering or contamination plume.
- Onverwacht, adjacent and south of East Pit: the SPCA and the immediately adjacent residential properties immediately opposite to the proposed East Offices have been identified as sensitive receptors:
  - Ground vibration will be experienced at these two sites, but can be very easily mitigated by using reduced explosive mass per charge as reported in the Blast study (Appendix 14).
  - Residential area will experience visual impacts and it is proposed that the berm on opposite this structure be slightly higher and well vegetated.
  - Noise reduction measures must be considered, such as conducting activities at a time more acceptable to the occupants while activities proceed within 500m of the site. On-going negotiations must be held with the occupants.
  - No significant dewatering of the groundwater levels is expected at Onverwacht and no boreholes will be impacted by the potential contamination plume.
  - PM10 may exceed limits at the residential area if dust suppression is not applied on site. With at least basic dust suppression, water sprays and wetting of roads, all parameters will be within limits. It must be stressed that limits in the region are already elevated and exceed most limits and the assessment above looks at the proposed GCMC development only.
  - Eastern Onverwacht in general may experience some elevated PM10 under the mitigated scenario and additional dust management measures other than just the basic wetting of roads must be applied to nearby dust sources.

The main environmental and social negative impacts have been detailed above. Positive impacts include:

- The project will create direct employment of staff and indirect employment through the use of contractors and service providers. This will be primarily sought locally if the skills and suppliers are available.
- The mine is situated in close proximity to two coal-fired power stations and will provide coal for power generation, currently a critical socio-economic issue in South Africa.
- The mine is situated in an area that is being rapidly developed into a coal mining and power generating centre and is therefore a developed and developing area.

- The operation of the mine will result in the implementation of the Social and Labour Plan (S&LP) compiled in association with the municipality and its Local Economic Development Plan resulting in social improvement in the area in general.
- The implementation of the S&LP will also benefit staff through training and bursary programmes.
- The project will provide for funds via the S&LP initiatives to various social development projects.
- The mine will also contribute locally, regionally and nationally to funding through taxes and contribution to GDP through coal sales locally and internationally.
- The proposed project will make a significant contribution to the inland coal market as well as the export markets.

11.2 Final Site Map

Please see Appendix 2.

11.3 Summary of Risks of the Proposed Activity and Identified Alternatives

Section 9.3 provides a full assessment of impacts related to changes in the mine plan, all of which are positive in terms of reducing impact to wetlands and 100m buffer zones. The need for temporary discard disposal on surface is the only activity that may have additional impact in terms of spontaneous combustion and management has been provided for this. In summary:

- Northern Siding and railway link is preferred due to fewer disturbances to sensitive features and compacted mine footprint for impact management.
- The eastern boundary of the West Pit has been reduced in order to fully preserve the riverine area and 100m buffer zone.
- Magazine has been relocated approximately 250m west of its original location to ensure the magazine is outside identified 100m buffer zones of pans and drainage area identified in the area.
- The mine will attempt to limit the eastern stockpile area to the extent south of the pans (Mine Plan – Appendix 2) if the site can accommodate the volume of material needed for storage. If the pans are required for stockpiling, no activity will take place in any of the pans until the necessary IWUL is obtained to do so.
- As it will take some years to attain backfilling, temporary disposal to surface is required. Facility must be engineer designed and spontaneous combustion maintained by maintaining discard moisture, applying sealing layer, especially on the side facing the dominant wind direction.

12 IMPACT MANAGEMENT OBJECTIVES & IMPACT MANAGEMENT OUTCOMES

The objectives of impact mitigation and management are to:

- Primarily pre-empt impacts and prevent the realisation of these impacts - PREVENTION.
- To ensure activities that are expected to impact on the environment are undertaken and controlled in such a way so as to minimise their impacts – MODIFY and/or CONTROL.
- To ensure a system is in place for treating and/or rectifying any significant impacts that will occur due to the proposed activity – REMEDY.
- Implement an adequate monitoring programme to:
    - Ensure that mitigation and management measure are effective.
    - Allow quick detection of potential impacts, which in turn will allow for quick response to issue/impacts.
    - Reduce duration of any potential negative impacts.

Environmental impact management outcomes are:

- Mine and rehabilitate responsibly and ensure operation is compliant with legislative requirements.
- Protect the biophysical environment as far as possible.
- Protect the water resources in the area as far as possible.
- Ensure atmospheric pollution is kept to a minimum.
- Ensure socially responsible mining.
- Protect historical and cultural aspects where required.
- Maintain open and transparent dialogue with I&APs.

13 FINAL PROPOSED ALTERNATIVES

Please see the final Mine Plan in Appendix 2 and Section 9.3 where the alternations to the mine plan are fully motivated.

14 ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION

As this EIA/EMP comprehensively covers impacts and mitigation of impacts, reference to compliance of with the EMP is seen to be adequate.

15 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

All specialist studies are conducted to certain levels of confidence, and in all instances known and accepted methodologies have been used and confidence levels are generally high. This means that in most cases the situation described in the pre-mining environment is accurate at high certainty levels, but there exists a low probability that some issues have not been identified during the studies. Such situations cannot be avoided simply due to the nature of field work and have therefore not been further discussed below.

Furthermore, statistical analyses and mathematical models are merely tools which assist the researcher in assessing field observations and have innate assumptions which can reduce objectivity of the results obtained. This is not seen as a major flaw but should always be considered when assessing results. This is not reiterated below for each specialist who has formulated impact assessment based on modelling.

Lastly, impact assessment is a predictive tool to identify aspects of a development that need to be prevented, altered or controlled in a manner to reduce the impact to the receiving environment, or determine where remediation activities will need to be incorporated into the overall development plan. This does not mean that the impact will occur at the predicted significance, but provides guidance on the formulation of the management and monitoring requirements which need to be incorporated into the EMP.

Specific knowledge gaps identified by the various specialists include:

- Droughts hampered flora and wetland assessments. However, site assessments and reports were generated during the prefeasibility phase and now the EIA phase, and data is seen to be representative of site.
- Wetland and terrestrial areas form transitional areas where an ecotone is formed as vegetation species change from terrestrial species to facultative and obligate wetland species. Within the transition zone some variation of opinion on the wetland boundary may occur, however if the Department of Water Affairs (DWA), 2008 method is followed, all assessors should get largely similar results.
- A final blast design has not been compiled and the blast study modelled data based on a high charge and low charge. It must be kept in mind that if one the blast design is finalised, then the impacts will change. It is accepted that the range included in the blast study for the higher charge mass is a worst case scenario and some of the impacts at the maximum charge may then not be experienced.
- Locating heritage resources is hampered by dense vegetation and reduced visibility. Furthermore, subterranean sites would not have been located. Allowance has been made for potential discovery of sites during construction and operations.
- Full details of temporary discard disposal to surface was unknown to many specialists at the time of completion of their studies as the issue came to light after many studies were already completed. Therefore this has not been exposed to the

same rigorous impact assessment process. As the site is situated within the West Material Stockpile area where carbonaceous material will be stored, this is not seen as a problem in terms of the impact assessment which has considered carbonaceous material stockpiles in this area.

- The socio-economic cost-benefit analysis is a snapshot in a particular time, and can vary with additional input values.

16 REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

16.1 Reasons Why the Activity should be Authorized or Not

Section 11 above provides a compact summary of pertinent findings, all of which can be mitigated by varying degrees depending on the type of mitigation measure applied. The EIA/EMPr is a comprehensive document with comprehensive information provided through the specialist studies, none of which identified fatal flaws.

It is therefore Cabanga Concepts reasoned opinion that the activity be authorised on condition that the EMP is fully adhered to, annually audited and amended where necessary based on audit findings.

16.2 Conditions that Must be Included in the Authorisation

16.2.1 Specific Conditions to be Included into the Compilation and Approval of EMPr

As the EIA/EMPr is a comprehensive document with comprehensive information provided through the specialist studies, the only condition recommended is that the EMP is fully adhered to, annually audited and amended where necessary based on future audit findings.

16.2.2 Rehabilitation Requirements

It is anticipated at this stage that the siding (and associated dirty water channels and the west PCD) may be retained on site and be operated as an SMME due to the expanding coal mining development proposed for Lephalale. The sewage treatment plant may also be retained on site and also be operated as an SMME. Closure objectives detailed below are relevant to the rehabilitation of remaining areas.

Rehabilitation will aim to:

- Ensure that the final elevation is free draining.
- Ensure that soil replaced in the same sequence to ensure soil characteristics are retained as far as possible.
- Ensure a self-sustaining post-mining land capability similar to pre-mining of grazing.

- Ensure that the rehabilitated areas are cleared of all contaminating substances and that runoff from the area is returned to the natural catchment.
- The site will not be returned fully to medium floral sensitivity as is the current rating for the bulk of the site, but rehabilitation will aim to ensure that vegetation growth and cover on the rehabilitated areas is sustainable and local indigenous species are establishing on site and that succession and colonisation from surrounding areas is taking place on rehabilitated areas.
- Ensure that alien invasive growth is eradicated until the closure certificate is granted.

The rehabilitation model must be drafted before mining commences and updated as needed.

In order to ensure rehabilitation of the site can be undertaken responsibly, the soil utilisation guide must be adhered to. This will ensure preservation of soil for re-use in rehabilitation of the site.

The rehabilitation plan is detailed in Section 28.1.1.3.

17 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The mine will be in operation for a maximum period of 20 years (if the pits have to be mined separately) with a further 5 years for post closure monitoring. Therefore the EA and Waste Management License (WML) are being sought for a period of 20 years.

18 UNDERTAKING

The undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the EIA/EMPr.

19 FINANCIAL PROVISION

As per NEMA financial provision regulations, itemised costs must be provided within the financial provision. As the DMR's closure cost assessment provides itemised costs, this process was used to determine the need for financial provision. Section 28.1 details the financial provision details and findings.

Financial Provision will be made by way of a financial guarantee from a bank registered in terms of the Banks Act.

20 DEVIATIONS FROM THE APPROVED SCOPING REPORT

20.1 Deviations from the Methodology for Impact and Risk Assessment

No deviation has been made other than the inclusion of the Traffic Impact Assessment study. This study is still outstanding and will be submitted on completion, either with the final EIA/EMPr or as an addendum to the EIA/EMPr.

20.2 Motivation for the Deviation

DEDET requested that the Traffic Impact Assessment study be completed. Various I&APs also raised concerns about the increased traffic through their town and residential areas.

21 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

21.1 Compliance with the Provisions of Sections 24(4)(a) and (b) read with Section 24 (3) (a) and (7) of NEMA, the EIA Report Must Include the:-

21.1.1 Impact on the Socio-Economic Conditions of any Directly Affected Person

A socio-economic assessment has been completed (Appendix 10). Section 11.1 summarises impacts to nearby I&APs. The main I&APs that may experience impact are the residents in the residential developments directly adjacent and opposite to the East Offices, the SPCA and the farmstead neighbouring the northern boundary of the mine and additional mitigation measures must be applied at these sites (See Section 11.1), or the possibility of relocation may have to be discussed with the I&APs.

21.1.2 Impact on any National Estate Referred to in Section 3(2) of the National Heritage Resources Act.

The findings of the heritage assessments are summarised under sensitive features in Section 8.1.3.3 and have been incorporated into sensitivity mapping.

The report was sent to SAHRA for comment. No comment has been received to date.

The following sites will be disturbed and permits will be sought from SAHRA:

- Loss of the old mine and recent historical farm which are on areas targeted for opencast mining.

- Loss of the cemetery with two (possibly three) graves due to opencast mining. Permits for relocation will be required.
- Eastern material stockpile area:
- Loss of and disturbance to structures associated with the recent historical farm which is on an area targeted for stockpiling. Permits for destruction will be required.
- In additional approval on the Heritage Report is sought from SAHRA on the disturbance to Stone Age sites, where the record of the report is seen as adequate mitigation.

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

Section 24(4) (b) (i) of the Act specifies “investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity”.

The alternatives assessed and the impacts associated with the alternatives assessed have been fully presented in Section 9.3 and the final layout has been motivated in this EIA report. This final layout has formed the basis for the impact assessment in the EIA Report (Part A of this report) and the EMPr (Part B of this report) reports specific management and monitoring that will be required in terms of the final layout presented in this EIA/EMPr.

PART B: ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

23 DETAILS OF THE EAP

Please see Section 1 of Part A, as well as Appendix 1.

24 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

Please see Section 3 of Part A.

25 COMPOSITE MAP

Please see Final Mine Plan attached as Appendix 2.

26 DESCRIPTION OF IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

The objectives of impact mitigation and management are to:

- Primarily pre-empt impacts and prevent the realisation of these impacts - PREVENTION.
- To ensure activities that are expected to impact on the environment are undertaken and controlled in such a way so as to minimise their impacts – MODIFY and/or CONTROL.
- To ensure a system is in place for treating and/or rectifying any significant impacts that will occur due to the proposed activity – REMEDY.
- Implement an adequate monitoring programme to:
    - Ensure that mitigation and management measure are effective.
    - Allow quick detection of potential impacts, which in turn will allow for quick response to issue/impacts.
    - Reduce duration of any potential negative impacts.

Environmental management outcomes and related management statements are:

- Protect the biophysical environment as far as possible.
    - Minimise impacts to the biophysical environment.

  - Ensure relevant legislation in National Environmental Management Act and Conservation of Agricultural Resources Act are applied on site including but not limited to alien invasive management and protection of ecologically sensitive species and environments.
  - Permits for any activities related to protected species on site will be sought prior to these species being affected. Preservation and “offset” approaches will be applied to these species as far as possible.
- Protect the water resources in the area.
  - Ensure clean and dirty water separation systems are established on site from the onset and are in line with GN704 principals.
  - Use water responsibly and recycle water as much as possible.
  - Ensure relevant legislation regarding the National Water Act are applied on site.
  - Ensure IWUL is obtained prior to activities commencing on site.
  - Annually update the IWWMP with updated data recorded from site.
- Ensure atmospheric pollution is to a minimum:
  - Manage dust generation.
  - Revegetate all bare soil.
- Mine responsibly and ensure operation is compliant with legislative requirements.
  - Ensure an adequate rehabilitation model is compiled and followed to allow for adequate rehabilitation to a prescribed land use.
  - Ensure soil utilisation guide is followed on site at all times from the onset of activities.
  - Conduct annual EMP audits and complete the necessary amendment process where this is deemed necessary.
- Ensure socially responsible mining:
  - Ensure the targets and objectives set out in the SLP are followed and adhered to.
  - Provide a safe environment for people to work in:
    - Ensure safety policies are established on site in line with national policy.
    - Ensure adequate PPE for staff, contractors and visitors to the site.
    - Ensure health and environmental policies are established and in line with national policies.
  - Provide a safe environment for people to live in.
    - Ensure environmental objectives are followed.
    - Provide open and transparent communication opportunity with all I&APs.
- Protect historical and cultural aspects:
  - Ensure all archaeological and cultural artefacts/sites are preserved in situ until such time that authorisation to remove these is obtained.

    - Ensure South African Heritage Resources Act principals are applied with regard to all the archaeological and cultural artefacts/sites.
    - Ensure any relocation of culturally sensitive sites is done according to SAHRA principals, in a socially sensitive manner and with open and transparent communication with relevant I&APs.
- Maintain open and transparent dialogue with I&APs:
    - Conduct regular feedback meetings with I&APs (quarterly for the first year and at least twice a year thereafter).
    - Maintain a complaints register on site and respond to comments in a timely manner.
    - Ensure communications and any necessary agreements are made between the sensitive I&APs identified: residents in the residential developments directly adjacent and opposite to the East Offices, the SPCA and the farmstead neighbouring the northern boundary of the mine

26.1 Determination of Closure Objectives

Closure objectives must be met with regards to:

- Topography
    - To ensure that the final elevation is free draining.
    - To ensure that the final elevation will result in the continuation of the pre-mining surface drainage pattern.
- Soil, Land Capability and Land Use
    - To ensure that soil types are replaced in correct sequence, subsoil followed by topsoil, and at appropriate depths.
    - To ensure post-mining land capability is at least similar to pre-mining.
    - To ensure that the land capability is self-sustaining.
    - To ensure that the land use is returned to the pre-mining use, namely grazing.
- Surface Water
    - To ensure that no dirty water from the site enters the surrounding surface water systems.
- Groundwater
    - To ensure that possible plumes originating from the mining areas do not impact significantly on the surface water features or surrounding users' boreholes.
    - To ensure that groundwater users that are impacted have alternative sustainable water sources of the similar quality and quantity.
- Flora and Fauna
    - To ensure that vegetation growth and cover on the rehabilitated areas is sustainable.

    - To ensure that alien invasive growth is eradicated until the closure certificate is granted.
    - To encourage surrounding animals to return into the rehabilitated areas to maintain the surrounding biodiversity.
- Aquatic Ecosystems
    - To ensure that aquatic ecosystems are maintained as close as possible to that of the pre-mining environment.
    - To ensure that the adjacent aquatic ecosystems conditions are similar to that of the pre-mining environment and that the FEPA rank is maintained.
- Wetlands
    - To minimise the disturbance on wetlands.
    - To ensure that the adjacent wetland conditions are similar to that of the pre-mining Present Ecological State.
- Visual Impacts
    - To ensure that rehabilitation is sustainable in the long term.

26.2 The Process for Managing any Environmental Impacts

The management plan is detailed below for each aspect during each mining phase. Some measures are relevant to more than one aspect. These are not reiterated for each aspect.

26.2.1 Design and Planning Phase

- All applications that are required will be completed and approval obtained prior to any of the relevant activities taking place. This includes:
    - Application for permits to relocate/destroy protected species as identified in the flora and fauna report.
    - Integrated water use license application, including exemption from GN704 for backfilling of pits with discard.
    - The necessary applications through SAHRA to:
        - Destroy heritage and cultural sites as may be relevant (Sites 3, 4 and 7); and
        - Relocate grave sites (Site 5).
- Written approvals that may be necessary in terms of structures and activities on site will be obtained prior to structures and activities being carried out. Amongst others this includes:
    - Written approval from the Principal Inspector of Mines for blasting within 500m horizontal distance of structures.
    - Written authorisation from the Chief Fire Inspectorate for diesel storage facilities and firefighting facilities/infrastructure on site.
- Where sensitive areas (wetlands and heritage sites) occur on the property, but will not be affected, permanent demarcation of the appropriate buffer zone will be made

and no activity will take place within these areas. Where possible, such as at the opencast mining areas, wetland demarcation will be created by a topsoil berm between the riparian wetland and the active mine area; this will also act as a protective berm. The following buffer zones are relevant:

- 100m for mining from the Lephalale cemetery.
- 100m buffer from the riverine wetland which comfortably encompasses the 1:100 year floodline from the Sandloop River.
  - IWUL must be obtained for the section of siding that will infringe on the riverine area (although well outside the 1:100 year floodline).
  - The farm road on the northern boundary which will be utilised for access between the east and west workings may also require a formalised river crossing to ensure access during a flood event and prevent damage to the Sandloop River.
- 100m buffer zone from pans, unless IWUL is granted for activity through these.

- Buffer zones must be established around these sites before any other activity commences on site.
- When purchasing equipment, consideration must be given to quieter equipment, to assist in noise level management.
- Keep to existing paths surrounding the site before the commencement of the construction phase in order to prevent unnecessary changes to the site.
- Make sure that plans for infrastructure have been optimally designed in order to prevent excessive environmental or visual impacts where feasible, and ensure maximum maintenance of vegetation on site.
- A fugitive dust management plan will need to be developed prior to the commencement of any onsite activities. Dust control measures need to be assessed in detail and incorporated into the design. The plan must include appropriate mitigation measures as detailed below (Rayten, 2015).
- The Rehabilitation model must be compiled before any activity commences on site.
- The blast design plan must be finalised before any blasting commences on site.
- Complete pre-mining topographical surveys to aid in compilation of rehabilitation plan.

26.2.2 Construction Phase

26.2.2.1 Topography

- No preventative mitigation can be applied to manage impacts on topography in the area during the construction phase.
- Ensure activity is in designated area by demarcating active footprint. Keep activity footprint as compact as possible. No activity is to take place beyond the demarcations.

- Ensure stockpile heights do not exceed 2m for topsoil and 6m for subsoil and 25m for overburden. Material placement for storage should consider remediation of other impacts, such as utilising material as a berm to shield visual impacts and act as noise buffer. Topsoil has been prioritised for upstream diversion berm construction and protective barrier berms between the opencast areas and the riverine areas of the Sandloop River.
- Establish approved erosion control measures to reduce the risk of formation of erosion gullies.
- After construction activities are completed, all areas no longer required for operations will be fully rehabilitated. Rehabilitated areas must be contoured and free draining to prevent ingress and pooling of water.

26.2.2.2 Soil and Land Capability

- Ensure water separation and dirty water runoff containment is established on site prior to any other activities taking place. This must be conducted as per GN704 requirements.
- Soil handling must be as per the soil utilisation guide to ensure soil is preserved for use in future rehabilitation. This will include separate stripping and stockpiling of soil horizons.
- Demarcate stockpile areas and minimise operation and machinery movement to stipulated area only. The topsoil should be stripped from soil stockpile areas. And can be utilised to create perimeter berms around soil stockpiles or clean water diversion berms.
- The topsoil stockpiles / berms must not exceed 2m height; subsoil stockpiles must not exceed 6m. Slopes for all soil stockpiles / berms must not exceed 1:3 and must be vegetated and maintained during the life of the operation.
- Incorporate herbaceous vegetation into soil stockpiles.
- Erosion control measures must be implemented as necessary. This includes:
    - Establishing top perimeter berms on stockpiles to prevent wash out of soils.
    - Constructing perimeter berms around all stockpiles.
    - Cut off drain must be constructed upslope of all stockpiles.
    - Developing drainage control system for the construction area and diverting storm runoff away from areas with high erosion potential where possible.
    - Gravel roads must be well drained in order to limit soil erosion.
    - Incorporating measures to reduce the flow velocity of storm water runoff.
    - Attending to all erosion observed on site by lifting and replacing the eroded soil back to the eroded site. Consideration will be given to gabion baskets, contour berms, water flow dissipaters and possible downstream silt traps.
    - Seed eroded areas and all bare soil.
    - Road surfaces must be compacted in order to increase stability (LWES, 2015).

- Soil stockpiles on site for more than 6 months must be vegetated. All soil diversion berms must be vegetated.
- Fields should not be trafficked if they are wet. Artificial drainage can help increase the number of trafficable days on poorly drained soil.
- Carbonaceous overburden stockpile areas must be adequately prepared, including stripping of soil from stockpile areas and areas graded and compacted in order to divert and contain water runoff from these areas which will be dirty water areas.
- Temporary discard disposal area must be adequately prepared as per engineered designs, with Class C barrier lining, including stripping of soil from the area. Subsoil stockpiles must be placed upslope of the area and utilised in cladding the sides as the dump facing the predominant wind direction to reduce risk of spontaneous combustion.
- Where required the compacted soils should be disked to an adequate depth and re-vegetated with indigenous plants.
- Cement handling should only take place over protected ground, such as over appropriate sheeting.
- Waste generated on site should be collected in skips and bins placed around the site, separated and recycled as far as possible and sold/given to interested contractors. Where relevant, waste will be stored according to the Norms and Standards for Storage of Waste and should not be stored on site for excessive periods.
- Inspect and repair all aspects of the sewage treatment facility as needed, including any plumbing associated with the bathrooms and toilets.
- Toilet and change house facilities will be kept clean and hygienic through regular cleaning and maintenance of a cleaning register.
- Standard operating procedure (SOP) will be devised and implemented for the sewage treatment facility.
- Bacterial assessment of monitoring point downstream of the sewage treatment plant will be included in the surface and groundwater monitoring programme.
- Spill kits must be available on site and personnel trained to utilise these to clear hydrocarbon spills immediately.
- All vehicles / machinery on site will be up-to-date with their service and maintenance plans to reduce risks of hydrocarbon leaks.
- Vehicles will only be maintained on site once the workshops have been constructed on site.
- The use of persistently leaky equipment will be discontinued until such time that repairs are made or equipment will be replaced.
- Equipment will not be parked over bare ground; where unavoidable, drip trays will be placed under the equipment to collect potential leaks.
- Any generators used on site and any initial hydrocarbon storage on site will be within mobile bunding to contain all leaks until permanent concrete bunded areas are constructed.

26.2.2.3 Surface Water, Wetlands and Aquatic Systems

One of the identified impacts to water resources is sedimentation and siltation. This will be largely as a result of exposure of soils and soil handling on site. Furthermore, preventing contamination to soils will prevent contaminated runoff to downstream water features. It is therefore critical that soil management measures be applied on site. These have not been repeated below.

- Authorised activities in any wetland/riverine areas will be maintained over as small an area as possible.
- Only environmentally friendly materials must be used during the construction phase to minimize pollution (LWES, 2015).
- Vegetation stripping must be limited to the minimum width required (LWES, 2015).
- Clean and dirty water separation and dirty water containment features must be established on site prior to any other activity taking place on site:
    - The dirty water catchment must be managed as small as possible (LWES, 2015).
    - Water runoff management must be established in accordance to GN704, unless the relevant exemption under GN704 is approved by DWS.
    - This will include upslope soil berms to divert clean water around the site of activity into natural drainage lines and internal channels to drain dirty water from the active footprint to lined containment dams.
    - This should include protective berms and channels between areas of activity and the river/wetland systems.
    - 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas and no vehicles or equipment will be allowed within the no-go zone and no activity will be allowed in the area until authorisations under NWA and NEMA have been obtained where necessary.
    - Flow dissipaters must be established at locations where diverted clean water enters natural drainage lines.
    - All storm water diversion and containment features will be deigned to contain a 1:50 year 24hr storm event.
    - Silt traps will be established upslope of PCDs to reduce the need for silt clearing in PCDs.
- All dams, including slurry dams, will be constructed and lined (Class C barrier) as per designs to contain a 1:50 year storm event and be operated with a 0.8m freeboard.
- Storm water collection systems must be designed, constructed and maintained on an on-going basis in order to collect contaminated runoff from site (LWES, 2015). Maintenance of all water management features must be on-going and all structures kept clear of obstructions.
- During the construction and operational phases of the proposed mining development erosion berms should be installed on roadways to prevent gully formation and

siltation of the wetland resources. The following points should serve to guide the placement of erosion berms (SAS Environmental, 2015):

- Where the track has slope of less than 2%, berms every 50m should be installed;
- Where the track slopes between 2% and 10%, berms every 25m should be installed;
- Where the track slopes between 10%-15%, berms every 20m should be installed;
- Where the track has slope greater than 15%, berms every 10m should be installed

- The mine's water balance must be strictly controlled at all times to ensure optimal water use, prevent overflow in dirty storm water management systems and prevent spills to the environment (SAS Environmental, 2015).
- All carbonaceous material stockpiling areas must form part of the dirty water footprint area and all runoff from these areas must be diverted and contained.
- All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities (SAS Environmental, 2015).
- Carbonaceous material must not be used for any construction material.
- Emergency response procedures for spills will be compiled for the site and implemented if spills to the surrounding environment occur.
- Domestic water will be sourced from a groundwater resource and temporarily stored in water tank at the main west offices. Utilise water on site responsibly; saving water initiatives will be included in environmental awareness training.
- Record all water usage on site.
- Package Sewage treatment plant must be designed to have enough capacity.
- Surface water monitoring programme will be initiated and continued on a monthly basis. It must be stressed that the monitoring points are likely to be dry in winter and samples will only be possible in the rainy season.
- Biannual biomonitoring will be conducted by a qualified specialist and their recommendations applied on site. Again, the biomonitoring sites will be dry in winter and a dry season survey may not be possible.
- Annual monitoring of the Sandloop River must take place, with a focus on riparian vegetation moisture stress. The wetland monitoring proposed in the monitoring plan must be implemented on site.

26.2.2.4 Groundwater

Preventing contamination to soils and keeping contaminated water in lined facilities will prevent contaminated seepage to the groundwater table. It is therefore critical that soil and surface water management measures be applied on site. These have not been repeated below.

- Carbonaceous overburden stockpiles must be stockpiled separately, must be in designated areas with compacted base, erosion control measures and water management features to contain runoff from these stockpiles.
- Discard and slurry facility will be constructed as per engineered designs with proper under-drainage and base preparation with Class C Barrier lining.
- Saving water initiatives will be included in environmental awareness training.
- Record all water usage on site.
- Conduct groundwater quality monitoring at least quarterly.

26.2.2.5 Air Quality

- A water cart will be used to spray gravel roads and relevant areas when dust levels are high.
- Consideration will be given to reducing any activities generating excessive dust during very windy periods where it is feasible and practical to do so.
- Stockpiles will be placed in locations sheltered from strong winds where possible.
- Stockpiles will be adequately vegetated. Other measures that can be considered include spraying, wind breaks or enclosing or screening stockpiles from predominant wind direction (Rayten, 2015).
- Machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of excessive emissions.
- Screens (berms, trees or wind breaks) can be considered around dusty sites on the side of the predominant wind direction should dust levels be excessive.
- Speed limits will be established on the dirt road to minimise dust generation.
- Dust fallout monitoring should be established on site and conducted monthly.

26.2.2.6 Flora and Fauna

By maintaining areas not targeted for development, the flora and fauna habitat at these sites can be preserved. It is therefore critical to apply soil and surface water management features on site, as well as dust management measures to prevent impact to nearby areas. These measures have not been reiterated below.

- Plan activities carefully so that only vegetation that needs to be impacted is impacted.
- Construction activities should commence during the winter months as far as is possible to minimise the impacts on breeding fauna and flora.
- Incorporate herbaceous vegetation into soil stockpiles to maintain a seed bank.
- Revegetate impacted areas as soon as possible.
- Maintain riverine area associated with the Sandloop River as an ecological corridor to allow for species movement through site and maintain ecological functioning of corridor.
- Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas (Dimela, 2015).

- Where possible the protected species should be conserved in situ (Dimela, 2015):
    - Otherwise plants should be removed by a qualified specialist and replanted (where feasible) into suitable conserved areas, or maintained under suitable growing conditions until such time that it can be replanted as part of rehabilitation.
    - Consider establishment of a nursery in which to store some of the local indigenous flora for use during rehabilitation.
    - Consider collecting seeds (permit required) of protected species and planting these in the nursery to use at rehabilitation.
    - Note that these plants may only be removed with the permission of the provincial authority (Dimela, 2015).
- Eradicate and control all alien invasive species on site (Dimela, 2015):
    - When removing these species, the spread of seeds must be prevented.
    - All alien seedlings and saplings must be removed as they become evident for the duration of mine operation and after closure. Manual / mechanical removal is preferred to chemical control.
    - All vehicles and equipment, as well as material brought to site should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the site.
    - Rehabilitate and revegetate all areas where alien invasive species were removed.
- No domesticated animals should be allowed on site.
- To prevent possible collisions with animals, drivers of construction and mine vehicles must remain vigilant to the possibility of animals crossing their paths and a strict speed limit should be adhered to.
- Relocate larger animals with the aid of specialists only if such species are under threat from the development; ensure relevant permits are in place prior to relocating fauna.
- Inform staff, contractors and visitors to not handle or harm fauna in the area in any way.
- No open fires must be allowed on site such as for cooking (Dimela, 2015).
- Prohibit the harvesting of trees for firewood (Dimela, 2015).
- Do not hinder, harm, trap animals (Dimela, 2015).
- Noise control measures as listed below will be applied.
- Any fencing or barrier that is established must consider animals that may move through the area and provide the means for animals to do so, such as culverts or open mesh fences.
- Consider the use of bird flappers and diversion balls on the power lines where these cross areas frequented by birds.
- Conduct activities during daylight hours as far as possible. When using lighting, ensure directional floodlights are utilised that focus light on the necessary areas and reduce light pollution to surrounding environment. Utilise lights in the orange and

yellow light ranges rather than white. This has the added benefit of reducing strong light and dark contrasts which also has safety benefits for staff.

26.2.2.7 Sites of Archaeological and Cultural Interest

- Stone Age sites (Sites 1 and 2) can be destroyed once the Heritage Report is approved by SAHRA, without the need to apply for further permits (Archaetnos, 2015).
- Additional sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites. The following will be relevant:
    - A conservation management plan will be compiled for such sites.
    - Permits must be obtained prior to destruction of such sites. This will include a process of documenting the sites.
    - Should other artefacts or archaeological items be uncovered during operations, then all activity should cease immediately, the area marked off and a specialists consulted prior to any further activity.
- Graves identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites. The following will be relevant (Archaetnos, 2015):
    - A conservation management plan will be compiled for such sites and sites will be fenced off.
    - Access to site will be maintained.
    - Permits must be obtained prior to relocation of such sites. This will include a process of documenting the sites, completing social consultation, exhumation and reburial of remains.
    - Should other graves be uncovered on site during activity progress then all activity should ceased and the area demarcated as a no-go zone. A specialist will need to be consulted and responsible action considered, whether grave relocation or ceasing activity completely within the buffer zone.
- After clearance of vegetation and during soil stripping, careful monitoring for potential heritage sites will be undertaken. If any of these are discovered, a qualified archaeologist should be called in to investigate the occurrence and adapt the HIA report.

26.2.2.8 Noise

- Noise monitoring must continue during construction phase. This will assist in formulating mitigation measures should complaints about noise be received from surrounding residents or communities. Additional monitoring point should be included in the vicinity if required/requested. Environmental noise monitoring must be undertaken at least quarterly.
- Occupational noise levels should be measured and adequate PPE given to staff exposed to high noise levels.

- A noise barrier in the form of a berm should be constructed on the boundary of the plant and pit areas. This is particularly important as it affects the sensitive receivers identified at SR1, SR2, SR4 and SR5. The berm will help with the attenuation of noise produced by the plant, mining activities and trucks along haul roads. A basic rule of thumb for barrier height is: any noise barrier should be at least as tall as the line-of-sight between the noise source and the receiver, plus 30%. So if the line-of-sight is 10m high, then the barrier should be at least 13m tall for best performance (Sadler, L., 2012).
- Bushy dense vegetation can also be considered on the plant-side of the berm if noise levels at sensitive receptors are still excessive as this will assist in absorbing noise. The existing vegetation should be left untouched as far as reasonably possible to assist with this. Botanists should be consulted to ensure adequate, non-invasive species are utilised.
- Fixed noise producing sources such as generators, pump stations and crushers should be either housed in enclosures or barriers put up around the noise source. The barriers should be installed between the noise source and sensitive noise receptor, as close to the noise source as possible. In this case, the noise source is expected to be the plant areas / pits during blasting and excavation.
- Equipment should be switched off when not in use.
- Quieter equipment will be sought where feasible.
- Future mining-related machinery and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective (e.g. installed exhaust mufflers). This is particularly important as it will affect the nearby sensitive receptors.
- The mine should consider limiting operating hours to day-time only, should issues arise from nearby sensitive receptors.
- Finally, the mine should look at increasing the distance of mining related activities from sensitive sites should complaints be received from I&APs and should monitoring indicate excessive levels at sensitive receptor groups, despite other mitigation measures having being implemented.

26.2.2.9 Blasting and Vibration

- As per the layout of activities for the various mining phases, no blasting will take place during the construction phase.
- Prior to any blasting activities taking place, the mine will obtain photographic records of all structures within 1500m of the mine area.

26.2.2.10 Visual Aspects

- Proper housekeeping and maintenance must be carried out continuously as part of the adaptive environmental management philosophy.
- Screens (berms, trees or wind breaks) will be considered at strategic locations if I&AP complaints are received.

- Ensure stockpile heights do not exceed 2m for topsoil and 6m for subsoil and 25m for overburden. Soil can be placed as visual screens where feasible.
- Prevent removal of plants or trees in areas not targeted for development.
- Preserving exiting trees and where needed, planting of additional trees, as a visual screen must be completed along the southern boundary of the Groothoek to screen the mine from the adjacent farms.
- Planting of rows of trees is also possible at the highly sensitive viewer's sites. This can be done if complaints are received.
- Vegetate any bare soils with local indigenous species.
- Waste generated on site should be collected, separated and recycled as far as possible and all litter cleared from site.
- The staff must be given training on how to keep the area litter free.
- Important indigenous vegetation, indicative of the areas characteristic vegetation must be left intact as far as possible.
- Dust suppression techniques must be in place at all times.

26.2.2.11 Traffic and Safety

- Coal haulage will be along rail.
- All intersections with main tarred roads will be clearly signposted.
- Drivers will be enforced to keep to the set speed limits.
- Directional floodlighting will be used to focus light on the area of activity only so as not to irritate road users.
- A fund will be set aside to maintain the serviceability of the road verge where the traffic approaches or departs from the main road.

26.2.2.12 Regional Socio-Economic Structure & I&AP Concerns

- Ensure workers have information available and sign a "code of conduct" at the start of employment which gives an overview of acceptable behaviour and information regarding health & safety on the site (Zone Land Solutions, 2015).
- GCMC should appoint a service provider or local NGO to develop, implement and manage a "Health & Safety Orientation Programme" which must include information on HIV/AIDS, TB, and alcohol abuse prevention, with all temporary and permanent workers on the site. This must include encouragement to connect with local community programmes and NGO's, health training and information which can be provided on-site to workers at the start of the project (Zone Land Solutions, 2015).
- GCMC to continuously engage with affected communities regarding mitigation practices (Zone Land Solutions, 2015).
- Implement a "local first" recruitment policy (Zone Land Solutions, 2015). Employ as per S&LP.
- Ensure that the local jobs created are linked to a skills development programme for permanent employment (Zone Land Solutions, 2015).

- GCMC to adopt a preferential procurement policies towards local suppliers and distributors; ensuring that principle of “local first” when procuring consumables, construction materials etc. (Zone Land Solutions, 2015).
- Part of the construction phase needs to include the continuous maintenance of the road to be able to handle the increase in traffic and excessive dust and noise as a result of the gravel roads (Zone Land Solutions, 2015).
- Limit traffic to roads indicated specifically for the project. Limit use of unimproved roads to emergency use only (Zone Land Solutions, 2015).
- Instruct and require all personnel and contractors to adhere to speed limits to ensure safe and efficient traffic flow (Zone Land Solutions, 2015).
- Limit mine-related vehicle traffic on public roadways to off-peak commuting times to minimize impacts on local commuters (Zone Land Solutions, 2015).
- Ensure that all power-related structures are adequately marked with relevant signs and warnings and fenced off with access control.
- Ensure magazine is fenced off with proper warning signs and access control.
- Ensure baseline photographs are taken of all structures within 1500m which may be impacted on by blasting for photographic evidence prior to any blasting. Ensure procedures in place to compensate for damage.
- Toilet and change house facilities will be kept clean and hygienic through regular cleaning and maintenance of a cleaning register.
- Ensure proper communication channels are in place with local businesses which may be affected by mining. Consider above proposed mitigation measures to reduce impacts which may affect such businesses. Consideration should be given to compensation for loss of business to local businesses.
- The public participation process should continue throughout the life of mine to allow all interested and affected parties (I&APs) to continue relations with the mine and offer them a platform to raise their issues and concerns.
- A complaints/comments register should be established on site at a site accessible to I&APs.

26.2.3 Operational Phase

Construction phase management activities must continue into operations phase. Construction phase management measures will also be relevant to new mine cuts as roll over opencast mining proceeds and must be applied at these locations. Only additional operational measures have been included below.

26.2.3.1 Topography

- Ensure rehabilitation is continuously completed in a roll over fashion as opencast mining progresses. Rehabilitation must be done according to the rehabilitation model which must be compiled prior to commencement of mining.

- Ensure adequate safety standards are set with regards to bord-and-pillar mining. Inspect areas of underground mining and rehabilitate any subsidence or sinkholes by filling deeper structures with overburden and soil and shallow structures with soil. Re-profile to attain adequate drainage and rehabilitate sites.
- Coal stockpiles must be in designated areas and removed on a first-in-first-out basis.
- Inspect all rehabilitated areas, especially after first heavy rain falls, to ensure adequate surface water drainage, no erosion and germination of vegetation.
- Drainage measures will need to be implemented to prevent accumulation of water on rehabilitated areas.

26.2.3.2 Geology

- Impacts to geology cannot be mitigated.

26.2.3.3 Soil and Land Capability

- Ensure roll-over rehabilitation is continuously completed as opencast mining progresses.
- Rehabilitation must be done according to the rehabilitation model which must be compiled prior to commencement of mining.
- Soil handling must be as per the soil utilisation guide presented in the Soil Assessment Report to ensure similar land capabilities can be attained over the mining areas.
- Once steady state opencast mining is obtained and materials excavated are replaced over prior cuts, soils must be excavated and replaced with minimal handling.
- Soil in rehabilitated areas must be sampled and tested annually and ameliorated in order to sustain a vegetative cover in order to attain land capabilities similar to pre-mining.
- The surface will be shaped to ensure a free draining surface and a continuation of the pre-mining surface drainage pattern.
- Topsoil will be replaced at adequate depths in order to achieve necessary land capability as which will be grazing.
- Implement surface stabilization to reduce erosion until a vegetative cover is established:
    - Mulches and chemical stabilizers can be utilized to provide short term benefits.
    - Matting and netting is recommended for application in steep sloping areas where there is a severe localized problem.
- To prevent over compaction problems it is very important that agricultural equipment be used for rehabilitation activities.
- Restrict vehicle movement over rehabilitated areas once seeded.
- Coal dust must be managed to prevent deposition of coal dust into neighbouring areas through wind dispersion:

  - Dust management measures, such as spraying with water, mist aerosoling, wind screens must be considered in the major coal storage and handling areas.
  - Trucks transporting coal on site must not be overloaded.
  - All coal spillages around site, along roads must be cleared.
- All diesel storage must be within concrete bunded areas that contain 110% of storage capacity if roofed or 120% storage capacity if not roofed.
  - Bunds will be fitted with an outlet which will only be opened under controlled circumstances.
  - The outflow from bunded areas will flow through an oil trap and water component will be treated and recycled as process water.
  - Oil from oil traps will be removed to the used hydrocarbon drums which will be temporarily stored in concrete bunded areas prior to removal from site by a reputable hydrocarbon waste contractor.
  - Spill kits must be available on site and personnel trained to utilise these to clear spills immediately.
- All chemicals will be stored as per requirements in the MSDS which will be kept on site in the lab. Wet and dry chemicals will be stored separately, reducing and oxidising agents will be stored separately. Liquid chemicals will be stored in plastic trays which will contain any potential spills.
- All dangerous goods on site will be stored according to legislative requirements to prevent contamination to the surrounding environment.

26.2.3.4 Surface Water, Wetlands and Aquatic Systems

- Soil management measures will apply as reduced erosion and reduced contamination of soils will reduce risk of transported contaminants and silt-loading to surrounding surface water bodies.
- Roll over mining methods will be implemented. The mined out areas will be rehabilitated as new areas are being mined out. Concurrent rehabilitation must be implemented in order to reduce desertification (LWES, 2015).
- The disturbed area and footprint of the mine's operations must be kept as small as possible by mining strips (LWES, 2015).
- Uncontaminated surface water must be allowed to freely flow to the environment (LWES, 2015).
- The topography of all disturbed areas must be rehabilitated, in such a manner that it blends with the surrounding natural area. This will reduce soil erosion and improve natural re-vegetation (LWES, 2015).
- Consider construction of cut-off trench to capture poor quality seepage and direct this to the PCD to prevent seepage from flowing into natural drainage lines.
- All coal stockpiling and handling areas must form part of the dirty water footprint area and all runoff from these areas must be diverted and contained in the PCD.

- Maintenance of all water management features must be on-going and all structures kept clear of obstructions. Clean out silt build up over dry season.
- Upstream dewatering boreholes should be considered in order to minimise the creation of dirty water within the opencast pit if any impact is observed on the Sandloop River; this clean water should be used to recharge the natural systems downstream of the mining rights areas at similar rates to the natural catchment (SAS Environmental, 2015).
- Inspect, maintain and repair pipelines and pumps regularly.
    - Back-up pumps and pipes must be available on site.
    - Ensure pumps are of adequate size for volumes which need to be pumped.
    - Pipelines should be within dirty water footprints or laid in paddocks which will serve to contain any leaks.
    - Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur.
- Access to water storage facilities should be restricted and warning signs must be placed at prominent locations (LWES, 2015).
- Ensure all pipelines and water containment facilities are adequately sealed to prevent leaks.
- On-going management and update of water balance at least annually (LWES, 2015).

26.2.3.5 Groundwater

- Ensure registered affected water user is compensated in some way, either with alternative water supply/borehole or monetary equivalent so that they can source their own water at no additional cost (Future Flow, 2015).
    - From the current model, no user boreholes will be affected.
    - BH08 (Plan 13) will be affected by dewatering and may experience some deterioration in quality. This is an Eskom Monitoring borehole. Eskom should be consulted as to whether they would like to relocate the borehole.
- Keep mining areas as dry as possible during operations.
- Replace carbonaceous material at the bottom of the pit during rehab to ensure early flooding and oxygen displacement. Compact the carbonaceous material at the base of the pit to further displace air.
- Seal off individual major seepage zones intercepted in the fractured rock.
- Reduce vertical flows into the underlying aquifers (Future Flow, 2015):
    - Seal floor using concrete lining
    - Compact floor area.
- Rehabilitated areas must be slightly convex and free draining to prevent ingress of water.
- Consider construction of cut-off trench to capture poor quality seepage and direct this to the PCD.
- Rehabilitated areas must be regularly inspected to assess and monitor for differential settlement and surface cracking/rat holing.

- Installation of additional groundwater level and quality monitoring boreholes in the vicinity of strategic points such as overburden stockpiles, water management dams, coal stockpiles to monitor potential plumes and groundwater contamination (Future Flow, 2015).
- Performing additional geochemical analysis and waste classification testing once mining started. This will confirm the results from the preliminary testing done during this study (Future Flow, 2015).
- Regular (2 yearly) updates of the numerical groundwater flow and contaminant transport models. This will help ensure that the results discussed in this document remain relevant with changes in mining operations, and also increase the level of confidence in the model results (calibrating the model based on time series groundwater levels, dewatering volumes, and qualities yield higher levels of confidence than calibrating the models on once-off data points collected during this study (Future Flow, 2015).

26.2.3.6 Air Quality

- A water cart will be used to spray hauls roads and relevant areas when dust levels are high.
- Coal will be moved on a first-in-first-out basis and no coal will stored on surface for excessive periods to prevent spontaneous combustion.
- Where spontaneous combustion takes place, fine subsoil material will be used to cover the surface to douse the combustion.
- Alternative blasting methods will be considered to reduce dust generation. Blasting should not be conducted when it is very windy.
- Material handling and processing should consider the following (Rayten, 2015):
    - Increased moisture content of the materials handled by spraying.
    - Reduced drop-height from excavator/conveyors into haul trucks/stockpiles.
    - Reduce tipping speeds.
    - Silos and chutes can also be considered where feasible.
    - Windbreaks or screens from predominant wind directions (northeast).
    - Regular clean-up at handling and loading areas.
- Consider use of chemical suppressants (Rayten, 2015) on all haul roads or paving the main road if dust management proves to be ineffective.
- Exposed and rehabilitated areas should be vegetated to reduce wind erosion (Rayten, 2015).
- Temporary discard disposal to surface will be done in an area sheltered from wind as far as possible. The side of the dump will continuously be cladded with subsoil, especially sides exposed to wind. These measures should reduce the risk of spontaneous combustion as the discard will only be on site for 3-5 years once backfilling activities can commence.

- Truck speeds should be kept as low as possible to minimize fugitive dust emissions. 20km/h would be ideal for reduced dust generation, but speed limit to 40km/h is acceptable if accompanied by more frequent spraying.

26.2.3.7 Flora and Fauna

- Eradicate and control all alien invasive species on site.
- Ensure rehabilitation is continuously completed in a roll over fashion as opencast mining progresses to reduce impact footprint area and return rehabilitated areas to the ecologically sustainable areas.
- Conduct monthly visual surveys of seeded areas for germination and reseed areas with poor germination and consider planting these areas with seedling plugs.
- Conduct annual floral surveys to monitor floral establishment on rehabilitated areas and apply specialist recommendations on site.
- The rehabilitation plan, using indigenous species from the study area, must be implemented so as to restore disturbed areas as close to pre-mining as possible on all disturbed areas as soon as they are no longer needed for activity (Dimela, 2015):
    - Due to the dry climate, natural colonisation could take a long time, in which vegetation may degrade further or become dominated by encroacher species. Therefore, timeous rehabilitation is imperative. Even in the event of good rains, annual pioneer plants are short-lived and therefore an effort must be made to keep as many perennial plants in place as possible or to replace these as part of rehabilitation.
    - Runoff water needs to be trapped by either the mechanical breaking of the soil surface to trap water, packing of stones, tyres or brush along contours to trap mulch, slow down water movement and reduce the impact on bare soil (Esler, et al, 2006). Pitter basins work well on fine textured soil and must be orientated and shaped to face upslope. The basins trap seeds, organic matter and water which could lead to rapid colonisation after rains (Esler, et al, 2006).

26.2.3.8 Sites of Archaeological and Cultural Interest

Construction phase mitigation measures are relevant and must continue into operations for any new areas which may be disturbed.

26.2.3.9 Noise

- Noise monitoring must continue during operations and must be undertaken at least quarterly.
- Any noise barrier erected during construction will be moved as necessary with roll-over mining and maintained during the operational phase.
- Equipment should be switched off when not in use.
- The mine should consider limiting operating hours to day-time only, when mining commences within 500m meters of SR1, SR2, SR4 and SR5.

26.2.3.10 Blasting and Vibration

- Blast specialist / blast contractor will be fully conversant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015) and ensure compliance with regards to the regulation on site.
- Consider a blast design to reduce charge mass near structures OR increase mining buffer area (Blast Management & Consulting, 2015). Blast study has indicated the following points as areas where blasting needs to be mitigated (reduced charge must be applied; distance of blasting must be considered):
    - Farm Buildings/Structures (Point 79 in Plan 48) adjacent to the northern boundary – all blasting within 459m of the site must be conducted at reduced charge of 748kg/charge.
    - Farm Buildings/Structures (Point 82 in Plan 48) on Eendracht – cannot be mitigated by reduced charge, however GCMC will purchase this property and buildings.
    - D1675 Road (Point 85 in Plan 48) adjacent to the southwestern corner of the West Pit – all blasting within 155m of the site must be conducted at reduced charge of 850kg/charge.
    - Buildings/Structures (Point 116 in Plan 48) adjacent to the southern boundary – all blasting within 459m of the site must be conducted at reduced charge of 119kg/charge.
    - Informal Housing (Point 121 in Plan 48) south of the East Pit – all blasting within 459m of the site must be conducted at reduced charge of 655kg/charge.
    - Buildings/Structures (Point 131 in Plan 48) east of East pit – all blasting within 1089m of the site must be conducted at reduced charge of 1723kg/charge. Area shielded from air blast by East Material Stockpile.
    - Buildings/Structures (Point 132 and Point 134 in Plan 48) east of East pit – all blasting within 459m of the site must be conducted at reduced charge of 1264 / 1216kg/charge respectively.
    - Buildings/Structures (SPCA Lephalale) (Point 135 in Plan 48) southeast of East pit – all blasting within 459m of the site must be conducted at reduced charge of 719kg/charge respectively.
    - Potential Bull frog habitat (Point 157 in Plan 48) – all blasting within 682m of the site must be conducted at reduced charge of 646kg/charge respectively. It must be stressed that after 2012 and 2015 surveys these species are still unconfirmed and are unlikely to be associated with these pans.
    - 4 mine boreholes (Points176-179 in Plan 48) have been identified as sensitive points for blasting. It must be stressed that these boreholes are mine monitoring boreholes and will be maintained by the mine throughout operations. Blasting impacts to these sites will result in the mine re-drilling the sites and bears financial implications to GCMC only.

  - Refuse Site (Point 197 in Plan 48) – all blasting within 301m of the site must be conducted at reduced charge of 674kg/charge respectively.
  - 200 -Communication Tower (Point 200 in Plan 48) adjacent to the south western corner of the West Pit – all blasting within 459m of the site must be conducted at reduced charge of 179kg/charge respectively.
- Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures (Blast Management & Consulting, 2015).
- Stemming control and audit, use proper stemming materials (Blast Management & Consulting, 2015).
- Blasts methods used to reduce outward impact radius.
- Utilise free-digging as far as possible.
- Reroute the road if damage to the road is severe (Blast Management & Consulting, 2015).
- Quality explosives to be used (Blast Management & Consulting, 2015).
- Do not sleep over explosives for extended periods of time (Blast Management & Consulting, 2015).
- If water is in blast holes use appropriate explosives (Blast Management & Consulting, 2015).
- Consider wind direction prior to blasting (Blast Management & Consulting, 2015).
- Blasting only to be conducted on cloudless days, if possible during times of low winds.
- Vibration impacts on nearby structures must be monitored by seismograph and compensation options must be in place and available to affected I&APs.
- A blasting schedule should be given to surrounding land owners / users. Sirens should be sounded prior to blasting to give warning to all personnel on site and the neighbouring residents.
- People within the 600m blasting zone will need to be evacuated during blasting events.
- All blasting will be conducted as per the requirements of the Mine Health and Safety Act.

26.2.3.11 Visual Aspects

- All berms and other visual screens must be maintained.
- Lighting must be kept to a minimum and any lights used on site must be faced away from residents or farmsteads when lit.
- Foreground planting of trees and shrubs can also be used along the property boundary to screen the views from each of the adjacent farmsteads if complaints are received.
- Machinery must be kept in colours that are similar to or compliment the surrounding vegetation and backdrop.

- Apply the rehabilitation plan on site for opencast sections that have been mined out as soon as possible.
- Continue with good housekeeping practices and keep area litter free and orderly.

26.2.3.12 Regional Socio-Economic Structure and I&AP Concerns

- Ensure baseline photographs are taken of all structures within 1500m which may be impacted for photographic evidence prior to any blasting. Ensure procedures in place to compensate for damage.
- Any retrenchment and employment will be done in accordance with the S&LP.

26.2.4 Decommissioning and Post-Closure Phase

Many of the operation phase management measures will need to be applied during decommissioning as activities are slowly phased out. Only additional measures strictly related to rehabilitation and closure phase are discussed below.

26.2.4.1 Topography

- General inspections of surface area especially after rains and attend to any issues observed.
- All final voids should be filled with remaining overburden and covered with remaining soil stockpiles.
- Adequate overburden material and soil should be available to ensure altitudes and contours stated in the final rehabilitation model are attained.
- Topographical surveys need to be conducted on rehabilitated areas to ensure adequate elevations are obtained. Material should be added or removed as needed to obtain elevations as per the rehabilitation model.
- The area should be contoured according to the rehabilitation plan and to allow for free surface water drainage.
- Areas where pooling of water occurs, or where erosion is prevalent should immediately be addressed to ensure that this does not occur.

26.2.4.2 Soil and Land Capability

- Stockpiled soil must be used to rehabilitate the remaining disturbed sites.
- The utilizable soil removed during the construction and operation phases shall be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the approved post-mining land use (low intensity grazing/arable), and will attain a free draining surface profile.
- Stockpiles will be removed and the footprint areas thoroughly cleaned and ripped in preparation for rehabilitation.
- Ensure reputable contractors are utilised for removal of all substances from site and that these are adequately transported and where necessary adequately disposed of.

- Soil specialists should be consulted to conduct annual assessments and determine the correct treatment of soils on rehabilitated land. This must be undertaken for at least 2-3 years after closure.
    - As a minimum the following elements will be tested for: EC, CEC, pH, Ca, Mg, K, Na, P, Zn, Clay% and Organic Carbon. These elements provide the basis for determining the fertility of soil; fertilisers will be applied if and as necessary.
- Runoff from the rehabilitated areas must be allowed to flow naturally to the environment (LWES, 2015).

26.2.4.3 Surface Water, Wetlands and Aquatic Systems

- All water within the area of activity will be contained on site and only released into the environment when rehabilitation is largely completed and water runoff from areas is of adequate quality.
- The final landform of the rehabilitated pits must be sustainable, free draining, minimize erosion and avoid ponding. Where final voids are maintained, these must be properly sloped to ensure a safe landscape (LWES, 2015).
- Monitor area for erosion and pooling and rehabilitate if necessary.
- Continue with annual wetland monitoring and apply any specialist recommendations.
- Continue with monthly surface water monitoring and biannual biomonitoring.
- Should artificial wetlands be established then water must stay within artificial wetlands long enough to adequately treat water quality. Consult specialists with regards to the need and design and operation of such systems.

26.2.4.4 Groundwater

- Continue with quarterly groundwater quality monitoring and drill additional monitoring boreholes at potential decant sites and downstream of rehabilitated areas to monitor plume quality.
- Finalise and implement any plume management systems that may be required as a result of monitoring results.

26.2.4.5 Flora and Fauna

- A qualified botanist should be consulted to assist during the rehabilitation to increase species diversity.
- Conduct monthly visual surveys of seeded areas for germination and reseed areas with poor germination and consider planting these areas with seedling plugs.
- Conduct annual floral surveys to monitor floral establishment on rehabilitated areas and apply specialist recommendations on site.
- The rehabilitation plan, using indigenous species from the study area, must be implemented so as to restore disturbed areas as close to pre-mining as possible on all disturbed areas as soon as they are no longer needed for activity (Dimela, 2015):

  - Due to the dry climate, natural colonisation could take a long time, in which vegetation may degrade further or become dominated by encroacher species. Therefore, timeous rehabilitation is imperative. Even in the event of good rains, annual pioneer plants are short-lived and therefore an effort must be made to keep as many perennial plants in place as possible or to replace these as part of rehabilitation.
  - Runoff water needs to be trapped by either the mechanical breaking of the soil surface to trap water, packing of stones, tyres or brush along contours to trap mulch, slow down water movement and reduce the impact on bare soil. Pitter basins work well on fine textured soil and must be orientated and shaped to face upslope. The basins trap seeds, organic matter and water which could lead to rapid colonisation after rains.
- It is recommended that Landscape Functional Analysis (LFA) forms part of the rehabilitation and monitoring process to restore specific and measurable elements of ecosystem function rather than focusing purely on attaining floristic targets and thresholds (Dimela, 2015).

26.2.4.6 Noise

- The mine should consider limiting operating hours to day-time only, should issues arise from nearby sensitive receptors.

26.2.4.7 Visual

- Apply the rehabilitation model on site and rehabilitation plan on site.
- Continue with general good housekeeping practices.

26.2.4.8 Regional Socio-Economic Structure and I&AP Concerns

- Should any new contracts be created during the decommissioning phase, then local contractors should be sought first.
- All SLP initiatives and commitments should be applied particularly with regard to retrenchment.
- Employ staff at other operations if feasible.
- The public participation process should continue throughout decommissioning of the mine to allow all interested and affected parties (I&APs) to continue relations with the mine and offer them a platform to raise their issues and concerns.

26.3 Potential Risk of Acid Mine Drainage

Acid base accounting and leach testing was completed as part of the geohydrological assessment which has been attached in Appendix 7. The following can be concluded regarding the potential for acid mine drainage (Future Flow, 2015):

It is likely that AMD conditions will form from the carbonaceous shale and coal seam material that will be handled in the area. The high Total – S percentage indicates that the acid conditions will be sustained in the long term in waste rock stockpiles;

Leach test results show that none of the analysed elements will exceed the IFC effluent guidelines. In general it can be said that the long term quality of seepage from the mined-out area will not pose a significant risk to the surrounding aquifers in terms of human consumption or environmental impacts.

26.4 Steps Taken to Investigate, Assess and Evaluate the Impact of Acid Mine Drainage

Contaminant transport modelling was completed as part of the geohydrological assessment which has been attached in Appendix 7, and detailed in Section 9.1.3 taking into account results obtained from the acid base accounting and leach testing. The following actions are recommended, even though the preliminary findings indicate that contamination will not be so severe as to cause impact on water users or the environment (Future Flow, 2015):

- Regular (2 yearly) updates of the numerical groundwater flow and contaminant transport models. This will help ensure that the results discussed in this document remain relevant with changes in mining operations, and also increase the level of confidence in the model results.
- Installation of additional groundwater level and quality monitoring boreholes in the vicinity of strategic points such as overburden stockpiles, water management dams, coal stockpiles. These can be sited after the completion of the next update of numerical groundwater flow and contaminant transport model as discussed above.
- Regular monitoring of groundwater and surface points. This will act as an early warning system for any contamination that could potentially migrate away from the mining areas.
- Compensation of surrounding landowners for loss of water supply, or water quality, due to the mining activities. From the current model, no user boreholes will be affected.
    - BH08 (Plan 13) will be affected by dewatering and may experience some deterioration in quality. This is an Eskom Monitoring borehole. Eskom should be consulted as to whether they would like to relocate the borehole.

26.5 Engineering or Mine Design Solutions to be Implemented to Avoid or Remedy Acid Mine Drainage

Preliminary findings indicate that contamination will not be so severe as to cause impact on water users or the environment (Future Flow, 2015). Regardless, the following measures are suggested to reduce acid mine drainage and associated plume migration:

- Mine responsibly during the operations phase:
    - Remove any water within the box cut to prevent contact time between carbonaceous material and water. The pit must be kept as dry as possible through dewatering. This will reduce the risk of AMD conditions as exposure of pyritic material to water is reduced.
    - Carbonaceous overburden and discard must be placed at the bottom of the pit during backfilling, placed in layers and tyre compacted.
    - Larger fractures that are encountered during mining contributing to water flow should be sealed to reduce water inflows into the mining area. In addition this will prevent these aquifer systems coming into contact with contaminated water post mining.
    - Reduce vertical flows into the underlying aquifers:
        - Seal floor using concrete lining, or
        - Compact floor area
    - Roll-over mining must be concurrent to rehabilitation as this will again assist in reducing exposure of pyritic material with the elements which lead to AMD formation.
    - Rehabilitated areas must be slightly convex and designed to be free-draining to reduce ingression of water.
- Rehabilitated areas must be regularly inspected to assess and monitor for differential settlement and surface cracking/rat holing which will increase ingress of water if not rehabilitated.

26.6 Measures that will be Put in Place to Remedy any Residual or Cumulative Impact that may Result from Acid Mine Drainage

Preliminary findings indicate that contamination will not be so severe as to cause impact on water users or the environment (Future Flow, 2015). Should monitoring measures as discussed in Section 29.1.5 indicate that water quality is deteriorating more than indicated in the initial model, the treatment options will be considered. The following can be considered, and must be implemented during decommissioning if needed:

- A pump-and-treat system can be established to continuously pump the water from the rehabilitated workings. This will keep the water levels below decant level. All the pumped, contaminated water can be sent to active or passive water treatment facilities. This option will have the benefit of reducing plume migration and also reducing seepage by ensuring water levels are kept low enough to prevent this water from reaching nearby water bodies, such as the Sandloop River. The only borehole that could be significantly affected is BH08 (Plan 13), an Eskom Monitoring borehole. Eskom should be consulted as to whether they would like to relocate the borehole. Depending on the level of treatment of the pumped water, this could be supplied to surrounding water users,

- Pollution control facilities such as intersection cut-off trenches (which must be excavated until the hard rock is exposed) and associated PCDs can be established to intercept any seepage/decant. Any water arising from the rehabilitated area will then decant into the trench and lead to the PCDs. The consideration of the area required to establish this will need to be properly evaluated so as to avoid wetlands.
- Specific trees with high water use could be planted over the opencast workings to keep water levels low and to take up contaminants.

26.7 Volumes and Rate of Water Use Required for the Mining Operation

Water requirements have been discussed under the detailed project description in Section 3.1.7.

26.8 Has a Water Use Licence has been Applied for?

A water use license application (IWULA) and associated Integrated Water and Waste Management Plan (IWWMP) will be submitted to the Department of Water Affairs and Sanitation (DWS). To date DWS has instructed GCMC to determine alternative water supplies to the MCWAP Phase II water supply, before submission of the IWULA. This is currently delaying the IWULA process as the site is water stressed. Sources being investigated include:

- Sourcing water from boreholes;
- Determining if there is any unallocated water in MCWAP I that can be utilised;
- Bringing water to site from other catchments (unlikely to be economically feasible); and
- Determining if other users in the nearby area can supply excess water to GCMC (qualities would need to be assessed and water may need some treatment which may also make the option unfeasible).

26.9 Impacts to be Mitigated in their Respective Phases

Please note, that in the table below, the first line discusses the entire active footprint and will be relevant to general mining and mining-related activities. As much as the contents in line 1 would be applicable for the individual sites and activities detailed further in the table, this is only discussed in line1 and not reiterated under each activity. The full impact assessment table is presented in Appendix 16 and only impacts of moderate, moderate to high and high significance are summarised below.

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
All infrastructure areas, development footprints and associated activities	Construction Operational Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Rehabilitate all disturbed areas when they are no longer needed, including contouring areas properly to ensure no pooling of water on site. **CONTROL** Complete pre-mining topographical surveys to aid in compilation of rehabilitation plan. Demarcate designated activity area as small as possible and maintain activity within this area only. Establish approved erosion control measures to reduce the risk of formation of erosion gullies. Install flow dissipaters in any areas where concentrated runoff flow is experienced, including silt traps in areas where flow becomes laden with sediment.	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Pre-mining topographical surveys will be completed before any activity takes place on site. Storm water runoff management features will be established around demarcated activity areas prior to other activities commencing and where necessary flow dissipaters and/or silt traps will be installed. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine.
Opencast excavations	Operational Decommissioning	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as soon as steady state mining is achieved. **CONTROL.** Compile a full rehabilitation model before any mining commences on site and apply on site throughout life of mine. Demarcate designated activity area. Conduct soil handling as per soil utilisation guide in the soil report. Rehabilitated areas must be contoured and free draining to prevent ingress and pooling of water.	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Pre-mining topographical surveys will be completed before any activity takes place on site. A full rehabilitation model will be compiled before mining commences on site and reviewed annually. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil utilisation guide will be implemented as soon as the first soil is stripped and stockpiled for the life of mine, until topsoil is applied to the final rehabilitated surface.
ALL material stockpile areas	Construction, Operation, Decommissioning	West: 87ha East: 200ha	**REMEDY** Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berms to shield visual impacts or divert clean water runoff from site. Ensure rehabilitation is continuously completed in a roll over fashion as soon as steady state mining is achieved to reduce need and extent for surface material stockpiles. **CONTROL** Stockpile heights must not exceed 2m for topsoil, 3m for coal stockpiles, 6m for subsoil, 25m for overburden. Move coal stockpiles on a first-in-first-out basis to reduce extent of coal stockpile areas. Coal stockpile and handling must be in designated areas only. Demarcate stockpile areas and strip soil from these areas. Conduct soil handling as per soil utilisation guide in the soil report.	NEMA & MPRDA principals and regulations regarding stockpile management, decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and rehabilitation model commencing once the first cut is started for the duration of operations. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. ROM coal handling at open pits, will be temporary and coal will be removed on a continuous basis to the processing facility once the first coal is extracted until final coal is removed from site. Coal RoM feed and product stockpiles will be maintained at appropriate height and moved on a first-in-first-out basis once coal stockpiling and processing commences until the final coal is removed from site.
Water	Construction,	8ha	**REMEDY**	Water will be managed in	Demarcation of active areas and nearby sensitive areas will be

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
storage (dams / reservoirs / tanks) & Slurry dam	Operation, Decommissioning		Ensure dams are adequately sized and inspect, maintain and repair all water management features. **CONTROL** Necessary measure to ensure water separation and dirty water containment on site as per GN704 requirements. Slurry dam is a necessary measure to ensure slurry can be reclaimed for blending.	terms of GN704; can only be released with permission from DWS. NEM:WA regulations regarding mine residue handling and management, where relevant for surface stockpiling of slurry prior to blending. Conditions stipulated in licenses/rights/permits.	established before any activity takes place in specific area and maintained for life of mine. An engineer will oversee dam construction in line with approved designs and will sign-off once dam is completed.
Opencast excavations	Construction, Operation, Decommissioning	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	Nature of mining developments.	Mining will be carried out in line with MPRDA regulations and standard industry practices. Conditions stipulated in licenses/rights/permits.	Mine plan and rehabilitation model will continuously be implemented on site and will be consulted regularly with regard to new cuts or if geological anomalies are encountered as long as opencast mining and successive backfilling and rehabilitation continues.
Blasting	Operation	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**MODIFY** Alternative blasting methods will be considered to reduce outward impact. **CONTROL** Blasting specialists must be contracted. Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Blasting will comply with MHSA and MPRDA Regulations. See "Nearby Structures" aspects in this table for specific blast limits. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.
Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Operation, Decommissioning, Closure, Post closure	West Pit: 256ha East Pit: 352ha	**MODIFY** Alternative would be a permanent discard dump facility which would impact negatively on topography and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on visual aesthetics.	NEMA & MPRDA principals and regulations regarding stockpile and mine residue management. NWA GN704 & NEM:WA GNR636 (2013) regulations regarding backfilling with discard. Conditions stipulated in licenses/rights/permits.	Discard backfilling and compression at the base of pits will be initiated as soon as steady state mining is achieved to reduce the need for surface stockpiling and continue until the final void is backfilled.
All infrastructure areas, development footprints and associated activities	Construction, Operation, Decommissioning, Closure	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required and cordon off areas until vegetation has established. Revegetate all bare soils. Incorporate herbaceous vegetation into soil stockpiles. Ameliorate soils as needed to establish stable vegetation communities on rehabilitated areas. **CONTROL** Demarcate designated activity area and keep as small as possible. Strip topsoil from all activity areas and stockpile as berms as per mine infrastructure plan. Conduct soil handling as per soil utilisation guide in the soil report. Construct drainage and erosion controls in advance of mining activities. These can include gabion baskets, levees and reseeding of areas not being used. Divert storm water runoff away from areas with high erosion potential.	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. Soil surveys will be undertaken annually over areas that have been rehabilitated and topsoiled until all rehabilitated areas are self-sustaining. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine.

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Install silt traps and/or flow dissipaters as needed to prevent erosion and associated silt loading.		
Topsoil & subsoil stripping & stockpiling	Construction, Operation, Decommissioning	West subsoil stockpile: 17ha East subsoil stockpile: 17ha Topsoil berms: 14588m (approximate 2-3m width)	**REMEDY** Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berm to shield visual impacts. As far as possible, plan soil stripping activities in the dry season. **CONTROL** Minimize the area which is disturbed at any one time. Topsoil and underlying material should be stored separately as per stripping guidelines. All excavated topsoil will be stored for use during rehabilitation of the mine. Topsoil should be stripped and stockpiled with herbaceous vegetation to retain organic content. All stockpiles / berms which will be in place for more than 6 months must be vegetated to reduce risk of erosion. Topsoil stockpiled as perimeter berms must not exceed 2 m. Subsoil stockpiles must not exceed not exceed 6 m in height. All stockpiles must have an outer slope of approximately 1 V: 3 H (to limit the potential for erosion of the outer pile face). Construct top perimeter berms on subsoil stockpiles. Cut off drain must be constructed upslope of all stockpiles. Seed all stockpiles - Seeding must be completed within seven (7) days of stockpiling.	NEMA & MPRDA principals and regulations regarding stockpile management, decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine.
All infrastructure areas, development footprints and associated activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	Apply soil management measures as stipulated above. **REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. **CONTROL** Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Clean and dirty water separation and dirty water containment features must be established on site. This will include upslope berms to divert clean water around the site of activity into natural drainage lines and internal channels to drain dirty water from the active footprint to lined containment dams. Line all dirty water dams to prevent seepage. Line all trenches carrying high or continuous loads of dirty water runoff to prevent seepage. Establish protective berms between active areas and wetlands, outside wetland buffer zones, where activity is near to such areas. Road surfaces must be compacted in order to increase stability. Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed. Install flow dissipaters where rapid flow of diverted clean storm water runoff occurs as necessary. Install silt traps / flow dissipaters if necessary to trap silt in highly silt-laden runoff. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained	Water will be managed in terms of GN704; can only be released with permission from DWS. Surface water quality in neighbouring areas will be maintained close to baseline conditions or to IWULA RWQOs and compared to SANS drinking water standards for pH, sulphate. Iron, TDS and EC. Erosion control measures will be considered in terms of CARA and MPRDA regulations. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			where necessary.		
All infrastructure areas, development footprints and associated activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Keep dirty water runoff areas as small as possible to increase clean water runoff footprint area. Runoff from the rehabilitated areas must be allowed to flow naturally to the environment as soon as such areas become stable. Upstream dewatering boreholes should be considered in order to minimise the creation of dirty water within the opencast pit, and this clean water should be used to recharge the natural systems downstream of the mining rights areas at a rate similar to the volume being contained in the dirty footprint. **CONTROL** Necessary measure to contain dirty water runoff.	Mine water will be contained on site as per GN704. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.
Infrastructure area & Opencast excavations.	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**CONTROL** Demarcate designated activity area and demarcate 100m buffer zone from wetlands and rivers as no-go areas. Establish protective berms outside wetland buffer zones between wetlands and active areas. Where the riparian wetland will be impacted (section of the loop siding), the activity will only commence once all authorisation are in place to do so and activity will proceed as per the approved IWWMP. Area activity within the wetland will be maintained as small as possible Berms will be erected on the immediate downslope side of the loop siding where this infringes into the wetland area. The trains entering the wetland area will be empty (trains will enter the siding clockwise) to prevent potential coal spillages in the wetland area. Area will be kept clear of rubble, waste, spills at all times and vegetation within the area will be maintained as far as possible to reduce impact on ecological functioning. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**)	Water will be managed in terms of GN704. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.
All Material stockpiles	Construction, Operation, Decommissioning	West: 87ha East: 200ha	**REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. Apply soil management measures as stipulated above. **CONTROL** Conduct soil handling as per soil utilisation guide in the soil report. Vegetation removal must be over a minimal area as possible. All bare surface areas must be re-vegetated. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish approved erosion control measures such as top and toe berms around stockpiles. All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities.	Water will be managed in terms of GN704. Erosion control measures and soil handling will be considered in terms of CARA and MPRDA regulations and best practices in industry. NEMA & MPRDA principals and regulations regarding soil handling and rehabilitation. Conditions stipulated in licenses/rights/permits.	Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine.

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Stockpile heights must not exceed 2m for topsoil, 6m for subsoil and 25m for overburden. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes. All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities. Vegetate soil stockpiles.		
East Overburden stockpiles (non-carbonaceous & carbonaceous)	Construction, Operation, Decommissioning	East: 183ha	**MODIFY** The eastern stockpile area should occupy the southern area (as indicated in the latest mine plan) in order to preserve the pans in the far north until such time that an IWUL is issued for activity in the pans. **CONTROL** Pans and 100m buffer zones should be preserved if IWUL to conduct activities in these areas is not granted. The following is relevant if pans remain in situ: Establish storm water control measures before any other activities commence to ensure clean water diversion around the pans. Establish approved erosion control measures such as top and toe berms around stockpiles to prevent sedimentation into the pans. **STOP** The pans can only be disturbed / destroyed once an IWUL is issued. Until such time, the eastern stockpile area must remain outside the pans and their 100m buffer zone.	Water will be managed in terms of GN704. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Conditions stipulated in licenses/rights/permits.	Wetland buffers will be maintained free of obstacles, sedimentation and rubble. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine and through to post closure phase to ensure water management is effective.
Overburden stockpiles (carbonaceous) & RoM and product coal stockpiles	Construction, Operation, Decommissioning	West: 87ha East: 200ha Coal: 25ha total (excluding piles at processing plant)	**CONTROL** Demarcate stockpile areas and manage as dirty footprint. Stockpile areas must be adequately prepared and compacted and be managed as part of the dirty water footprint area. Coal stockpile area will have a Class C lining system. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment from stockpile area.	Water will be managed in terms of GN704; can only be released with permission from DWS. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. NEM:WA regulations regarding mine residue handling and management. NEM:WA regulations regarding waste to landfill. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. The base of the stockpile area will be prepared (compacted and sloped to drain into the dirty water management area) before any material stockpiling takes place. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.
ALL coal handling, storage, processing and conveyance areas	Construction, Operation	Coal: 25ha total (excluding piles at processing plant) 38ha (includes coal stockpiles for processing / blending) 9 900m of rail for preferred Northern	**REMEDY** Coal spillages must be cleared. **CONTROL** Coal stockpile and handling must be in designated areas with compacted base and must form part of the dirty water footprint. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes. Manage dust through water carts or sprinklers. Wagons must not be overloaded and must be covered with tarpaulin. Trucks must not be overloaded.	Dust fallout will be monitored and managed as per GNR827 and compared to baseline limits (which already exceed NEM:AQA limits). Water management on site will be as per GN704. Conditions stipulated in licenses/rights/permits.	All coal handling, transfer and stockpiling will be within designated areas only, which will be incorporated into the dirty water footprint, and coal will be processed and removed from site regularly as soon as coal is extracted until final coal is removed from site. The base of the stockpile areas will be prepared (compacted and sloped to drain into the dirty water management area) before any material stockpiling takes place. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		option			completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.
Water storage (dams / reservoirs / tanks) & Slurry dam	Construction, Operation	8ha	**REMEDY** Inspect, maintain and repair all water management features. Follow emergency response plan for spills. Keep back-up pumps and pipes on site. **CONTROL** Ensure water separation and dirty water containment on site as per GN704 requirements. Ensure all dirty water containment facilities are adequately sized, designed and constructed. All dams will be constructed and lined as per designs and managed with a 0.8m freeboard. All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs Slurry removed from dams will be stockpiled in the dirty footprint area and be blended into product or disposed of onto the discard dump in compacted layers.	Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Mine water will be contained on site as per GN704. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.
Water & slurry pipelines	Construction, Operation	Approximately 1600m	**REMEDY** Inspect, maintain and repair pipelines and pumps. Follow emergency response plan for spills. Keep back-up pumps and pipes on site. **CONTROL** Pipelines should be laid in paddocks which will serve to contain any leaks. Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur. **STOP** Dirty water pipelines will remain outside 100m buffer zones / 1:100 year floodlines until authorisations under NWA have been obtained where needed.	Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Mine water will be contained on site as per GN704. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.
Stores, workshops & washbays & Hardpark & Fuel Storage	Construction, Operation	12.5ha	**REMEDY** Oil from oil traps will be removed to the used hydrocarbon drum for removal from site by a reputable hydrocarbon waste contractor. Spill kits must be available on site and personnel trained to utilise these to clear spills. **CONTROL** Areas will be treated as a dirty areas and any runoff from sites must be contained. Maintenance of vehicles must be conducted on a demarcated area with a concrete slab and oil collection system. Cement will be handled over protected ground or sheeting. Chemicals will be stored as per requirements with the MSDS. Wet and dry chemicals, reducing and oxidising agents, will be stored separately. All diesel storage must be within concrete bunded areas that contain 110% of storage capacity if roofed or 120% storage capacity if not	Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. Waste oil handled and stored as per NEM:WA and its regulation: GNR926. Conditions stipulated in licenses/rights/permits.	Cement handling will occur in designated areas or over protective sheeting during construction and whenever cement is brought to and utilised on site. Storage and handling of chemicals will be conducted in terms of the chemical's specifications and / or MSDS as long as chemicals are stored on site . Hydrocarbons will only be stored on site once bunded areas are constructed and storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance with the EMP as soon as hydrocarbons are brought to site for the life of mine. Hydrocarbon storage infrastructure, including concrete bunding and oil traps will be maintained as long as hydrocarbons are stored on site. Vehicles, machinery and equipment will be maintained within their operating specifications through servicing, calibration and general maintenance for the life of

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			roofed; must be to SANS standards, refuelling areas will be over concrete platform. Bunds in workshop, washbay and fuel storage facility will be fitted with an outlet valve or drain to an oil trap. The outflow will flow through an oil trap and water component will be treated and recycled as process water. Oil from oil traps will be removed to the used hydrocarbon drums which will be temporarily stored in concrete bunded areas prior to removal from site by a reputable hydrocarbon waste contractor. All vehicles / machinery on site will be up-to-date with their service and maintenance plans. The use of persistently leaky equipment will be discontinued until repairs are made. Equipment will not be parked over bare ground; where unavoidable, drip trays will be placed under the equipment to collect potential leaks.		mine. Good housekeeping practices will be applied to the hard park area and the area will be kept clear of spills for as long as vehicles and machinery are kept in the area.
Ablutions & change house with sewage treatment plant	Construction, Operation	<1ha	**MODIFY** Alternative to utilise existing municipal facilities not feasible as these facilities are already highly stressed due to the growth of Lephalale. **REMEDY** Inspect and repair all aspects of the sewage treatment facility as needed, including any plumbing associated with the bathrooms and toilets. **CONTROL** Package Sewage treatment plant must be designed to have enough capacity. Standard operating procedure (SOP) will be devised and implemented for the sewage treatment facility. Bacterial assessment of all monitoring points downstream of the sewage treatment plant.	Downstream water quality will be within background quality limits and compared to SAN 2011 drinking water quality guidelines for bacteria. Conditions stipulated in licenses/rights/permits.	Water use will be monitored for the life of mine as soon as water use commences. Construction of ALL water management features, including the sewage treatment plant, will be completed before other activities commence in the area and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. sites downstream of the sewage treatment plant will also be tested for bacterial counts.
All infrastructure areas, development footprints and associated activities	Construction, Operation	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	Apply all surface water management measures as containment of dirty water on site within lined facilities will prevent seepage of contaminants to groundwater. **REMEDY** Keep all materials within properly prepared and designated areas and apply good housekeeping practices by keeping surface clear of all materials. **CONTROL** Ensure all storage areas for potentially contaminating material (coal, carbonaceous material, hydrocarbons, chemicals and various wastes) are designed and appropriately lined to reduce seepage.	Groundwater quality in neighbouring areas will be maintained close to baseline conditions for pH, sulphate. Iron, TDS and EC. NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. Conditions stipulated in licenses/rights/permits.	Good housekeeping practices will be applied over mining and infrastructure areas and areas will be kept clear of any potentially contaminated material, which will only be stored in designated areas, from the onset of construction throughout the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.
Opencast excavations	Construction, Operation, Decommissioning	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as per the rehabilitation plan. Ensure registered affected water users are compensated in some way with alternative water supply. **CONTROL** Seal off individual seepage zones in the fractured rock. Reduce vertical flows into the underlying aquifers: seal floor using concrete lining; compact floor area.	Affected registered water users will be compensated for loss of water quality and quantity as per the Constitution and NWA. Conditions stipulated in licenses/rights/permits.	Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Groundwater level monitoring will commence before construction and continue for life of mine at nearby user boreholes.
Opencast excavations	Operation, Decommissioning,	West Pit: 256ha	**MODIFY** Alternative would be a permanent discard dump facility which would	Groundwater quality in neighbouring areas will be	Conduct mining responsible and apply EMP measures from the onset of mining, including proper material handling (stripping,

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
& Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Closure, Post-Closure	East Pit: 352ha Maximum at any one time: 50ha at each pit	still impact negatively on groundwater and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on topography and visual aesthetics. Treatment options for contamination plume: utilisation of a proposed water treatment plant; a pump and treat system to continuously pump the water from the rehabilitated workings to surface dams to keep the water levels below decant level; cut-off intercept drain installed until the hard rock is exposed to capture any seepage/decant and drain water to the PCD; retaining a final void. Passive treatment can also be investigated and the mine can establish passive water ponds/wetlands. Specific trees can be planted over the opencast working to keep water levels low and to take up contaminants. **REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as per the rehabilitation plan. Ensure registered affected water users are compensated in some way with alternative water supply. **CONTROL** Keep mining areas as dry as possible and replace and compact carbonaceous material at the bottom of the pit during rehab to ensure early flooding and oxygen displacement. Seal off individual seepage zones in the fractured rock. Rehabilitated areas must be free draining to prevent ingress of water.	maintained close to baseline conditions for pH, sulphate. Iron, TDS and EC. NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. Affected registered water users will be compensated for loss of water quality and quantity as per the Constitution and NWA GN704 & NEM:WA GNR636 (2013) regulations regarding backfilling with discard. Conditions stipulated in licenses/rights/permits.	stockpiling and replacement) activities until final void is fully rehabilitated. Discard backfilling and compression at the base of pits will be initiated as soon as steady state mining is achieved to reduce the need for surface stockpiling and continue until the final void is backfilled. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Groundwater level monitoring will commence before construction and continue for life of mine at nearby user boreholes. Update the contaminant transport model for groundwater throughout operations (every two years) to ensure proactive response to potential decant and contaminated plumes at the time of decommissioning and closure.
All infrastructure areas, development footprints and associated activities	Construction, Operation, Decommissioning, Closure	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Rehabilitate all disturbed areas and seed with local indigenous species. **CONTROL** Clear all vehicles coming to site of any vegetative material to prevent introduction and spread of potential alien and invasive species. Eradicate and control all alien invasive species, removing those identified during the specialist study before construction commences to prevent spread of these species. Mechanical methods should be utilised in preference to chemical methods. Dispose of the eradicated plant material at an approved solid waste disposal site. Compile and implement an alien and invasive species management plan. Leave as much natural vegetation intact as possible. Do not disturbed soil unnecessary. Ensure that areas outside of the operational footprint that were disturbed, are adequately rehabilitated and that dense stands of encroacher species are prevented. Develop a burning, cutting and/or grazing management plant with an ecologist which takes into account safety of the operation, local by-laws and national legislation, in order to effectively manage veld areas.	Alien and invasive species managed in terms of CARA and NEM:BA.	An alien and invasive management plan must be implemented on site from the onset of construction throughout the life of mine.
All infrastructure areas, development footprints	Construction, Operation	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one	**REMEDY** Rehabilitate all disturbed areas. Revegetate all bare soils. Consider establishment of a nursery in which to store some of the local indigenous flora for use during rehabilitation.	Erosion control measures will be considered in terms of CARA and MPRDA regulations and best practice. NEMA & MPRDA principals	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Soil and flora surveys will be completed over rehabilitated areas once the first cut is fully rehabilitated for the life of mine to

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
and associated activities & Opencast excavations		time: 50ha at each pit	Incorporate herbaceous vegetation into soil stockpiles. **CONTROL** Demarcate designated activity area to ensure only flora in that area is affected. Prioritise low sensitivity areas and then conduct activities in medium sensitivity areas. An independent Ecological Control Officer (ECO) should be appointed to oversee construction. The ECO should be knowledgeable on the protected species that may occur within the development footprint as per the identification guide (Appendix D of the ecological report attached as Appendix 9). Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas. Prevent access to sensitive environs, particularly pans and the Sandloop River. Apply soil management measures to provide adequate substrate for vegetation establishment and growth. Apply surface water management measures to ensure ecosystems associated with wetlands and streams are maintained. Maintain connectivity of ecological corridors as far as possible by protecting the Sandloop River and associated riverine vegetation. Staff / contractors may not tamper or remove these trees where they are not within the construction footprint. No open fires must be allowed on site such as for cooking. Prohibit the harvesting of trees for firewood. Do not hinder, harm, trap animals. Noise control measures will be applied. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**). Pans will be preserved in situ until IWUL is obtained to conduct activities in these areas.	and regulations regarding rehabilitation. Conditions stipulated in licenses/rights/permits.	ensure adequate indigenous flora cover over rehabilitated areas to support grazing land use.
All infrastructure areas, development footprints and associated activities	Construction, Operation	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** As far as possible species (such as young saplings) should be transplanted or placed into nursery and replanted on site. A permit to collect the seeds of these trees could be obtained from DAFF and seeds can be grown in a small nursery on site to be replanted as part of rehabilitation. **CONTROL** Demarcate designated activity area and only remove species from the active area. Specialist will have to walk area and plot all protected species. Preserve all other species in situ. Staff / contractors may not tamper or remove these trees where they are not within the construction footprint. No open fires must be allowed on site such as for cooking. Prohibit the harvesting of trees for firewood. **STOP** Protected species cannot be removed until the necessary permits are obtained under NEM:BA. Northern rail link will affect fewer protected species.	Permits will be obtained under NEM:BA to relocate / destroy protected species. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Protected species on or near site must be monitored to prevent destruction to species and permits must be obtained for any species that will be removed or destroyed during construction and opencast mining before any activity tales place on site.

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
All infrastructure areas, development footprints and associated activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**CONTROL** Maintain connectivity of ecological corridors. Keep areas of tree clearance to a minimal in opencast areas and include a tree-planting in the rehabilitation plan. Do not hinder, harm, trap animals. Animals or protected flora under threat from the development will be relocated from site by specialists Noise control measures will be considered.	Conditions stipulated in licenses/rights/permits.	Protected species on or near site must be monitored to prevent destruction to species and permits must be obtained for any species that will be removed or destroyed during construction and opencast mining before any activity tales place on site.
All water management features	Operation, Decommissioning, Closure	Topsoil berms: 14588m (approximate 2-3m width) Dirty water channels: 1883m (approximate 2-3m width) PCDs& Slurry Dam: 8ha	**REMEDY** Contain all dirty water on site by establishing appropriately sized, designed and lined mine water dams on site. Line all dirty water dams to prevent seepage. Line all trenches carrying high or continuous loads of dirty water runoff to prevent seepage. **CONTROL** Demarcate designated activity area. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish protective berms / fence outside wetland buffer zones between wetlands and active areas. Establish clean water diversion berms upslope of activity footprint to prevent clean water runoff flowing onto site. Drain all water runoff on activity area to PCDs and dirty water containment features. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**). The northern rail way link and siding is preferred due to much smaller footprint encroaching into the buffer zone.	Water will be managed in terms of GN704; can only be released with permission from DWS. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Operation, Decommissioning, Closure	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Rehabilitation must be on-going. Soil must be ameliorated in order to sustain a vegetative cover. Local indigenous species must be utilised during rehabilitation. AMD management plan must be implemented as per the groundwater management measures. The area should be re-landscaped and resemble the land form prior to the open cast activities. The areas should be planted with indigenous vegetation typical of the area and monitored to ensure that the vegetation progress through succession stages. Runoff water needs to be trapped by either the mechanical breaking of the soil surface to trap water, packing of stones, tyres or brush along contours to trap mulch, slow down water movement and reduce the impact on bare soil. Pitter basins work well on fine textured soil and must be orientated and shaped to face upslope. The basins trap seeds, organic matter and water which could lead to rapid colonisation	Conditions stipulated in licenses/rights/permits.	Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil quantity and quality will be maintained over rehabilitated areas to ensure adequate vegetative cover for grazing land use until rehabilitated areas are stable and self-sustaining.

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			after rains. Mulch and brush also reduces the force of raindrops, limiting the dispersion of clay and the extent of mineral crusting. It also traps dust, sand and seeds to ensure plant establishment. Monitoring of the rehabilitation success should take place for at least five years and include corrective follow-up action. It is recommended that Landscape Functional Analysis (LFA) forms part of the rehabilitation and monitoring process.		
All infrastructure areas, development footprints and associated activities	Construction, Operational Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Ensure rehabilitation and seeding is continuously completed in a roll over fashion. **CONTROL** Wagons must not be overloaded and must be covered with tarpaulin. Speed limits must be established. Stockpile heights must not exceed 2m for topsoil, 6m for subsoil and 25m for overburden. Vegetate soil stockpiles and all exposed areas. Manage dust through water carts or sprinklers. Consider reducing activities when windy. Consider windbreaks, enclosures, shelters or misting of very dusty areas.	Dust fallout will be monitored and managed as per GNR827. Baseline conditions already exceed standards and emissions will be compared to baseline data. Conditions stipulated in licenses/rights/permits.	Dust suppression will commence from the onset of construction and continue for the life of mine. As a controlled Group C emitter, the mine must register and report to the NAEIS site from the onset of construction for the life mine.
Blasting	Operation	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**MODIFY** Alternative blasting methods will be considered to reduce outward impact. **CONTROL** Blasting specialists must be contracted who are fully compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015). Blasts methods used to reduce outward impact radius. Blasting should not be conducted when it is very windy. Utilise free-digging as far as possible.	Blasting will comply with MHSA and MPRDA Regulations. Dust fallout will be monitored and managed as per GNR827. Baseline conditions already exceed standards and emissions will be compared to baseline data. Conditions stipulated in licenses/rights/permits.	Dust suppression will commence from the onset of construction and continue for the life of mine. As a controlled Group C emitter, the mine must register and report to the NAEIS site from the onset of construction for the life mine.
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Ensure rehabilitation and seeding is continuously completed in a roll over fashion. **CONTROL** Manage dust through water carts or sprinklers.	Dust fallout will be monitored and managed as per GNR827. Baseline conditions already exceed standards and emissions will be compared to baseline data. Conditions stipulated in licenses/rights/permits.	Dust suppression will commence from the onset of construction and continue for the life of mine. As a controlled Group C emitter, the mine must register and report to the NAEIS site from the onset of construction for the life mine.
Opencast excavations	Construction, Operational Decommissioning	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**CONTROL** Site must be properly document by specialists and permit must be obtained from SAHRA prior to destruction of site. **STOP** Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained. Should other sites / graves be uncovered on site during activity progress then all activity should cease and the area demarcated as a no-go zone.	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to destruction or relocation of such sites.

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			A specialists will need to be consulted and responsible action considered, whether destruction / grave relocation / ceasing activity completely and maintaining site in situ.		
Opencast excavations	Construction, Operational Decommissioning	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**CONTROL** Permits must be obtained prior to relocation of sites (cemetery area with minimum of 2 graves). Site must be properly documented by a specialists and once permits are obtained the site can be exhumed and remains reburied. **STOP** Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained. Should other sites / graves be uncovered on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialists will need to be consulted and responsible action considered, whether destruction / grave relocation / ceasing activity completely and maintaining site in situ.	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to relocation of such sites.
Overburden stockpiles	Construction, Operation Decommissioning	West: 87ha East: 200ha	**CONTROL** Site must be properly document by specialists and permit must be obtained from SAHRA prior to destruction of site (recent farm structure / school). **STOP** Consideration should be given to adjusting stockpiling areas to preserve site and 50m buffer in situ where possible. Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained.	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to destruction or relocation of such sites.
Overburden stockpiles	Construction, Operation Decommissioning	West: 87ha East: 200ha	HIA report to be approved by SAHRA. No mitigation or permit required.	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to destruction or relocation of such sites.
Blasting	Operation	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**MODIFY** Alternative blasting methods will be considered to reduce outward impact. **REMEDY** A conservation management plan will be compiled for all sites that are not targeted for destruction or relocation and sites will be fenced off. Ensure heritage management plan includes procedures to compensate for damage. Ensure baseline photographs are taken of all structures within 1500m of the mine pits which may be impacted for photographic evidence prior to any blasting. **CONTROL** Evacuate 600m radius prior to blasting. Blasting specialists must be contracted. Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Blasting will comply with MHSA and MPRDA Regulations. SAHRA will be complied with regarding management of site in situ. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
All infrastructure areas, development footprints and associated activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Visual screens (vegetated berms, trees or wind breaks) will be considered where necessary. All berms and soil stockpiles will be vegetated. Apply dust control measures and other environmental measures to ensure impact area is contained. Apply good housekeeping practices.	Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Good housekeeping practices will be applied over mining and infrastructure areas and areas will be kept clear of any potentially contaminated material, which will only be stored in designated areas, from the onset of construction throughout the life of mine. Regular communications with I&APs.
Lighting	Construction, Operation	<1ha	**REMEDY** Utilise lights in the orange and yellow light ranges rather than white. This has the added benefit of reducing strong light and dark contrasts which also has safety benefits for staff. **CONTROL** Conduct activities during day as far as possible. Ensure directional floodlights are utilised to reduce light pollution to surrounds and prevent these from shining directly on adjacent land users and road users.	Conditions stipulated in licenses/rights/permits.	-
Blasting	Operation	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area OR increase blast distance. **REMEDY** Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures. **CONTROL** Stemming control and audit, use proper stemming materials, Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.
Blasting	Operation	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area OR increase blast distance. **REMEDY** Drill new boreholes at similar locations and similar depths to continue with groundwater monitoring. **CONTROL** Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.
Blasting	Operation	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area. **REMEDY** Reroute the road if damage to the road is severe. **CONTROL** Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.
Blasting	Operation	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each	**REMEDY** Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures.	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		pit	**CONTROL** Stemming control and audit, use proper stemming materials, re-design of blasts.	licenses/rights/permits.	
Blasting	Operation	West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**REMEDY** Reroute the road if damage to the road is severe. **CONTROL** Stemming control and audit, use proper stemming materials, re-design of blasts.	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.
All infrastructure areas, development footprints and associated activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	Nature of mining activities. A change in land use rezoning to mining must be applied for with the municipality.	Conditions stipulated in licenses/rights/permits.	Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil quantity and quality will be maintained over rehabilitated areas to ensure adequate vegetative cover for grazing land use until rehabilitated areas are stable and self-sustaining.
All footprints & All activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	Apply management measures for air quality	See Air Quality Aspect	See Air Quality Aspect
All footprints & All activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	Apply management measures for Noise & Nearby Structures (blast).	See Noise & Nearby Structures (blast) Aspects	See Noise & Nearby Structures (blast) Aspects
All footprints & All activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**MODIFY** Ensure workers have information available and sign a “code of conduct” at the start of employment which gives an overview of acceptable behaviour and information regarding health & safety on the site. **CONTROL** GCMC should appoint a service provider or local NGO to develop, implement and manage a “Health & Safety Orientation Programme” which must include information on HIV/AIDS, TB, and alcohol abuse prevention, with all temporary and permanent workers on the site. This must include encouragement to connect with local community programmes and NGO’s, health training and information which can be provided on-site to workers at the start of the project.	Comply with MHSA and MPRDA Regulations.	To be addressed in the Health & Safety Orientation Programme
All footprints & All activities	Construction, Operation	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one	Apply management measures for Nearby Structures (blast) **REMEDY** Should any of these activities prove ineffective, and in the case of scientifically proven health and safety risks, the last resort would be to negotiate resettlement with the affected residents. **CONTROL**	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
		time: 50ha at each pit	GCMC to continuously engage with affected communities regarding mitigation practices.		
All footprints & All activities	Construction, Operation,	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	Note that mitigation would not be possible in this instance. Should GCMC decide to negotiate a buyout of affected properties as part of a mining housing scheme, this concern would effectively be managed. This option has however not been raised by any of the parties involved and as such, no mitigation measures are presented. NOTE: This area has been targeted as a power generation / coal mining hub over the last 5 to 10 years. Furthermore property in South Africa has gone through severe fluctuations over the last 10 years. Lephalale's development plan report states that the property development exceeded requirements, which will negatively affect housing prices in the area. There are many factors that will play a role in overall property value.	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects
All footprints & All activities	Operation	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	Apply management measures for visual aesthetics	See Visual Aesthetics Aspect	See Visual Aesthetics Aspect
All footprints & All activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	**MODIFY** Preference should be given to rail transport where ever possible **REMEDY** Part of the construction phase needs to include the continuous maintenance of the road to be able to handle the increase in traffic and excessive dust and noise as a result of the gravel roads. **CONTROL** Limit traffic to roads indicated specifically for the project. Limit use of unimproved roads to emergency use only. Instruct and require all personnel and contractors to adhere to speed limits to ensure safe and efficient traffic flow. Limit mine-related vehicle traffic on public roadways to off-peak commuting times to minimize impacts on local commuters.	Operations will comply with MHSA and Regulations. Conditions stipulated in licenses/rights/permits. Vehicles will be serviced and maintained in road worthy condition.	Internal roads and intersections with public roads will be maintained from the onset of construction throughout the life of mine Speed inspections will be undertaken sporadically on site throughout the life of mine to ensure contractors are obeying speed limits.
All footprints & All activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	No mitigation can be applied. See Section 7.4.1.1.14 of the EIA report for full detailed discussion of municipal development plans. Communication with LLM must continue.	-	-
All footprints & All activities	Construction, Operation, Decommissioning	Proposed activity area: 1250ha West Pit: 256ha East Pit: 352ha Maximum at any one time: 50ha at each pit	Apply management measures for air quality	See Air Quality Aspect	See Air Quality Aspect

27 IMPACT MANAGEMENT OUTCOMES

Please note, that in the table below, the first line discusses the entire active footprint and will be relevant to general mining and mining-related activities. As much as the contents in line 1 would be applicable for the individual sites and activities detailed further in the table, this is only discussed in line1 and not reiterated under each activity. The full impact assessment table is presented in Appendix 16 and only impacts of moderate, moderate to high and high significance are summarised below.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
All infrastructure areas, development footprints and associated activities	Excavation and creation of infrastructure foundations and servitudes will alter the topographical nature of the site and associated drainage.	Topography	Construction Operational Decommissioning	**REMEDY** Rehabilitate all disturbed areas when they are no longer needed, including contouring areas properly to ensure no pooling of water on site. **CONTROL** Complete pre-mining topographical surveys to aid in compilation of rehabilitation plan. Demarcate designated activity area as small as possible and maintain activity within this area only. Establish approved erosion control measures to reduce the risk of formation of erosion gullies. Install flow dissipaters in any areas where concentrated runoff flow is experienced, including silt traps in areas where flow becomes laden with sediment.	Reduce impact to neighbouring areas. Restore natural catchment drainage patterns as far as possible. Restore land to grazing land use.
Opencast excavations	Altered topographical nature and associated drainage.	Topography	Operational Decommissioning	**REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as soon as steady state mining is achieved. **CONTROL.** Compile a full rehabilitation model before any mining commences on site and apply on site throughout life of mine. Demarcate designated activity area. Conduct soil handling as per soil utilisation guide in the soil report. Rehabilitated areas must be contoured and free draining to prevent ingress and pooling of water.	Reduce impact to neighbouring areas. Restore natural catchment drainage patterns as far as possible. Retain soil to achieve rehabilitation objectives. Restore land to grazing land use.
ALL material stockpile areas	Stockpiles will change the topographical nature of the area.	Topography	Construction, Operation, Decommissioning	**REMEDY** Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berms to shield visual impacts or divert clean water runoff from site. Ensure rehabilitation is continuously completed in a roll over fashion as soon as steady state mining is achieved to reduce need and extent for surface material stockpiles. **CONTROL** Stockpile heights must not exceed 2m for topsoil, 3m for coal stockpiles, 6m for subsoil, 25m for overburden. Move coal stockpiles on a first-in-first-out basis to reduce extent of coal stockpile areas. Coal stockpile and handling must be in designated areas only. Demarcate stockpile areas and strip soil from these areas. Conduct soil handling as per soil utilisation guide in the soil report.	Reduce impact to neighbouring areas. Keep disturbed area as small as possible. Reduce coal stockpile load on site. Restore natural catchment drainage patterns as far as possible. Restore land to grazing land use.
Water storage (dams / reservoirs / tanks) & Slurry dam	Excavation of dams will alter topography and drainage patterns.	Topography	Construction, Operation, Decommissioning	**REMEDY** Ensure dams are adequately sized and inspect, maintain and repair all water management features. **CONTROL** Necessary measure to ensure water separation and dirty water containment on site as per GN704 requirements. Slurry dam is a necessary measure to ensure slurry can be reclaimed for blending.	Containment of mine water runoff up to the runoff generated during a 1:50 year 24hr storm event. Maximising product retrieval and reducing mine residue waste.
Opencast excavations	Alteration of the geological nature and sequence.	Geology	Construction, Operation, Decommissioning	Nature of mining developments.	Maximise extraction of coal resources.
Blasting	Cracks and disruption to geological layers.	Geology	Operation	**MODIFY** Alternative blasting methods will be considered to reduce outward impact.	Severe impact must be contained to 500m radius; evacuation of 600m

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				CONTROL Blasting specialists must be contracted. Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	radius based on current blast design.
Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Alteration of the geological nature and sequence.	Geology	Operation, Decommissioning, Closure, Post closure	**MODIFY** Alternative would be a permanent discard dump facility which would impact negatively on topography and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on visual aesthetics.	Temporary discard dump must be fully designed and comply with NEM:WA GNR636, 2013. Backfilling must be conducted as per the rehabilitation plan and IWWMP once approved.
All infrastructure areas, development footprints and associated activities	Loss in grazing potential, loss of soil and deterioration of soil characteristics.	Soil & Land Capability	Construction, Operation, Decommissioning, Closure	**REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required and cordon off areas until vegetation has established. Revegetate all bare soils. Incorporate herbaceous vegetation into soil stockpiles. Ameliorate soils as needed to establish stable vegetation communities on rehabilitated areas. **CONTROL** Demarcate designated activity area and keep as small as possible. Strip topsoil from all activity areas and stockpile as berms as per mine infrastructure plan. Conduct soil handling as per soil utilisation guide in the soil report. Construct drainage and erosion controls in advance of mining activities. These can include gabion baskets, levees and reseeding of areas not being used. Divert storm water runoff away from areas with high erosion potential. Install silt traps and/or flow dissipaters as needed to prevent erosion and associated silt loading.	Impact to neighbouring areas avoided. Soil on site will be preserved. Grazing land capability will be restored.
Topsoil & subsoil stripping & stockpiling	Loss of fertile topsoil layer.	Soil & Land Capability	Construction, Operation, Decommissioning	**REMEDY** Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berm to shield visual impacts. As far as possible, plan soil stripping activities in the dry season. **CONTROL** Minimize the area which is disturbed at any one time. Topsoil and underlying material should be stored separately as per stripping guidelines. All excavated topsoil will be stored for use during rehabilitation of the mine. Topsoil should be stripped and stockpiled with herbaceous vegetation to retain organic content. All stockpiles / berms which will be in place for more than 6 months must be vegetated to reduce risk of erosion. Topsoil stockpiled as perimeter berms must not exceed 2 m. Subsoil stockpiles must not exceed not exceed 6 m in height. All stockpiles must have an outer slope of approximately 1 V: 3 H (to limit the potential for erosion of the outer pile face). Construct top perimeter berms on subsoil stockpiles. Cut off drain must be constructed upslope of all stockpiles. Seed all stockpiles - Seeding must be completed within seven (7) days of stockpiling.	Visual impact reduced. Soil will be preserved for rehabilitation requirements.
All infrastructure areas, development footprints and associated activities	Increased runoff and associated potential silt-loading and contamination of downstream water bodies and associated	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	Apply soil management measures as stipulated above. **REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. **CONTROL** Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Clean and dirty water separation and dirty water	Impact to neighbouring areas avoided. Surface water quality in neighbouring areas will be maintained close to baseline conditions. Wetland systems and Aquatic

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	wetlands.			containment features must be established on site. This will include upslope berms to divert clean water around the site of activity into natural drainage lines and internal channels to drain dirty water from the active footprint to lined containment dams. Line all dirty water dams to prevent seepage. Line all trenches carrying high or continuous loads of dirty water runoff to prevent seepage. Establish protective berms between active areas and wetlands, outside wetland buffer zones, where activity is near to such areas. Road surfaces must be compacted in order to increase stability. Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed. Install flow dissipaters where rapid flow of diverted clean storm water runoff occurs as necessary. Install silt traps / flow dissipaters if necessary to trap silt in highly silt-laden runoff. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained where necessary.	ecosystem integrity will be maintained close to natural conditions with regards to PES.
All infrastructure areas, development footprints and associated activities	Downstream water quantity of catchment reduced.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	**REMEDY** Keep dirty water runoff areas as small as possible to increase clean water runoff footprint area. Runoff from the rehabilitated areas must be allowed to flow naturally to the environment as soon as such areas become stable. Upstream dewatering boreholes should be considered in order to minimise the creation of dirty water within the opencast pit, and this clean water should be used to recharge the natural systems downstream of the mining rights areas at a rate similar to the volume being contained in the dirty footprint. **CONTROL** Necessary measure to contain dirty water runoff.	Dirty mine water contained on site.
Infrastructure area & Opencast excavations.	Destruction of Sandloop River riparian wetland habitat and loss of wetland ecological status and functioning.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	**CONTROL** Demarcate designated activity area and demarcate 100m buffer zone from wetlands and rivers as no-go areas. Establish protective berms outside wetland buffer zones between wetlands and active areas. Where the riparian wetland will be impacted (section of the loop siding), the activity will only commence once all authorisation are in place to do so and activity will proceed as per the approved IWWMP. Area activity within the wetland will be maintained as small as possible Berms will be erected on the immediate downslope side of the loop siding where this infringes into the wetland area. The trains entering the wetland area will be empty (trains will enter the siding clockwise) to prevent potential coal spillages in the wetland area. Area will be kept clear of rubble, waste, spills at all times and vegetation within the area will be maintained as far as possible to reduce impact on ecological functioning. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**)	Impact to neighbouring areas avoided. IWWMP measures will be implemented once approved. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES.
All Material stockpiles	Increased runoff and associated potential silt-loading of downstream water bodies and associated wetlands.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	**REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. Apply soil management measures as stipulated above. **CONTROL** Conduct soil handling as per soil utilisation guide in the soil report. Vegetation removal must be over a minimal area as possible. All bare surface areas must be re-vegetated. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish approved erosion control measures such as top and toe berms around stockpiles.	Impact to neighbouring areas avoided. Visual impact reduced. Soil will be preserved for rehabilitation purposes.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities. Stockpile heights must not exceed 2m for topsoil, 6m for subsoil and 25m for overburden. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes. All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities. Vegetate soil stockpiles.	
East Overburden stockpiles (non-carbonaceous & carbonaceous)	Destruction of pans.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	**MODIFY** The eastern stockpile area should occupy the southern area (as indicated in the latest mine plan) in order to preserve the pans in the far north until such time that an IWUL is issued for activity in the pans. **CONTROL** Pans and 100m buffer zones should be preserved if IWUL to conduct activities in these areas is not granted. The following is relevant if pans remain in situ: Establish storm water control measures before any other activities commence to ensure clean water diversion around the pans. Establish approved erosion control measures such as top and toe berms around stockpiles to prevent sedimentation into the pans. **STOP** The pans can only be disturbed / destroyed once an IWUL is issued. Until such time, the eastern stockpile area must remain outside the pans and their 100m buffer zone.	Impact to neighbouring areas avoided. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES.
Overburden stockpiles (carbonaceous) & RoM and product coal stockpiles	Increased risk of contamination through contaminated runoff to downstream water bodies and associated wetlands.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation, Decommissioning	**CONTROL** Demarcate stockpile areas and manage as dirty footprint. Stockpile areas must be adequately prepared and compacted and be managed as part of the dirty water footprint area. Coal stockpile area will have a Class C lining system. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment from stockpile area.	Surface water quality in neighbouring areas will be maintained close to baseline conditions or necessary action taken. Class C barrier system for Type III Waste will be implemented at coal stockpile areas (GNR636, 2013). Dirty mine water contained on site.
ALL coal handling, storage, processing and conveyance areas	Generation of coal dust and coal spillages could contaminate water bodies in neighbouring areas.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation	**REMEDY** Coal spillages must be cleared. **CONTROL** Coal stockpile and handling must be in designated areas with compacted base and must form part of the dirty water footprint. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes. Manage dust through water carts or sprinklers. Wagons must not be overloaded and must be covered with tarpaulin. Trucks must not be overloaded.	Dust fallout will be managed. Surface area kept clean through good housekeeping practices.
Water storage (dams / reservoirs / tanks) & Slurry dam	Contamination of surface water features with contaminated water runoff, ruptured dam walls.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation	**REMEDY** Inspect, maintain and repair all water management features. Follow emergency response plan for spills. Keep back-up pumps and pipes on site. **CONTROL** Ensure water separation and dirty water containment on site as per GN704 requirements. Ensure all dirty water containment facilities are adequately sized, designed and constructed. All dams will be constructed and lined as per designs and managed with a 0.8m freeboard. All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs Slurry removed from dams will be stockpiled in the dirty footprint area and be blended into product or	Surface water quality in neighbouring areas will be maintained close to baseline conditions. Class C barrier system for Type III Waste will be implemented at all dirty water dams. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				disposed of onto the discard dump in compacted layers.	Dirty mine water contained on site.
Water & slurry pipelines	Potential contamination of surface water features with burst pipelines.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation	**REMEDY** Inspect, maintain and repair pipelines and pumps. Follow emergency response plan for spills. Keep back-up pumps and pipes on site. **CONTROL** Pipelines should be laid in paddocks which will serve to contain any leaks. Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur. **STOP** Dirty water pipelines will remain outside 100m buffer zones / 1:100 year floodlines until authorisations under NWA have been obtained where needed.	Impact to neighbouring areas avoided. Dirty mine water contained on site.
Stores, workshops & washbays & Hardpark & Fuel Storage	Potential hydrocarbon contamination of surface water. Potential contamination of surface water with indiscriminate use of contaminating materials (cement, chemicals, etc.).	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation	**REMEDY** Oil from oil traps will be removed to the used hydrocarbon drum for removal from site by a reputable hydrocarbon waste contractor. Spill kits must be available on site and personnel trained to utilise these to clear spills. **CONTROL** Areas will be treated as a dirty areas and any runoff from sites must be contained. Maintenance of vehicles must be conducted on a demarcated area with a concrete slab and oil collection system. Cement will be handled over protected ground or sheeting. Chemicals will be stored as per requirements with the MSDS. Wet and dry chemicals, reducing and oxidising agents, will be stored separately. All diesel storage must be within concrete bunded areas that contain 110% of storage capacity if roofed or 120% storage capacity if not roofed; must be to SANS standards, refuelling areas will be over concrete platform. Bunds in workshop, washbay and fuel storage facility will be fitted with an outlet valve or drain to an oil trap. The outflow will flow through an oil trap and water component will be treated and recycled as process water. Oil from oil traps will be removed to the used hydrocarbon drums which will be temporarily stored in concrete bunded areas prior to removal from site by a reputable hydrocarbon waste contractor. All vehicles / machinery on site will be up-to-date with their service and maintenance plans. The use of persistently leaky equipment will be discontinued until repairs are made. Equipment will not be parked over bare ground; where unavoidable, drip trays will be placed under the equipment to collect potential leaks.	Dangerous goods managed appropriately as per SANS standards. Maintained vehicles, machinery and equipment reduces safety & environmental risks.
Ablutions & change house with sewage treatment plant	Potential contamination of surface water bodies with sewage.	Surface Water & Associated Wetlands & Aquatic Ecosystems	Construction, Operation	**MODIFY** Alternative to utilise existing municipal facilities not feasible as these facilities are already highly stressed due to the growth of Lephalale. **REMEDY** Inspect and repair all aspects of the sewage treatment facility as needed, including any plumbing associated with the bathrooms and toilets. **CONTROL** Package Sewage treatment plant must be designed to have enough capacity. Standard operating procedure (SOP) will be devised and implemented for the sewage treatment facility. Bacterial assessment of all monitoring points downstream of the sewage treatment plant.	Reduced bacterial contamination on neighbouring areas.
All infrastructure areas, development footprints and associated activities	Increased risk of contamination through seepage from any contaminating surface material.	Groundwater	Construction, Operation	Apply all surface water management measures as containment of dirty water on site within lined facilities will prevent seepage of contaminants to groundwater. **REMEDY** Keep all materials within properly prepared and designated areas and apply good housekeeping practices by keeping surface clear of all materials. **CONTROL**	Groundwater quality in neighbouring areas will be maintained close to baseline conditions. Good surface housekeeping practices in line with industry best

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				Ensure all storage areas for potentially contaminating material (coal, carbonaceous material, hydrocarbons, chemicals and various wastes) are designed and appropriately lined to reduce seepage.	practices and NEMA & NWA duty of care. Class C barrier system for Type III Waste will be implemented at all dirty water dams.
Opencast excavations	Alteration of weathered aquifer flow dynamics and reduction of local groundwater levels.	Groundwater	Construction, Operation, Decommissioning	**REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as per the rehabilitation plan. Ensure registered affected water users are compensated in some way with alternative water supply. **CONTROL** Seal off individual seepage zones in the fractured rock. Reduce vertical flows into the underlying aquifers: seal floor using concrete lining; compact floor area.	Reduce negative impacts on surrounding land owners/users.
Opencast excavations & Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Generation of Acid Mine Drainage (AMD)	Groundwater	Operation, Decommissioning, Closure, Post-Closure	**MODIFY** Alternative would be a permanent discard dump facility which would still impact negatively on groundwater and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on topography and visual aesthetics. Treatment options for contamination plume: utilisation of a proposed water treatment plant; a pump and treat system to continuously pump the water from the rehabilitated workings to surface dams to keep the water levels below decant level; cut-off intercept drain installed until the hard rock is exposed to capture any seepage/decant and drain water to the PCD; retaining a final void. Passive treatment can also be investigated and the mine can establish passive water ponds/wetlands. Specific trees can be planted over the opencast working to keep water levels low and to take up contaminants. **REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as per the rehabilitation plan. Ensure registered affected water users are compensated in some way with alternative water supply. **CONTROL** Keep mining areas as dry as possible and replace and compact carbonaceous material at the bottom of the pit during rehab to ensure early flooding and oxygen displacement. Seal off individual seepage zones in the fractured rock. Rehabilitated areas must be free draining to prevent ingress of water.	Temporary discard dump must be fully designed and comply with NEM:WA GNR636, 2013. Backfilling must be conducted as per the rehabilitation plan and IWWMP once approved. Groundwater quality in neighbouring areas will be maintained close to baseline conditions. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES. Rehabilitation will aim to restore topographic elevations so that natural drainage patterns and catchment areas remain largely similar to pre-mining dynamics. Backfilling must be conducted as per the rehabilitation plan. Affected registered water users will be provided access to similar water quality and quantity.
All infrastructure areas, development footprints and associated activities	Alien invasive establishment and bush encroachment.	Flora & Fauna	Construction, Operation, Decommissioning, Closure	**REMEDY** Rehabilitate all disturbed areas and seed with local indigenous species. **CONTROL** Clear all vehicles coming to site of any vegetative material to prevent introduction and spread of potential alien and invasive species. Eradicate and control all alien invasive species, removing those identified during the specialist study before construction commences to prevent spread of these species. Mechanical methods should be utilised in preference to chemical methods. Dispose of the eradicated plant material at an approved solid waste disposal site. Compile and implement an alien and invasive species management plan. Leave as much natural vegetation intact as possible. Do not disturbed soil unnecessary. Ensure that areas outside of the operational footprint that were disturbed, are adequately rehabilitated and that dense stands of encroacher species are prevented.	Alien and invasive species managed with the view to eradicate species from the properties and preserve indigenous flora and fauna.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				Develop a burning, cutting and/or grazing management plant with an ecologist which takes into account safety of the operation, local by-laws and national legislation, in order to effectively manage veld areas.	
All infrastructure areas, development footprints and associated activities & Opencast excavations	Loss of biodiversity, degradation of vegetation and fragmentation and loss of ecological corridors through vegetation clearance and activity in pans.	Flora & Fauna	Construction, Operation	**REMEDY** Rehabilitate all disturbed areas. Revegetate all bare soils. Consider establishment of a nursery in which to store some of the local indigenous flora for use during rehabilitation. Incorporate herbaceous vegetation into soil stockpiles. **CONTROL** Demarcate designated activity area to ensure only flora in that area is affected. Prioritise low sensitivity areas and then conduct activities in medium sensitivity areas. An independent Ecological Control Officer (ECO) should be appointed to oversee construction. The ECO should be knowledgeable on the protected species that may occur within the development footprint as per the identification guide (Appendix D of the ecological report attached as Appendix 9). Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas. Prevent access to sensitive environs, particularly pans and the Sandloop River. Apply soil management measures to provide adequate substrate for vegetation establishment and growth. Apply surface water management measures to ensure ecosystems associated with wetlands and streams are maintained. Maintain connectivity of ecological corridors as far as possible by protecting the Sandloop River and associated riverine vegetation. Staff / contractors may not tamper or remove these trees where they are not within the construction footprint. No open fires must be allowed on site such as for cooking. Prohibit the harvesting of trees for firewood. Do not hinder, harm, trap animals. Noise control measures will be applied. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**). Pans will be preserved in situ until IWUL is obtained to conduct activities in these areas.	Impact to neighbouring areas avoided. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES. Rehabilitation will aim to replace and ameliorate soils in order to restore grazing land capability supporting local indigenous species.
All infrastructure areas, development footprints and associated activities	Destruction of protected species.	Flora & Fauna	Construction, Operation	**REMEDY** As far as possible species (such as young saplings) should be transplanted or placed into nursery and replanted on site. A permit to collect the seeds of these trees could be obtained from DAFF and seeds can be grown in a small nursery on site to be replanted as part of rehabilitation. **CONTROL** Demarcate designated activity area and only remove species from the active area. Specialist will have to walk area and plot all protected species. Preserve all other species in situ. Staff / contractors may not tamper or remove these trees where they are not within the construction footprint. No open fires must be allowed on site such as for cooking. Prohibit the harvesting of trees for firewood. **STOP** Protected species cannot be removed until the necessary permits are obtained under NEM:BA. Northern rail link will affect fewer protected species.	Conserve protected species as far as is practically possible.
All infrastructure areas, development	Alienation of, and disturbance to, animals and loss of roost and	Flora & Fauna	Construction, Operation, Decommissioning	**CONTROL** Maintain connectivity of ecological corridors. Keep areas of tree clearance to a minimal in opencast areas and include a tree-planting in the	Impact to neighbouring areas, which will provide refuge for animals leaving site, avoided.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
footprints and associated activities	foraging sites for birds and bats.			rehabilitation plan. Do not hinder, harm, trap animals. Animals or protected flora under threat from the development will be relocated from site by specialists Noise control measures will be considered.	
All water management features	Potential harm to sensitive flora in the riparian habitats associated with the Sandloop River through contaminated runoff and poor rehabilitation	Flora & Fauna	Operation, Decommissioning, Closure	**REMEDY** Contain all dirty water on site by establishing appropriately sized, designed and lined mine water dams on site. Line all dirty water dams to prevent seepage. Line all trenches carrying high or continuous loads of dirty water runoff to prevent seepage. **CONTROL** Demarcate designated activity area. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish protective berms / fence outside wetland buffer zones between wetlands and active areas. Establish clean water diversion berms upslope of activity footprint to prevent clean water runoff flowing onto site. Drain all water runoff on activity area to PCDs and dirty water containment features. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**). The northern rail way link and siding is preferred due to much smaller footprint encroaching into the buffer zone.	Impact to neighbouring areas avoided. Surface water and groundwater quality in neighbouring areas will be maintained close to baseline conditions. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES.
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Lack of functional vegetation due to poor rehabilitation and associated downstream impacts on riparian vegetation	Flora & Fauna	Operation, Decommissioning, Closure	**REMEDY** Rehabilitation must be on-going. Soil must be ameliorated in order to sustain a vegetative cover. Local indigenous species must be utilised during rehabilitation. AMD management plan must be implemented as per the groundwater management measures. The area should be re-landscaped and resemble the land form prior to the open cast activities. The areas should be planted with indigenous vegetation typical of the area and monitored to ensure that the vegetation progress through succession stages. Runoff water needs to be trapped by either the mechanical breaking of the soil surface to trap water, packing of stones, tyres or brush along contours to trap mulch, slow down water movement and reduce the impact on bare soil. Pitter basins work well on fine textured soil and must be orientated and shaped to face upslope. The basins trap seeds, organic matter and water which could lead to rapid colonisation after rains. Mulch and brush also reduces the force of raindrops, limiting the dispersion of clay and the extent of mineral crusting. It also traps dust, sand and seeds to ensure plant establishment. Monitoring of the rehabilitation success should take place for at least five years and include corrective follow-up action. It is recommended that Landscape Functional Analysis (LFA) forms part of the rehabilitation and monitoring process.	Rehabilitation will aim to replace and ameliorate soils in order to restore grazing land capability supporting local indigenous species.
All infrastructure areas, development footprints and associated activities	Dust generation and particulate matter.	Air Quality	Construction, Operational Decommissioning	**REMEDY** Ensure rehabilitation and seeding is continuously completed in a roll over fashion. **CONTROL** Wagons must not be overloaded and must be covered with tarpaulin. Speed limits must be established. Stockpile heights must not exceed 2m for topsoil, 6m for subsoil and 25m for overburden. Vegetate soil stockpiles and all exposed areas.	Dust fallout will be managed to not exceed baseline levels as current baseline levels already exceed standards.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				Manage dust through water carts or sprinklers. Consider reducing activities when windy. Consider windbreaks, enclosures, shelters or misting of very dusty areas.	
Blasting	Dust generation.	Air Quality	Operation	**MODIFY** Alternative blasting methods will be considered to reduce outward impact. **CONTROL** Blasting specialists must be contracted who are fully compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015). Blasts methods used to reduce outward impact radius. Blasting should not be conducted when it is very windy. Utilise free-digging as far as possible.	Dust fallout will be managed to not exceed baseline levels as current baseline levels already exceed standards. Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015)
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Dust generation associated with material handling.	Air Quality	Operation, Decommissioning	**REMEDY** Ensure rehabilitation and seeding is continuously completed in a roll over fashion. **CONTROL** Manage dust through water carts or sprinklers.	Dust fallout will be managed to not exceed baseline levels as current baseline levels already exceed standards.
Opencast excavations	Loss of and disturbance to archaeological / heritage sites (Historic farmstead & Abandoned mine).	Archaeological/ Cultural Sites	Construction, Operational Decommissioning	**CONTROL** Site must be properly document by specialists and permit must be obtained from SAHRA prior to destruction of site. **STOP** Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained. Should other sites / graves be uncovered on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialists will need to be consulted and responsible action considered, whether destruction / grave relocation / ceasing activity completely and maintaining site in situ.	Preservation and responsible handling of heritage sites.
Opencast excavations	Loss of and disturbance to 3 graves associated with Site 5.	Archaeological/ Cultural Sites	Construction, Operational Decommissioning	**CONTROL** Permits must be obtained prior to relocation of sites (cemetery area with minimum of 2 graves). Site must be properly documented by a specialists and once permits are obtained the site can be exhumed and remains reburied. **STOP** Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained. Should other sites / graves be uncovered on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialists will need to be consulted and responsible action considered, whether destruction / grave relocation / ceasing activity completely and maintaining site in situ.	Preservation and responsible handling of heritage sites.
Overburden stockpiles	Loss of and disturbance to archaeological / heritage sites (Site 3 - Historic farmstead / school Foundations).	Archaeological/ Cultural Sites	Construction, Operation Decommissioning	**CONTROL** Site must be properly document by specialists and permit must be obtained from SAHRA prior to destruction of site (recent farm structure / school). **STOP** Consideration should be given to adjusting stockpiling areas to preserve site and 50m buffer in situ where possible. Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained.	Preservation and responsible handling of heritage sites.
Overburden stockpiles	Loss of and disturbance to archaeological / heritage sites (Site 1	Archaeological/ Cultural Sites	Construction, Operation Decommissioning	HIA report to be approved by SAHRA. No mitigation or permit required.	Preservation and responsible handling of heritage sites.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
	and 2 - stone age findings).				
Blasting	Vibrations may damage nearby heritage sites and the Lephalale Cemetery (Site 6).	Archaeological/ Cultural Sites	Operation	**MODIFY** Alternative blasting methods will be considered to reduce outward impact. **REMEDY** A conservation management plan will be compiled for all sites that are not targeted for destruction or relocation and sites will be fenced off. Ensure heritage management plan includes procedures to compensate for damage. Ensure baseline photographs are taken of all structures within 1500m of the mine pits which may be impacted for photographic evidence prior to any blasting. **CONTROL** Evacuate 600m radius prior to blasting. Blasting specialists must be contracted. Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Severe impact must be contained to 500m radius; evacuation of 600m radius based on current blast design. Affected property will be compensated, repaired or replaced. Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015)
All infrastructure areas, development footprints and associated activities	Deterioration in visual aesthetics.	Visual Aesthetic	Construction, Operation, Decommissioning	**REMEDY** Visual screens (vegetated berms, trees or wind breaks) will be considered where necessary. All berms and soil stockpiles will be vegetated. Apply dust control measures and other environmental measures to ensure impact area is contained. Apply good housekeeping practices.	Visual impact reduced. Impact to neighbouring areas reduced. Surface area kept clean through good housekeeping practices.
Lighting	Increased visibility of the site.	Visual Aesthetic	Construction, Operation	**REMEDY** Utilise lights in the orange and yellow light ranges rather than white. This has the added benefit of reducing strong light and dark contrasts which also has safety benefits for staff. **CONTROL** Conduct activities during day as far as possible. Ensure directional floodlights are utilised to reduce light pollution to surrounds and prevent these from shining directly on adjacent land users and road users.	Visual impact reduced. Impact to neighbouring areas reduced.
Blasting	Ground vibration and airblast impact on houses (including SPCA)	Nearby Structures	Operation	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area OR increase blast distance. **REMEDY** Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures. **CONTROL** Stemming control and audit, use proper stemming materials, Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Ground Vibration Limit of 25mm/s for sturdy houses, 12.5mm/s for constructed houses with lesser foundations, 6mm/s for rural structures. Airblast limit of 134dB. Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).
Blasting	Ground vibration impact on boreholes	Nearby Structures	Operation	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area OR increase blast distance. **REMEDY** Drill new boreholes at similar locations and similar depths to continue with groundwater monitoring. **CONTROL** Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Ground Vibration Limit of 50mm/s. Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).
Blasting	Ground vibration impact on roads	Nearby Structures	Operation	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area. **REMEDY** Reroute the road if damage to the road is severe.	Ground Vibration Limit of 150mm/s. Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				CONTROL Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	of 2015).
Blasting	Fly Rock Impact on houses	Nearby Structures	Operation	**REMEDY** Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures. **CONTROL** Stemming control and audit, use proper stemming materials, re-design of blasts.	600m radius to be evacuated (distance is liable to change based on final blast plan). Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).
Blasting	Fly Rock Impact on roads	Nearby Structures	Operation	**REMEDY** Reroute the road if damage to the road is severe. **CONTROL** Stemming control and audit, use proper stemming materials, re-design of blasts.	600m radius to be evacuated (distance is liable to change based on final blast plan). Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).
All infrastructure areas, development footprints and associated activities	Change in land use to mining.	Land Use	Construction, Operation, Decommissioning	Nature of mining activities. A change in land use rezoning to mining must be applied for with the municipality.	Rehabilitation will aim to replace soils in order to restore grazing land capability in order to reinstate current land uses post-mining.
All footprints & All activities	General health and safety - Air Quality.	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	Apply management measures for air quality	See Air Quality Aspect
All footprints & All activities	General health and safety - Noise	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	Apply management measures for Noise & Nearby Structures (blast).	See Noise & Nearby Structures (blast) Aspects
All footprints & All activities	Social ills - Disease	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	**MODIFY** Ensure workers have information available and sign a “code of conduct” at the start of employment which gives an overview of acceptable behaviour and information regarding health & safety on the site. **CONTROL** GCMC should appoint a service provider or local NGO to develop, implement and manage a “Health & Safety Orientation Programme” which must include information on HIV/AIDS, TB, and alcohol abuse prevention, with all temporary and permanent workers on the site. This must include encouragement to connect with local community programmes and NGO’s, health training and information which can be provided on-site to workers at the start of the project.	Rights of people must not be infringed upon.
All footprints & All activities	Proximity of mine to residential areas	Socio-economic, Health & Safety	Construction, Operation	Apply management measures for Nearby Structures (blast) **REMEDY** Should any of these activities prove ineffective, and in the case of scientifically proven health and safety risks, the last resort would be to negotiate resettlement with the affected residents. **CONTROL** GCMC to continuously engage with affected communities regarding mitigation practices.	See Nearby Structures (blast) Aspects
All footprints & All activities	Property value	Socio-economic, Health & Safety	Construction, Operation,	Note that mitigation would not be possible in this instance. Should GCMC decide to negotiate a buyout of affected properties as part of a mining housing scheme, this concern would effectively be managed. This option has however not been raised by any of the parties involved and as such, no mitigation measures are presented. NOTE: This area has been targeted as a power generation / coal mining hub over the last 5 to 10 years. Furthermore property in South Africa has gone through severe fluctuations over the last 10 years. Lephalale's development plan report states that the property development exceeded requirements, which	Rights of people must not be infringed upon.

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDARD TO BE ACHIEVED
				will negatively affect housing prices in the area. There are many factors that will play a role in overall property value.	
All footprints & All activities	Sense of Place	Socio-economic, Health & Safety	Operation	Apply management measures for visual aesthetics	See Visual Aesthetics Aspect
All footprints & All activities	Impact on road infrastructure	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	**MODIFY** Preference should be given to rail transport where ever possible **REMEDY** Part of the construction phase needs to include the continuous maintenance of the road to be able to handle the increase in traffic and excessive dust and noise as a result of the gravel roads. **CONTROL** Limit traffic to roads indicated specifically for the project. Limit use of unimproved roads to emergency use only. Instruct and require all personnel and contractors to adhere to speed limits to ensure safe and efficient traffic flow. Limit mine-related vehicle traffic on public roadways to off-peak commuting times to minimize impacts on local commuters.	High safety standards on site and roads with reduced safety risks.
All footprints & All activities	City development	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	No mitigation can be applied. See Section 7.4.1.1.14 of the EIA report for full detailed discussion of municipal development plans. Communication with LLM must continue.	-
All footprints & All activities	Matimba power station ACC's	Socio-economic, Health & Safety	Construction, Operation, Decommissioning	Apply management measures for air quality	See Air Quality Aspect

28 IMPACT MANAGEMENT ACTIONS

Please note, that in the table below, the first line discusses the entire active footprint and will be relevant to general mining and mining-related activities. As much as the contents in line 1 would be applicable for the individual sites and activities detailed further in the table, this is only discussed in line1 and not reiterated under each activity. The full impact assessment table is presented in Appendix 16 and only impacts of moderate, moderate to high and high significance are summarised below.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
All infrastructure areas, development footprints and associated activities	Excavation and creation of infrastructure foundations and servitudes will alter the topographical nature of the site and associated drainage.	**REMEDY** Rehabilitate all disturbed areas when they are no longer needed, including contouring areas properly to ensure no pooling of water on site. **CONTROL** Complete pre-mining topographical surveys to aid in compilation of rehabilitation plan. Demarcate designated activity area as small as possible and maintain activity within this area only. Establish approved erosion control measures to reduce the risk of formation of erosion gullies. Install flow dissipaters in any areas where concentrated runoff flow is experienced, including silt traps in areas where flow becomes laden with sediment.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Pre-mining topographical surveys will be completed before any activity takes place on site. Storm water runoff management features will be established around demarcated activity areas prior to other activities commencing and where necessary flow dissipaters and/or silt traps will be installed. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine.	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.
Opencast excavations	Altered topographical nature and associated drainage.	**REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as soon as steady state mining is achieved. **CONTROL.** Compile a full rehabilitation model before any mining commences on site and apply on site throughout life of mine. Demarcate designated activity area. Conduct soil handling as per soil utilisation guide in the soil report. Rehabilitated areas must be contoured and free draining to prevent ingress and pooling of water.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Pre-mining topographical surveys will be completed before any activity takes place on site. A full rehabilitation model will be compiled before mining commences on site and reviewed annually. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil utilisation guide will be implemented as soon as the first soil is stripped and stockpiled for the life of mine, until topsoil is applied to the final rehabilitated surface.	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.
ALL material stockpile areas	Stockpiles will change the topographical nature of the area.	**REMEDY** Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berms to shield visual impacts or divert clean water runoff from site. Ensure rehabilitation is continuously completed in a roll over fashion as soon as steady state mining is achieved to reduce need and extent for surface material stockpiles. **CONTROL** Stockpile heights must not exceed 2m for topsoil, 3m for coal stockpiles, 6m for subsoil, 25m for overburden. Move coal stockpiles on a first-in-first-out basis to reduce extent of coal stockpile areas. Coal stockpile and handling must be in designated areas only. Demarcate stockpile areas and strip soil from these areas. Conduct soil handling as per soil utilisation guide in the soil report.	Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and rehabilitation model commencing once the first cut is started for the duration of operations. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. ROM coal handling at open pits, will be temporary and coal will be removed on a continuous basis to the processing facility once the first coal is extracted until final coal is removed from site. Coal RoM feed and product stockpiles will be maintained at appropriate height and moved on a first-in-first-out basis once coal stockpiling and processing commences until the final coal is removed from site.	NEMA & MPRDA principals and regulations regarding stockpile management, decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.
Water storage (dams / reservoirs / tanks) &	Excavation of dams will alter topography and drainage patterns.	**REMEDY** Ensure dams are adequately sized and inspect, maintain and repair all water management features. **CONTROL** Necessary measure to ensure water separation and dirty water containment on site as per GN704 requirements.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. An engineer will oversee dam construction in line with approved designs and will sign-off once dam is completed.	Water will be managed in terms of GN704; can only be released with permission from DWS. NEM:WA regulations regarding mine residue

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
Slurry dam		Slurry dam is a necessary measure to ensure slurry can be reclaimed for blending.		handling and management, where relevant for surface stockpiling of slurry prior to blending. Conditions stipulated in licenses/rights/permits.
Opencast excavations	Alteration of the geological nature and sequence.	Nature of mining developments.	Mine plan and rehabilitation model will continuously be implemented on site and will be consulted regularly with regard to new cuts or if geological anomalies are encountered as long as opencast mining and successive backfilling and rehabilitation continues.	Mining will be carried out in line with MPRDA regulations and standard industry practices. Conditions stipulated in licenses/rights/permits.
Blasting	Cracks and disruption to geological layers.	**MODIFY** Alternative blasting methods will be considered to reduce outward impact. **CONTROL** Blasting specialists must be contracted. Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	Blasting will comply with MHSA and MPRDA Regulations. See "Nearby Structures" aspects in this table for specific blast limits. Conditions stipulated in licenses/rights/permits.
Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Alteration of the geological nature and sequence.	**MODIFY** Alternative would be a permanent discard dump facility which would impact negatively on topography and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on visual aesthetics.	Discard backfilling and compression at the base of pits will be initiated as soon as steady state mining is achieved to reduce the need for surface stockpiling and continue until the final void is backfilled.	NEMA & MPRDA principals and regulations regarding stockpile and mine residue management. NWA GN704 & NEM:WA GNR636 (2013) regulations regarding backfilling with discard. Conditions stipulated in licenses/rights/permits.
All infrastructure areas, development footprints and associated activities	Loss in grazing potential, loss of soil and deterioration of soil characteristics.	**REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required and cordon off areas until vegetation has established. Revegetate all bare soils. Incorporate herbaceous vegetation into soil stockpiles. Ameliorate soils as needed to establish stable vegetation communities on rehabilitated areas. **CONTROL** Demarcate designated activity area and keep as small as possible. Strip topsoil from all activity areas and stockpile as berms as per mine infrastructure plan. Conduct soil handling as per soil utilisation guide in the soil report. Construct drainage and erosion controls in advance of mining activities. These can include gabion baskets, levees and reseeding of areas not being used. Divert storm water runoff away from areas with high erosion potential. Install silt traps and/or flow dissipaters as needed to prevent erosion and associated silt loading.	Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. Soil surveys will be undertaken annually over areas that have been rehabilitated and topsoiled until all rehabilitated areas are self-sustaining. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine.	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.
Topsoil & subsoil stripping &	Loss of fertile topsoil layer.	**REMEDY** Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berm to shield visual impacts.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Material handling (removal, stockpiling and replacement) will be conducted as	NEMA & MPRDA principals and regulations regarding stockpile management,

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
stockpiling		As far as possible, plan soil stripping activities in the dry season. **CONTROL** Minimize the area which is disturbed at any one time. Topsoil and underlying material should be stored separately as per stripping guidelines. All excavated topsoil will be stored for use during rehabilitation of the mine. Topsoil should be stripped and stockpiled with herbaceous vegetation to retain organic content. All stockpiles / berms which will be in place for more than 6 months must be vegetated to reduce risk of erosion. Topsoil stockpiled as perimeter berms must not exceed 2 m. Subsoil stockpiles must not exceed not exceed 6 m in height. All stockpiles must have an outer slope of approximately 1 V: 3 H (to limit the potential for erosion of the outer pile face). Construct top perimeter berms on subsoil stockpiles. Cut off drain must be constructed upslope of all stockpiles. Seed all stockpiles - Seeding must be completed within seven (7) days of stockpiling.	per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine.	decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.
All infrastructure areas, development footprints and associated activities	Increased runoff and associated potential silt-loading and contamination of downstream water bodies and associated wetlands.	Apply soil management measures as stipulated above. **REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. **CONTROL** Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Clean and dirty water separation and dirty water containment features must be established on site. This will include upslope berms to divert clean water around the site of activity into natural drainage lines and internal channels to drain dirty water from the active footprint to lined containment dams. Line all dirty water dams to prevent seepage. Line all trenches carrying high or continuous loads of dirty water runoff to prevent seepage. Establish protective berms between active areas and wetlands, outside wetland buffer zones, where activity is near to such areas. Road surfaces must be compacted in order to increase stability. Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed. Install flow dissipaters where rapid flow of diverted clean storm water runoff occurs as necessary. Install silt traps / flow dissipaters if necessary to trap silt in highly silt-laden runoff. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained where necessary.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	Water will be managed in terms of GN704; can only be released with permission from DWS. Surface water quality in neighbouring areas will be maintained close to baseline conditions or to IWULA RWQOs and compared to SANS drinking water standards for pH, sulphate. Iron, TDS and EC. Erosion control measures will be considered in terms of CARA and MPRDA regulations. Conditions stipulated in licenses/rights/permits.
All infrastructure areas, development footprints and associated activities	Downstream water quantity of catchment reduced.	**REMEDY** Keep dirty water runoff areas as small as possible to increase clean water runoff footprint area. Runoff from the rehabilitated areas must be allowed to flow naturally to the environment as soon as such areas become stable. Upstream dewatering boreholes should be considered in order to minimise the creation of dirty water within the opencast pit, and this clean water should be used to recharge the natural systems downstream of the mining rights areas at a rate similar to the volume being contained in the dirty footprint. **CONTROL**	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	Mine water will be contained on site as per GN704. Conditions stipulated in licenses/rights/permits.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		Necessary measure to contain dirty water runoff.		
Infrastructure area & Opencast excavations.	Destruction of Sandloop River riparian wetland habitat and loss of wetland ecological status and functioning.	**CONTROL** Demarcate designated activity area and demarcate 100m buffer zone from wetlands and rivers as no-go areas. Establish protective berms outside wetland buffer zones between wetlands and active areas. Where the riparian wetland will be impacted (section of the loop siding), the activity will only commence once all authorisation are in place to do so and activity will proceed as per the approved IWWMP. Area activity within the wetland will be maintained as small as possible Berms will be erected on the immediate downslope side of the loop siding where this infringes into the wetland area. The trains entering the wetland area will be empty (trains will enter the siding clockwise) to prevent potential coal spillages in the wetland area. Area will be kept clear of rubble, waste, spills at all times and vegetation within the area will be maintained as far as possible to reduce impact on ecological functioning. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**)	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	Water will be managed in terms of GN704. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Conditions stipulated in licenses/rights/permits.
All Material stockpiles	Increased runoff and associated potential silt-loading of downstream water bodies and associated wetlands.	**REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. Apply soil management measures as stipulated above. **CONTROL** Conduct soil handling as per soil utilisation guide in the soil report. Vegetation removal must be over a minimal area as possible. All bare surface areas must be re-vegetated. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish approved erosion control measures such as top and toe berms around stockpiles. All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities. Stockpile heights must not exceed 2m for topsoil, 6m for subsoil and 25m for overburden. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes. All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities. Vegetate soil stockpiles.	Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine.	Water will be managed in terms of GN704. Erosion control measures and soil handling will be considered in terms of CARA and MPRDA regulations and best practices in industry. NEMA & MPRDA principals and regulations regarding soil handling and rehabilitation. Conditions stipulated in licenses/rights/permits.
East Overburden stockpiles (non-carbonaceous & carbonaceous)	Destruction of pans.	**MODIFY** The eastern stockpile area should occupy the southern area (as indicated in the latest mine plan) in order to preserve the pans in the far north until such time that an IWUL is issued for activity in the pans. **CONTROL** Pans and 100m buffer zones should be preserved if IWUL to conduct activities in these areas is not granted. The following is relevant if pans remain in situ: Establish storm water control measures before any other activities commence to ensure clean water diversion around the pans. Establish approved erosion control measures such as top and toe berms around	Wetland buffers will be maintained free of obstacles, sedimentation and rubble. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine and through to post closure phase to ensure water management is effective.	Water will be managed in terms of GN704. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Conditions stipulated in

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		stockpiles to prevent sedimentation into the pans. **STOP** The pans can only be disturbed / destroyed once an IWUL is issued. Until such time, the eastern stockpile area must remain outside the pans and their 100m buffer zone.		licenses/rights/permits.
Overburden stockpiles (carbonaceous) & RoM and product coal stockpiles	Increased risk of contamination through contaminated runoff to downstream water bodies and associated wetlands.	**CONTROL** Demarcate stockpile areas and manage as dirty footprint. Stockpile areas must be adequately prepared and compacted and be managed as part of the dirty water footprint area. Coal stockpile area will have a Class C lining system. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment from stockpile area.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. The base of the stockpile area will be prepared (compacted and sloped to drain into the dirty water management area) before any material stockpiling takes place. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	Water will be managed in terms of GN704; can only be released with permission from DWS. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. NEM:WA regulations regarding mine residue handling and management. NEM:WA regulations regarding waste to landfill. Conditions stipulated in licenses/rights/permits.
ALL coal handling, storage, processing and conveyance areas	Generation of coal dust and coal spillages could contaminate water bodies in neighbouring areas.	**REMEDY** Coal spillages must be cleared. **CONTROL** Coal stockpile and handling must be in designated areas with compacted base and must form part of the dirty water footprint. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes. Manage dust through water carts or sprinklers. Wagons must not be overloaded and must be covered with tarpaulin. Trucks must not be overloaded.	All coal handling, transfer and stockpiling will be within designated areas only, which will be incorporated into the dirty water footprint, and coal will be processed and removed from site regularly as soon as coal is extracted until final coal is removed from site. The base of the stockpile areas will be prepared (compacted and sloped to drain into the dirty water management area) before any material stockpiling takes place. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	Dust fallout will be monitored and managed as per GNR827 and compared to baseline limits (which already exceed NEM:AQA limits). Water management on site will be as per GN704. Conditions stipulated in licenses/rights/permits.
Water storage (dams / reservoirs / tanks) & Slurry dam	Contamination of surface water features with contaminated water runoff, ruptured dam walls.	**REMEDY** Inspect, maintain and repair all water management features. Follow emergency response plan for spills. Keep back-up pumps and pipes on site. **CONTROL** Ensure water separation and dirty water containment on site as per GN704 requirements. Ensure all dirty water containment facilities are adequately sized, designed and constructed. All dams will be constructed and lined as per designs and managed with a 0.8m freeboard. All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs Slurry removed from dams will be stockpiled in the dirty footprint area and be blended into product or disposed of onto the discard dump in compacted layers.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Mine water will be contained on site as per GN704. Conditions stipulated in licenses/rights/permits.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
Water & slurry pipelines	Potential contamination of surface water features with burst pipelines.	**REMEDY** Inspect, maintain and repair pipelines and pumps. Follow emergency response plan for spills. Keep back-up pumps and pipes on site. **CONTROL** Pipelines should be laid in paddocks which will serve to contain any leaks. Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur. **STOP** Dirty water pipelines will remain outside 100m buffer zones / 1:100 year floodlines until authorisations under NWA have been obtained where needed.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Mine water will be contained on site as per GN704. Conditions stipulated in licenses/rights/permits.
Stores, workshops & washbays & Hardpark & Fuel Storage	Potential hydrocarbon contamination of surface water. Potential contamination of surface water with indiscriminate use of contaminating materials (cement, chemicals, etc.).	**REMEDY** Oil from oil traps will be removed to the used hydrocarbon drum for removal from site by a reputable hydrocarbon waste contractor. Spill kits must be available on site and personnel trained to utilise these to clear spills. **CONTROL** Areas will be treated as a dirty areas and any runoff from sites must be contained. Maintenance of vehicles must be conducted on a demarcated area with a concrete slab and oil collection system. Cement will be handled over protected ground or sheeting. Chemicals will be stored as per requirements with the MSDS. Wet and dry chemicals, reducing and oxidising agents, will be stored separately. All diesel storage must be within concrete bunded areas that contain 110% of storage capacity if roofed or 120% storage capacity if not roofed; must be to SANS standards, refuelling areas will be over concrete platform. Bunds in workshop, washbay and fuel storage facility will be fitted with an outlet valve or drain to an oil trap. The outflow will flow through an oil trap and water component will be treated and recycled as process water. Oil from oil traps will be removed to the used hydrocarbon drums which will be temporarily stored in concrete bunded areas prior to removal from site by a reputable hydrocarbon waste contractor. All vehicles / machinery on site will be up-to-date with their service and maintenance plans. The use of persistently leaky equipment will be discontinued until repairs are made. Equipment will not be parked over bare ground; where unavoidable, drip trays will be placed under the equipment to collect potential leaks.	Cement handling will occur in designated areas or over protective sheeting during construction and whenever cement is brought to and utilised on site. Storage and handling of chemicals will be conducted in terms of the chemical's specifications and / or MSDS as long as chemicals are stored on site . Hydrocarbons will only be stored on site once bunded areas are constructed and storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance with the EMP as soon as hydrocarbons are brought to site for the life of mine. Hydrocarbon storage infrastructure, including concrete bunding and oil traps will be maintained as long as hydrocarbons are stored on site. Vehicles, machinery and equipment will be maintained within their operating specifications through servicing, calibration and general maintenance for the life of mine. Good housekeeping practices will be applied to the hard park area and the area will be kept clear of spills for as long as vehicles and machinery are kept in the area.	Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. Waste oil handled and stored as per NEM:WA and its regulation: GNR926. Conditions stipulated in licenses/rights/permits.
Ablutions & change house with sewage treatment plant	Potential contamination of surface water bodies with sewage.	**MODIFY** Alternative to utilise existing municipal facilities not feasible as these facilities are already highly stressed due to the growth of Lephalale. **REMEDY** Inspect and repair all aspects of the sewage treatment facility as needed, including any plumbing associated with the bathrooms and toilets. **CONTROL** Package Sewage treatment plant must be designed to have enough capacity. Standard operating procedure (SOP) will be devised and implemented for the sewage treatment facility. Bacterial assessment of all monitoring points downstream of the sewage treatment plant.	Water use will be monitored for the life of mine as soon as water use commences. Construction of ALL water management features, including the sewage treatment plant, will be completed before other activities commence in the area and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. sites downstream of the sewage treatment plant will also be tested for bacterial counts.	Downstream water quality will be within background quality limits and compared to SAN 2011 drinking water quality guidelines for bacteria. Conditions stipulated in licenses/rights/permits.
All infrastructure areas, development	Increased risk of contamination through seepage from any	Apply all surface water management measures as containment of dirty water on site within lined facilities will prevent seepage of contaminants to groundwater. **REMEDY** Keep all materials within properly prepared and designated areas and apply good	Good housekeeping practices will be applied over mining and infrastructure areas and areas will be kept clear of any potentially contaminated material, which will only be stored in designated areas, from the onset of construction throughout the life of mine.	Groundwater quality in neighbouring areas will be maintained close to baseline conditions for pH, sulphate.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
footprints and associated activities	contaminating surface material.	housekeeping practices by keeping surface clear of all materials. **CONTROL** Ensure all storage areas for potentially contaminating material (coal, carbonaceous material, hydrocarbons, chemicals and various wastes) are designed and appropriately lined to reduce seepage.	Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	Iron, TDS and EC. NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. Conditions stipulated in licenses/rights/permits.
Opencast excavations	Alteration of weathered aquifer flow dynamics and reduction of local groundwater levels.	**REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as per the rehabilitation plan. Ensure registered affected water users are compensated in some way with alternative water supply. **CONTROL** Seal off individual seepage zones in the fractured rock. Reduce vertical flows into the underlying aquifers: seal floor using concrete lining; compact floor area.	Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Groundwater level monitoring will commence before construction and continue for life of mine at nearby user boreholes.	Affected registered water users will be compensated for loss of water quality and quantity as per the Constitution and NWA. Conditions stipulated in licenses/rights/permits.
Opencast excavations & Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Generation of Acid Mine Drainage (AMD)	**MODIFY** Alternative would be a permanent discard dump facility which would still impact negatively on groundwater and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on topography and visual aesthetics. Treatment options for contamination plume: utilisation of a proposed water treatment plant; a pump and treat system to continuously pump the water from the rehabilitated workings to surface dams to keep the water levels below decant level; cut-off intercept drain installed until the hard rock is exposed to capture any seepage/decant and drain water to the PCD; retaining a final void. Passive treatment can also be investigated and the mine can establish passive water ponds/wetlands. Specific trees can be planted over the opencast working to keep water levels low and to take up contaminants. **REMEDY** Ensure rehabilitation is continuously completed in a roll over fashion as per the rehabilitation plan. Ensure registered affected water users are compensated in some way with alternative water supply. **CONTROL** Keep mining areas as dry as possible and replace and compact carbonaceous material at the bottom of the pit during rehab to ensure early flooding and oxygen displacement. Seal off individual seepage zones in the fractured rock. Rehabilitated areas must be free draining to prevent ingress of water.	Conduct mining responsible and apply EMP measures from the onset of mining, including proper material handling (stripping, stockpiling and replacement) activities until final void is fully rehabilitated. Discard backfilling and compression at the base of pits will be initiated as soon as steady state mining is achieved to reduce the need for surface stockpiling and continue until the final void is backfilled. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Groundwater level monitoring will commence before construction and continue for life of mine at nearby user boreholes. Update the contaminant transport model for groundwater throughout operations (every two years) to ensure proactive response to potential decant and contaminated plumes at the time of decommissioning and closure.	Groundwater quality in neighbouring areas will be maintained close to baseline conditions for pH, sulphate. Iron, TDS and EC. NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. Affected registered water users will be compensated for loss of water quality and quantity as per the Constitution and NWA GN704 & NEM:WA GNR636 (2013) regulations regarding backfilling with discard. Conditions stipulated in licenses/rights/permits.
All infrastructure areas, development footprints and associated activities	Alien invasive establishment and bush encroachment.	**REMEDY** Rehabilitate all disturbed areas and seed with local indigenous species. **CONTROL** Clear all vehicles coming to site of any vegetative material to prevent introduction and spread of potential alien and invasive species. Eradicate and control all alien invasive species, removing those identified during the specialist study before construction commences to prevent spread of these species. Mechanical methods should be utilised in preference to chemical methods. Dispose of the eradicated plant material at an approved solid waste disposal site. Compile and implement an alien and invasive species management plan. Leave as much natural vegetation intact as possible.	An alien and invasive management plan must be implemented on site from the onset of construction throughout the life of mine.	Alien and invasive species managed in terms of CARA and NEM:BA.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		Do not disturbed soil unnecessary. Ensure that areas outside of the operational footprint that were disturbed, are adequately rehabilitated and that dense stands of encroacher species are prevented. Develop a burning, cutting and/or grazing management plant with an ecologist which takes into account safety of the operation, local by-laws and national legislation, in order to effectively manage veld areas.		
All infrastructure areas, development footprints and associated activities & Opencast excavations	Loss of biodiversity, degradation of vegetation and fragmentation and loss of ecological corridors through vegetation clearance and activity in pans.	**REMEDY** Rehabilitate all disturbed areas. Revegetate all bare soils. Consider establishment of a nursery in which to store some of the local indigenous flora for use during rehabilitation. Incorporate herbaceous vegetation into soil stockpiles. **CONTROL** Demarcate designated activity area to ensure only flora in that area is affected. Prioritise low sensitivity areas and then conduct activities in medium sensitivity areas. An independent Ecological Control Officer (ECO) should be appointed to oversee construction. The ECO should be knowledgeable on the protected species that may occur within the development footprint as per the identification guide (Appendix D of the ecological report attached as Appendix 9). Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas. Prevent access to sensitive environs, particularly pans and the Sandloop River. Apply soil management measures to provide adequate substrate for vegetation establishment and growth. Apply surface water management measures to ensure ecosystems associated with wetlands and streams are maintained. Maintain connectivity of ecological corridors as far as possible by protecting the Sandloop River and associated riverine vegetation. Staff / contractors may not tamper or remove these trees where they are not within the construction footprint. No open fires must be allowed on site such as for cooking. Prohibit the harvesting of trees for firewood. Do not hinder, harm, trap animals. Noise control measures will be applied. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**). Pans will be preserved in situ until IWUL is obtained to conduct activities in these areas.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Soil and flora surveys will be completed over rehabilitated areas once the first cut is fully rehabilitated for the life of mine to ensure adequate indigenous flora cover over rehabilitated areas to support grazing land use.	Erosion control measures will be considered in terms of CARA and MPRDA regulations and best practice. NEMA & MPRDA principals and regulations regarding rehabilitation. Conditions stipulated in licenses/rights/permits.
All infrastructure areas, development footprints and associated activities	Destruction of protected species.	**REMEDY** As far as possible species (such as young saplings) should be transplanted or placed into nursery and replanted on site. A permit to collect the seeds of these trees could be obtained from DAFF and seeds can be grown in a small nursery on site to be replanted as part of rehabilitation. **CONTROL** Demarcate designated activity area and only remove species from the active area. Specialist will have to walk area and plot all protected species. Preserve all other species in situ. Staff / contractors may not tamper or remove these trees where they are not within the construction footprint.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Protected species on or near site must be monitored to prevent destruction to species and permits must be obtained for any species that will be removed or destroyed during construction and opencast mining before any activity tales place on site.	Permits will be obtained under NEM:BA to relocate / destroy protected species. Conditions stipulated in licenses/rights/permits.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		No open fires must be allowed on site such as for cooking. Prohibit the harvesting of trees for firewood. **STOP** Protected species cannot be removed until the necessary permits are obtained under NEM:BA. Northern rail link will affect fewer protected species.		
All infrastructure areas, development footprints and associated activities	Alienation of, and disturbance to, animals and loss of roost and foraging sites for birds and bats.	**CONTROL** Maintain connectivity of ecological corridors. Keep areas of tree clearance to a minimal in opencast areas and include a tree-planting in the rehabilitation plan. Do not hinder, harm, trap animals. Animals or protected flora under threat from the development will be relocated from site by specialists Noise control measures will be considered.	Protected species on or near site must be monitored to prevent destruction to species and permits must be obtained for any species that will be removed or destroyed during construction and opencast mining before any activity tales place on site.	Conditions stipulated in licenses/rights/permits.
All water management features	Potential harm to sensitive flora in the riparian habitats associated with the Sandloop River through contaminated runoff and poor rehabilitation	**REMEDY** Contain all dirty water on site by establishing appropriately sized, designed and lined mine water dams on site. Line all dirty water dams to prevent seepage. Line all trenches carrying high or continuous loads of dirty water runoff to prevent seepage. **CONTROL** Demarcate designated activity area. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish protective berms / fence outside wetland buffer zones between wetlands and active areas. Establish clean water diversion berms upslope of activity footprint to prevent clean water runoff flowing onto site. Drain all water runoff on activity area to PCDs and dirty water containment features. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area. **STOP** 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (**NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland**). The northern rail way link and siding is preferred due to much smaller footprint encroaching into the buffer zone.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	Water will be managed in terms of GN704; can only be released with permission from DWS. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Conditions stipulated in licenses/rights/permits.
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Lack of functional vegetation due to poor rehabilitation and associated downstream impacts on riparian vegetation	**REMEDY** Rehabilitation must be on-going. Soil must be ameliorated in order to sustain a vegetative cover. Local indigenous species must be utilised during rehabilitation. AMD management plan must be implemented as per the groundwater management measures. The area should be re-landscaped and resemble the land form prior to the open cast activities. The areas should be planted with indigenous vegetation typical of the area and monitored to ensure that the vegetation progress through succession stages. Runoff water needs to be trapped by either the mechanical breaking of the soil surface to trap water, packing of stones, tyres or brush along contours to trap mulch, slow down water movement and reduce the impact on bare soil. Pitter basins work well on	Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil quantity and quality will be maintained over rehabilitated areas to ensure adequate vegetative cover for grazing land use until rehabilitated areas are stable and self-sustaining.	Conditions stipulated in licenses/rights/permits.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		fine textured soil and must be orientated and shaped to face upslope. The basins trap seeds, organic matter and water which could lead to rapid colonisation after rains. Mulch and brush also reduces the force of raindrops, limiting the dispersion of clay and the extent of mineral crusting. It also traps dust, sand and seeds to ensure plant establishment. Monitoring of the rehabilitation success should take place for at least five years and include corrective follow-up action. It is recommended that Landscape Functional Analysis (LFA) forms part of the rehabilitation and monitoring process.		
All infrastructure areas, development footprints and associated activities	Dust generation and particulate matter.	**REMEDY** Ensure rehabilitation and seeding is continuously completed in a roll over fashion. **CONTROL** Wagons must not be overloaded and must be covered with tarpaulin. Speed limits must be established. Stockpile heights must not exceed 2m for topsoil, 6m for subsoil and 25m for overburden. Vegetate soil stockpiles and all exposed areas. Manage dust through water carts or sprinklers. Consider reducing activities when windy. Consider windbreaks, enclosures, shelters or misting of very dusty areas.	Dust suppression will commence from the onset of construction and continue for the life of mine. As a controlled Group C emitter, the mine must register and report to the NAEIS site from the onset of construction for the life mine.	Dust fallout will be monitored and managed as per GNR827. Baseline conditions already exceed standards and emissions will be compared to baseline data. Conditions stipulated in licenses/rights/permits.
Blasting	Dust generation.	**MODIFY** Alternative blasting methods will be considered to reduce outward impact. **CONTROL** Blasting specialists must be contracted who are fully compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015). Blasts methods used to reduce outward impact radius. Blasting should not be conducted when it is very windy. Utilise free-digging as far as possible.	Dust suppression will commence from the onset of construction and continue for the life of mine. As a controlled Group C emitter, the mine must register and report to the NAEIS site from the onset of construction for the life mine.	Blasting will comply with MHSA and MPRDA Regulations. Dust fallout will be monitored and managed as per GNR827. Baseline conditions already exceed standards and emissions will be compared to baseline data. Conditions stipulated in licenses/rights/permits.
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Dust generation associated with material handling.	**REMEDY** Ensure rehabilitation and seeding is continuously completed in a roll over fashion. **CONTROL** Manage dust through water carts or sprinklers.	Dust suppression will commence from the onset of construction and continue for the life of mine. As a controlled Group C emitter, the mine must register and report to the NAEIS site from the onset of construction for the life mine.	Dust fallout will be monitored and managed as per GNR827. Baseline conditions already exceed standards and emissions will be compared to baseline data. Conditions stipulated in licenses/rights/permits.
Opencast excavations	Loss of and disturbance to archaeological / heritage sites (Historic farmstead & Abandoned mine).	**CONTROL** Site must be properly document by specialists and permit must be obtained from SAHRA prior to destruction of site. **STOP** Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained. Should other sites / graves be uncovered on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialists will need to be consulted and responsible action considered, whether destruction / grave relocation / ceasing activity completely and maintaining site in situ.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to destruction or relocation of such sites.	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
Opencast excavations	Loss of and disturbance to 3 graves associated with Site 5.	**CONTROL** Permits must be obtained prior to relocation of sites (cemetery area with minimum of 2 graves). Site must be properly documented by a specialists and once permits are obtained the site can be exhumed and remains reburied. **STOP** Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained. Should other sites / graves be uncovered on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialists will need to be consulted and responsible action considered, whether destruction / grave relocation / ceasing activity completely and maintaining site in situ.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to relocation of such sites.	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.
Overburden stockpiles	Loss of and disturbance to archaeological / heritage sites (Site 3 - Historic farmstead / school Foundations).	**CONTROL** Site must be properly document by specialists and permit must be obtained from SAHRA prior to destruction of site (recent farm structure / school). **STOP** Consideration should be given to adjusting stockpiling areas to preserve site and 50m buffer in situ where possible. Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to destruction or relocation of such sites.	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.
Overburden stockpiles	Loss of and disturbance to archaeological / heritage sites (Site 1 and 2 - stone age findings).	HIA report to be approved by SAHRA. No mitigation or permit required.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to destruction or relocation of such sites.	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.
Blasting	Vibrations may damage nearby heritage sites and the Lephalale Cemetery (Site 6).	**MODIFY** Alternative blasting methods will be considered to reduce outward impact. **REMEDY** A conservation management plan will be compiled for all sites that are not targeted for destruction or relocation and sites will be fenced off. Ensure heritage management plan includes procedures to compensate for damage. Ensure baseline photographs are taken of all structures within 1500m of the mine pits which may be impacted for photographic evidence prior to any blasting. **CONTROL** Evacuate 600m radius prior to blasting. Blasting specialists must be contracted. Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	Blasting will comply with MHSA and MPRDA Regulations. SAHRA will be complied with regarding management of site in situ. Conditions stipulated in licenses/rights/permits.
All infrastructure areas, development footprints and associated activities	Deterioration in visual aesthetics.	**REMEDY** Visual screens (vegetated berms, trees or wind breaks) will be considered where necessary. All berms and soil stockpiles will be vegetated. Apply dust control measures and other environmental measures to ensure impact area is contained. Apply good housekeeping practices.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Good housekeeping practices will be applied over mining and infrastructure areas and areas will be kept clear of any potentially contaminated material, which will only be stored in designated areas, from the onset of construction throughout the life of mine. Regular communications with I&APs.	Conditions stipulated in licenses/rights/permits.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
Lighting	Increased visibility of the site.	**REMEDY** Utilise lights in the orange and yellow light ranges rather than white. This has the added benefit of reducing strong light and dark contrasts which also has safety benefits for staff. **CONTROL** Conduct activities during day as far as possible. Ensure directional floodlights are utilised to reduce light pollution to surrounds and prevent these from shining directly on adjacent land users and road users.	-	Conditions stipulated in licenses/rights/permits.
Blasting	Ground vibration and airblast impact on houses (including SPCA)	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area OR increase blast distance. **REMEDY** Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures. **CONTROL** Stemming control and audit, use proper stemming materials, Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.
Blasting	Ground vibration impact on boreholes	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area OR increase blast distance. **REMEDY** Drill new boreholes at similar locations and similar depths to continue with groundwater monitoring. **CONTROL** Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.
Blasting	Ground vibration impact on roads	**MODIFY** Consider a blast design to reduce charge mass near structures OR increase mining buffer area. **REMEDY** Reroute the road if damage to the road is severe. **CONTROL** Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.
Blasting	Fly Rock Impact on houses	**REMEDY** Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures. **CONTROL** Stemming control and audit, use proper stemming materials, re-design of blasts.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.
Blasting	Fly Rock Impact on roads	**REMEDY** Reroute the road if damage to the road is severe. **CONTROL** Stemming control and audit, use proper stemming materials, re-design of blasts.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.
All infrastructure areas, development footprints	Change in land use to mining.	Nature of mining activities. A change in land use rezoning to mining must be applied for with the municipality.	Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil quantity and quality will be maintained over rehabilitated areas to ensure adequate vegetative cover for grazing land use until rehabilitated areas are	Conditions stipulated in licenses/rights/permits.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
and associated activities			stable and self-sustaining.	
All footprints & All activities	General health and safety - Air Quality.	Apply management measures for air quality	See Air Quality Aspect	See Air Quality Aspect
All footprints & All activities	General health and safety - Noise	Apply management measures for Noise & Nearby Structures (blast).	See Noise & Nearby Structures (blast) Aspects	See Noise & Nearby Structures (blast) Aspects
All footprints & All activities	Social ills - Disease	**MODIFY** Ensure workers have information available and sign a “code of conduct” at the start of employment which gives an overview of acceptable behaviour and information regarding health & safety on the site. **CONTROL** GCMC should appoint a service provider or local NGO to develop, implement and manage a “Health & Safety Orientation Programme” which must include information on HIV/AIDS, TB, and alcohol abuse prevention, with all temporary and permanent workers on the site. This must include encouragement to connect with local community programmes and NGO’s, health training and information which can be provided on-site to workers at the start of the project.	To be addressed in the Health & Safety Orientation Programme	Comply with MHSA and MPRDA Regulations.
All footprints & All activities	Proximity of mine to residential areas	Apply management measures for Nearby Structures (blast) **REMEDY** Should any of these activities prove ineffective, and in the case of scientifically proven health and safety risks, the last resort would be to negotiate resettlement with the affected residents. **CONTROL** GCMC to continuously engage with affected communities regarding mitigation practices.	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects
All footprints & All activities	Property value	Note that mitigation would not be possible in this instance. Should GCMC decide to negotiate a buyout of affected properties as part of a mining housing scheme, this concern would effectively be managed. This option has however not been raised by any of the parties involved and as such, no mitigation measures are presented. NOTE: This area has been targeted as a power generation / coal mining hub over the last 5 to 10 years. Furthermore property in South Africa has gone through severe fluctuations over the last 10 years. Lephalale's development plan report states that the property development exceeded requirements, which will negatively affect housing prices in the area. There are many factors that will play a role in overall property value.	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects
All footprints & All activities	Sense of Place	Apply management measures for visual aesthetics	See Visual Aesthetics Aspect	See Visual Aesthetics Aspect
All footprints & All activities	Impact on road infrastructure	**MODIFY** Preference should be given to rail transport where ever possible **REMEDY** Part of the construction phase needs to include the continuous maintenance of the road to be able to handle the increase in traffic and excessive dust and noise as a result of the gravel roads. **CONTROL** Limit traffic to roads indicated specifically for the project. Limit use of unimproved roads to emergency use only.	Internal roads and intersections with public roads will be maintained from the onset of construction throughout the life of mine Speed inspections will be undertaken sporadically on site throughout the life of mine to ensure contractors are obeying speed limits.	Operations will comply with MHSA and Regulations. Conditions stipulated in licenses/rights/permits. Vehicles will be serviced and maintained in road worthy condition.

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
		Instruct and require all personnel and contractors to adhere to speed limits to ensure safe and efficient traffic flow. Limit mine-related vehicle traffic on public roadways to off-peak commuting times to minimize impacts on local commuters.		
All footprints & All activities	City development	No mitigation can be applied. See Section 7.4.1.1.14 of the EIA report for full detailed discussion of municipal development plans. Communication with LLM must continue.	-	-
All footprints & All activities	Matimba power station ACC's	Apply management measures for air quality	See Air Quality Aspect	See Air Quality Aspect

28.1 Financial Provision

28.1.1 Determination of the Amount of Financial Provision

28.1.1.1 Describe the Closure Objectives and the Extent to these are Aligned to the Baseline Environment

It is anticipated at this stage that the siding (and associated dirty water channels and the west PCD) may be retained on site and be operated as an SMME due to the expanding coal mining development proposed for Lephalale. The sewage treatment plant may also be retained on site and also be operated as an SMME.

Furthermore, the municipal waste disposal facility will remain on site and will be expanded based on current plans.

Lastly, the road link proposed between Onverwacht and Marapong may be established on site.

Closure objectives and rehabilitation plan detailed below are relevant to the rehabilitation of remaining areas.

Closure objectives identified in this report include:

- Topography
    - To ensure that the final elevation is free draining.
    - To ensure that the final elevation will result in the continuation of the pre-mining surface drainage pattern.
- Soil, Land Capability and Land Use
    - To ensure that soil replaced in the same sequence to ensure soil characteristics are retained as far as possible.
    - To ensure post-mining land capability is at least similar to pre-mining of grazing.
    - To ensure that the land capability is self-sustaining.
- Surface Water
    - To ensure that no dirty water from the site enters the surrounding surface water systems.
    - Ensure that the rehabilitated areas are cleared of all contaminating substances and that runoff from the area is returned to the natural catchment.
- Groundwater
    - Ensure registered affected water user is compensated in some way, either with alternative water supply/borehole or monetary equivalent so that they can source their own water at no additional cost (Future Flow, 2015). From the current model, no user boreholes will be affected.
        - BH08 (Plan 13) will be affected by dewatering and may experience some deterioration in quality. This is an Eskom Monitoring borehole.

Eskom should be consulted as to whether they would like to relocate the borehole.

- Continue groundwater monitoring post closure to substantiate findings from contaminant transport model regarding plumes and water qualities, which are expected to be minimal regarding water users and the surrounding environment.
- Ensure that any long-term containment and mitigation measures that may need to be installed to manage contaminant plumes are installed in a timely manner and are sustainable.

- Flora and Fauna & Wetlands
  - If the IWUL is granted for activities in the pans, and the area is used for stockpiling then these pans will be lost and will not be rehabilitated.
  - The site will not be returned fully to medium sensitivity as is the current rating for the bulk of the site, but the high sensitivity areas associated with the riverine system of the Sandloop River will be preserved as such throughout the life of mine with the implementation of the management plan.
  - To ensure that vegetation growth and cover on the rehabilitated areas is sustainable and local indigenous species are establishing on site.
  - Ensure that succession and colonisation from surrounding areas is taking place on rehabilitated areas.
  - To ensure that alien invasive growth is eradicated until the closure certificate is granted.
  - To encourage surrounding animals to return into the rehabilitated areas to maintain the surrounding biodiversity.
- Aquatic Ecosystems
  - To ensure that aquatic ecosystems are maintained as close as possible to that of the pre-mining environment.
  - To ensure that the adjacent aquatic ecosystems conditions are similar to that of the pre-mining environment and that the FEPA rank is maintained.
- Wetlands
  - To minimise the disturbance on wetlands, and continue monitoring wetland conditions annually after closure for at least 2-3 years.
  - To ensure that the adjacent wetland conditions are similar to that of the pre-mining Present Ecological State.
- Visual Impacts
  - To ensure that rehabilitation is sustainable.

28.1.1.2 Confirm that the Environmental Objectives in Relation to Closure have been Consulted with Landowner and I&APs

Closure objectives were presented in the EIA/EMP phase meeting (PPP report in Appendix 15) which was attended by the land owners and I&APs (PPP report in Appendix 15).

Furthermore the EIA/EMPr will be released to I&APs for a 45 day review period.

28.1.1.3 Rehabilitation Plan to Attain Closure Objectives Including Proposed Post-Mining Land Capability and Land Use

Please refer to the mine plan in Appendix 2 for reference to the various areas proposed for mine development.

The rehabilitation model must be drafted before mining commences and updated as needed.

In order to ensure rehabilitation of the site can be undertaken responsibly, the soil utilisation guide as presented below must be adhered to. This will ensure preservation of soil for re-use in rehabilitation of the site.

Post mining land capability must be restored to as close to pre-mining land capabilities as possible, in this case grazing with some wilderness.

During closure of a mine area, all infrastructure no longer required by the future land owner/user will be demolished or removed. Non-leaching building waste can be placed in the final mine void if additional material is required.

Plant and processing infrastructure will be re-used at other sites or sold to other mining companies before being considered as scrap.

All scrap metal will be removed and sold where possible, or disposed of at an appropriate site.

All other waste will be separated and removed from site. These will be recycled where possible or removed by reputable contractors to appropriate waste facilities for that particular waste type.

All chemical toilets will be removed from site by registered and reputable contractors. It is anticipated at this stage that the sewage treatment plant may remain on site and handed over or sold to parties interested in running this as an SMME.

All fences will be dismantled and either disposed of at a permitted disposal site or sold as scrap. Fences erected to cordon off dangerous areas will remain in place and maintained, and will only be removed once such sites are considered safe and stable.

Roads or sections of roads no longer required after completion of mining will be identified. These roads will be ripped down and rehabilitated.

The formal rehabilitation model must be compiled in order to attain the closure objectives. The following actions must be considered to obtain the closure objectives:

- Topography
    - Complete pre-mining topographical surveys and apply information to the formal rehabilitation model.
    - Ensure that a detailed rehabilitation model is drafted before mining commences on site and applied throughout the life of mine.
    - Ensure drainage patterns are considered in the rehabilitation plan to ensure catchment characteristics are re-instated as far as possible.
    - Ensure roll-over rehabilitation is carried out as far as possible.

- Soil, Land Capability and Land Use
    - Follow the soil utilisation guide.
    - Topsoil utilisation will be concurrent with the stripping.
    - Ensure adequate topsoil placement on rehabilitated areas.
    - Annually assess soil depth and quality in rehabilitated areas to determine amelioration requirements, which must be applied as specified by the soil specialist.
- Surface Water
    - Apply GN704, where relevant and where exemptions are not relevant, from the onset of mining and apply throughout the life of mine.
    - Minimise the areas cleared for mining and associated infrastructure.
    - Monitor surface water to ensure water management on site is functioning.
- Groundwater
    - On granting of the activity to backfill the mine with carbonaceous material, this activity must be conducted with due diligence as specified in the EMP.
    - Install monitoring boreholes in proposed plume areas to monitor for potential plume development and water qualities associated with the plumes. If water quality indicates the need, finalise potential plume management options.
    - From the current model, no user boreholes will be affected. BH08 (Plan 13) will be affected by dewatering and may experience some deterioration in quality. This is an Eskom Monitoring borehole. Eskom should be consulted as to whether they would like to relocate the borehole.
- Flora and Fauna
    - Relocate rather than destroy protected species where possible after permits are obtained to do so.
    - Minimise the areas cleared for mining and associated infrastructure and keep vegetation intact in areas not targeted for any surface activities.
    - Revegetate all rehabilitated areas as soon as possible, with area specific vegetation.
    - Apply an alien invasive eradication and control plan from the onset of operations.
    - Ensure that an environmental awareness plan and induction training is drafted to include protection of fauna.
- Aquatic Ecosystems & Wetlands
    - Maintain adequate buffers from the wetlands unless the relevant authorisation to proceed through these or close to these sites is granted – relevant to a small section (approximately 400m) of the siding and proposed Eastern Material Stockpiles (northern area where pans have been identified).
    - Maintain current PES and EIS status of streams and wetlands which have not been approved for activity.
- Visual Impacts
    - Apply good housekeeping practices throughout the life of mine.

  - Vegetate all berms and soil stockpiles on site.
  - Ensure the rehabilitation plan is drafted before mining commences and applied throughout the life of mine.
- General
  - The EIA/EMP will be reviewed in conjunction with the trends observed from the monitoring programmes as set out in this document.
  - Clear all coal and carbonaceous material from the site.
  - Remove all waste from site.
  - Monitor rehabilitated areas for a period of five years following revegetation of the areas.

28.1.1.3.1 Soil Management and Rehabilitation Plan

The aim of the soil management and rehabilitation plan is to highlight measures to be followed during the construction, operation, and decommissioning phases to preserve soil.

The primary objectives of the soil management plan are to:

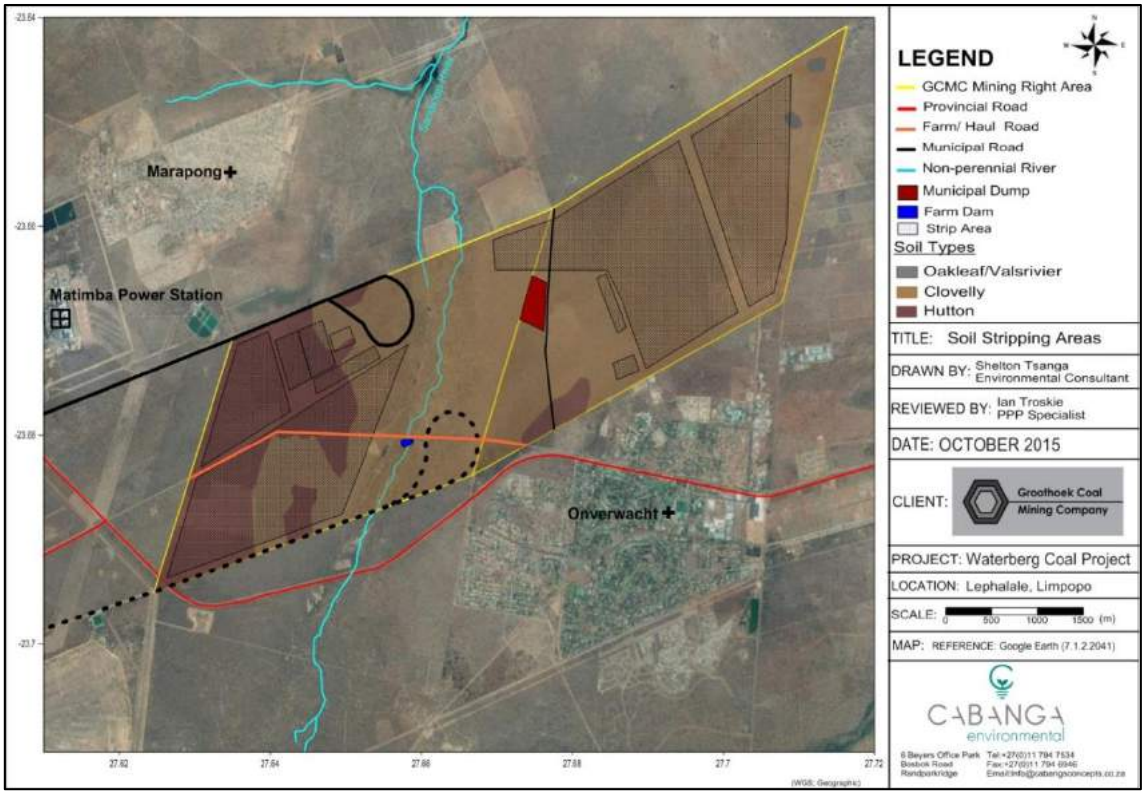
- Devise and maintain a topsoil balance that achieves rehabilitation objectives during the life of mine,
- Ensure effective topsoil removal techniques are employed to maximise volumes of suitable topsoil removed and minimise wastage, and
- Maintain topsoil viability during stripping, stockpiling and spreading through best practice techniques and effective stockpile design and treatment.

28.1.1.3.2 Soil Stripping, Stockpiling and Replacement

Stripping and stockpiling of topsoil will take place to a large extent during the construction and operational phase, mainly at the footprint of infrastructure and opencast areas. Stripping must be supervised to ensure soils are stripped correctly. Soil horizons must be stripped as shown in Plan 54 and Table 41, which shows the stripping depths, the areas, and the calculated total soil volume per soil type, based on the stripping depth. The following is relevant regarding stripping:

- The Orthic A horizon: The Orthic A horizon from the Clovelly and Hutton soil forms must be stripped and can be mixed together as follows:
  - Strip 150 mm in depth across the opencast area, infrastructure area, stockpile areas, dam areas and over the proposed railway links.
    - Do not strip too large an area ahead of mining, because this exposes the stripped surface to water and wind erosion, with the associated dust and water sedimentation problems.
    - Avoid vegetation clearance and earthworks during the rainy season.
  - This stripped Orthic A horizon must be stockpiled as the perimeter berm with a height not exceeding 2m and cut off drain upslope of the stockpile as shown in Figure 22

- The Red and Yellow Brown Apedal B horizons: The Red and Yellow Brown Apedal B horizons from the Clovelly and Hutton soil forms must be stripped and can be mixed together as follows:
    - From the 1st cuts strip 800 mm in depth across the 1st cut area.
    - From the stockpile area, infrastructure areas, dams and the proposed railway link area strip 800 mm in depth.
    - This must be stockpiled at the designated stockpile areas as shown in Plan 55.



Plan 54: Soil stripping within the GCMC mining right area

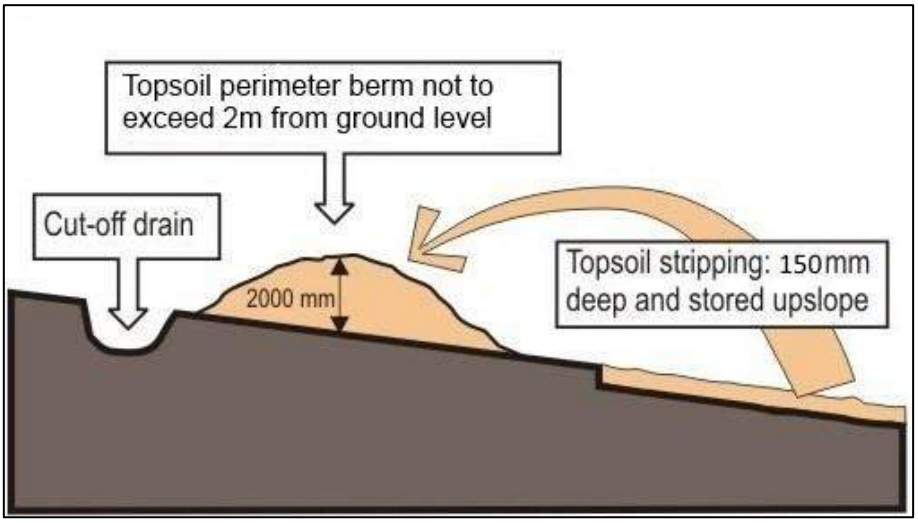


Figure 22: Topsoil perimeter stockpiling/berm procedure

Plan 55 and Table 41 provide guidelines for soil stripping, stockpiling of topsoil and should be read together. These Plans and Tables show the combination (groups) of soil types that need to be stripped and stockpiled.

Table 41: Soil stripping depths over the GCMC mining area

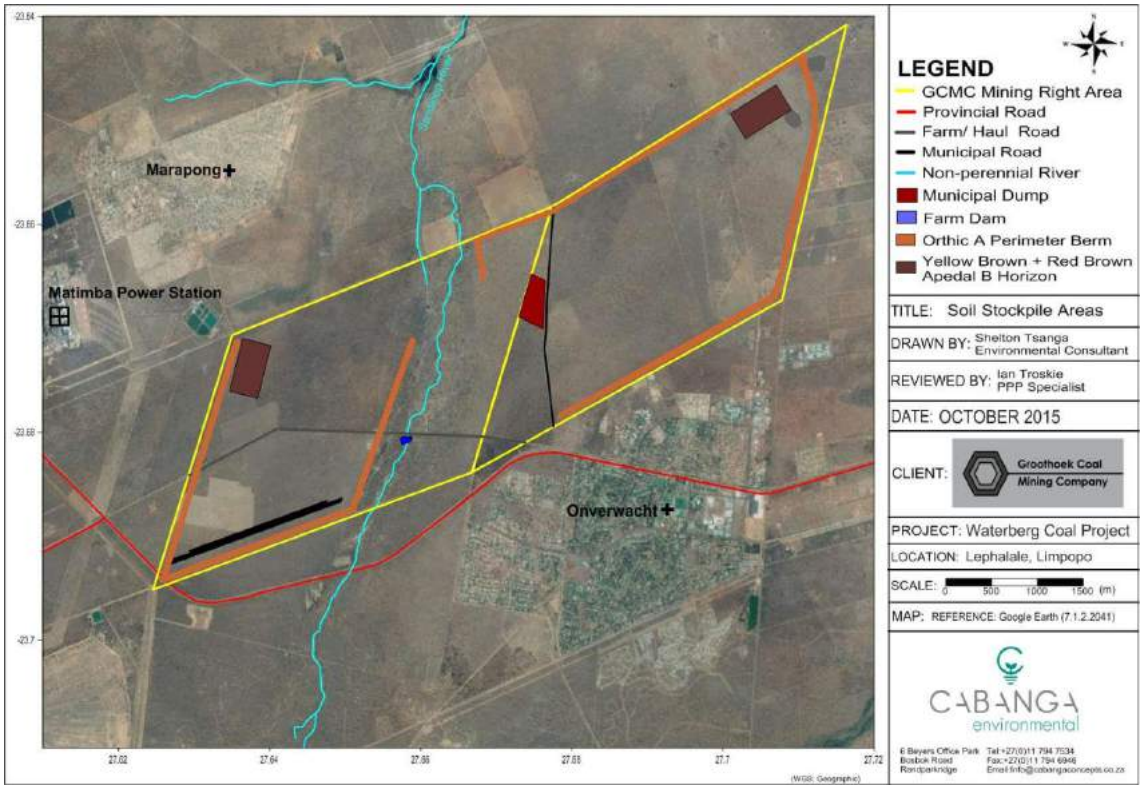
Stockpile No	Soil stripping group and stockpile no.	Total stripping depth (mm)	Area (ha)	Soil volume (m^3)
Orthic A - Perimeter berm	Clovelly	150	1981.9	2.973×10^3
	Hutton	150	419.3	628×10^3
B - Horizon from East Pit 1st Cut	Yellow Brown Apedal B + Red Apedal B Horizon	800	6.2	49600
B - Horizon from West Pit 1st Cut	Yellow Brown Apedal B + Red Apedal B Horizon	800	1.6	12800

The following is relevant regarding stripping and stockpiling:

- The A and B-horizons will be stripped and stockpiled separately and marked with a signboard indicating the Soil horizon and date of Stockpiling.
- The B-horizon stockpile constituting of the mixed Red and Yellow Brown Apedal B horizons must have an outer slope of approximately 1 V: 3 H (to limit the potential for erosion of the outer pile face). These stockpiles must not exceed a maximum height of 6 m.
- Top perimeter and toe perimeter berms must be installed across all stockpiles.
- A side-slope location with suitable cut-off drain construction upslope is acceptable. Figure 22 illustrates the stockpiling procedure with cut-off drain upslope.

A stockpile survey must be undertaken of the A and B horizon stockpile to determine the volume of soil available for post mining replacement.

Post-mining replacement depth must be calculated taking into account the total soil volume per horizon on the respective stockpiles divided by the pre-mined area.

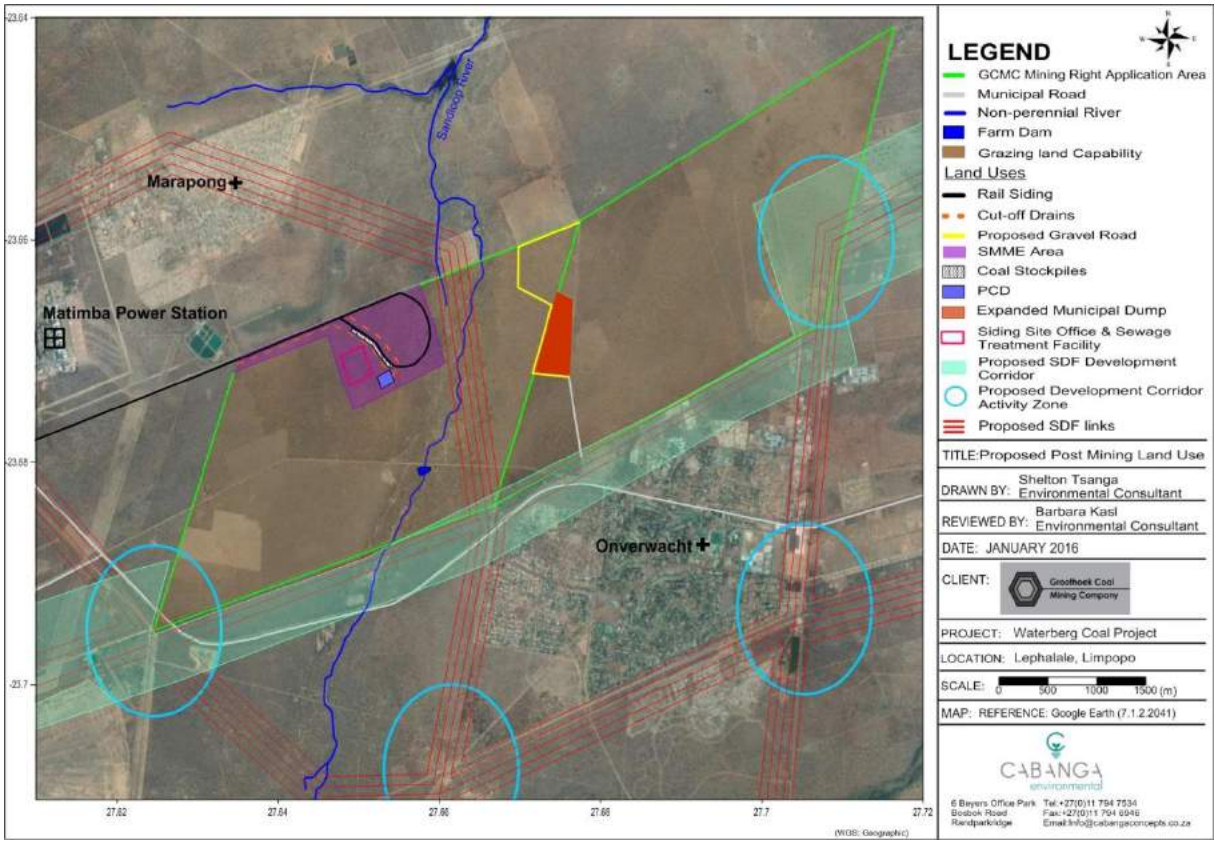


Plan 55: Soil stockpile placement map within the GCMC mining right area

28.1.1.3.3 Post-Mining Land Capability Requirements

The proposed post-mining land capability class was determined by the soil type and soil volumes as calculated under the stripping guidelines. Other factors and characteristics that might influence post-mining land capability are slope, compaction, and reduction of soil quality due to contamination of topsoil by soft overburden or spoil material.

The proposed post-mining land capability should be returned to Grazing (Plan 56) on the proposed mining area; however, a final post-mining land capability assessment and post rehabilitation performance assessment must be done progressively (annually) during the operational phase by a soil specialist by means of auger observations at a grid spacing of 100 x 100 with soil analyses. This will aid in the compilation of a final post-mining land capability map which should be submitted for closure purposes.



Plan 56: Post mining land capability and land use for the GCMC mining right area

28.1.1.3.4 Considerations for Flora

A rehabilitation plan, using indigenous species from the study area, must be implemented that will restore disturbed areas beyond the footprint of the infrastructure to what it was prior to construction, thereby making the impact on the remainder of the site negligible in the long term. Due to the dry climate, natural colonisation could take a long time, in which vegetation may degrade further or become dominated by encroacher species. Therefore, timeous rehabilitation is imperative. Even in the event of good rains, annual pioneer plants are short-lived and therefore an effort must be made to keep as many perennial plants in place as possible or to replace these as part of rehabilitation. As a start, runoff water needs to be trapped by either the mechanical breaking of the soil surface to trap water, packing of stones, tyres or brush along contours to trap mulch, slow down water movement and reduce the impact on bare soil (Esler, et al, 2006). Pitter basins work well on fine textured soil and must be orientated and shaped to face upslope. The basins trap seeds, organic matter and water which could lead to rapid colonisation after rains (Esler, et al, 2006).

Removed herbaceous plants could be housed in a temporary nursery and used to rehabilitate the areas affected during construction. The nursery and rehabilitation should form part of the rehabilitation plan.

28.1.1.4 Quantum of the Financial Provision Required to Manage and Rehabilitate the Environment

As per NEMA financial provision regulations, itemised costs must be provided within the financial provision. As the DMR's closure cost assessment provides itemised costs, this process was used to determine the need for financial provision.

Regarding the financial provision provided below, the following assumptions were made:

- Roll over rehabilitation will be applied at all times, and only final voids will require rehabilitation at end of life of mine.
- All remaining overburden stockpiles will be used to fill final voids, and the surface areas of stockpiles have been included in general rehabilitation only.
- The sewage treatment facility and the siding and associated water management features (including PCD West) will remain on site and be operated as independent SMMEs.
- All access roads will remain on site as these will be required by future land users.

As the site is a greenfield site, no costs provision is made for remediation as no activities have commenced. The financial provision has provided for annual rehabilitation as reflected in the itemised costs opencast mining. This would be rehabilitated in a roll-over fashion and would approximate annual rehabilitation costs. The total costs indicated forms part of the overall closure costs.

Monitoring costs will form part of the mine operational costs.

The financial provision is indicated in Table 42.

28.1.1.5 Confirm that the Financial Provision will be Provided as Determined

Financial Provision will be made by way of a financial guarantee from a bank registered in terms of the Banks Act.

Table 42: Financial Provision

"Rules-base" assessment of the quantum for financial provision 2015 Rates			
Mine:	**GCMC Waterberg Colliery - Class A & High Sensitivity**	**Location:**	**Lephalale**
Evaluators:	Barbara Kasl	**Date:**	**23-Jul-15**

Disclaimer: Calculations are based on survey data and information provided by the client, as well as visual observations on site & previous experience in the field. Rates are based on DMR published rates, with an annual increase linked to CPI to account for inflation. Whilst every attempt is made to ensure this information is accurate, These calculations are estimates only and Cabanga Concepts cannot be held liable for any discrepancies.

No.:	Description: NB The survey for these areas are still required	Unit:	A Quantity 2015	B Master rate DMR	B Master rate 2015 inflat.	C Multiplication factor	D Weighting factor 1	E=A*B*C*D Amount (Rands)
			Step 4.5	Step 4.3	Step 4.3	Step 4.3	Step 4.4	2015
1	Dismantling of processing plant	m^3	11250.00	R 6.82	R 12.32	1.00	**1.00**	R 138 600.00
2 (A)	Demolition of steel buildings & Structures	m^2		R 95.00	R 171.61	1.00	**1.00**	
2 (B)	Demolition of reinforced concrete buildings & structures	m^2	50000.00	R 140.00	R 252.90	1.00	**1.00**	R 12 645 000.00
3	Rehabilitation of access roads	m^2		R 17.00	R 30.71	1.00	**1.00**	
4 (A)	Demolition & rehabilitation of electrified railway lines	m		R 165.00	R 298.06	1.00	**1.00**	
4 (B)	Demolition & rehabilitation of non electrified railway lines	m		R 90.00	R 162.58	1.00	**1.00**	
5	Demolition of housing &/or administration facilities	m^2		R 190.00	R 343.22	1.00	**1.00**	
6	Opencast rehabilitation including final voids & ramps	ha	15.75	R 96 700.00	R 179 921.04	**1.00**	**1.00**	R 2 833 756.38
7	Sealing of shafts, adits & inclines	m^3		R 51.00	R 92.13	1.00	**1.00**	
8 (A)	Rehabilitation of overburden & spoils	ha		R 66 400.00	R 119 947.36	1.00	**1.00**	
8 (B)	Rehabilitation of processing waste deposits & evaporation ponds (basic)	ha		R 82 700.00	R 149 392.27	1.00	**1.00**	
8 (C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic)	ha	1.50	R 240 200.00	R 433 799.44	**1.00**	**1.00**	R 650 699.16
9	Rehabilitation of subsided areas	ha		R 55 600.00	R 100 437.84	1.00	**1.00**	
10	General surface rehabilitation	ha	145.00	R 52 600.00	R 95 018.54	1.00	**1.00**	R 13 777 688.30
11	River diversions	ha		R 52 600.00	R 95 018.54	1.00	**1.00**	
12	Fencing	m	22100.00	R 60.00	R 108.39	1.00	**1.00**	R 2 395 419.00
13	Water management	ha	2.70	R 20 000.00	R 36 128.72	**1.00**	**1.00**	R 97 547.54
14	2 to 3 years of maintenance & aftercare	ha	145.00	R 7 000.00	R 12 645.05	1.00	**1.00**	R 1 833 532.25
15 (A)		SUM		R 1.00	R 1.00	**1.00**	**1.00**	
		(Sum of items 1 to 15 Above)						R 34 372 242.63
	Weighting factor 2 (step 4.4)	**Sub-Total 1**				**1**		**R 34 372 242.63**
	Preliminary and General	12% of Subtotal 1						R 4 124 669.12
	Contingency	10% of Subtotal 1						R 3 437 224.26
	Sub Total	**Sub-Total 2**						**R 41 934 136.01**
		VAT (14%)						R 5 870 779.04
		Sub-Total 3 (including VAT)				**GRAND TOTAL**		**R 47 804 915.06**

29 MONITORING OF IMPACT MANAGEMENT ACTIONS

The table below details the monitoring details, including: Monitoring and reporting frequency; Responsible persons; Time period for implementing impact management actions; and Mechanism for monitoring compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Aspect: Topography				
All infrastructure areas, development footprints and associated activities	Excavation and creation of infrastructure foundations and servitudes will alter the topographical nature of the site and associated drainage.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 3. Ensure activity is proceeding in the correct area to prevent impact to areas not targeted for development. 4. Ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks, optimise water use and minimise wasting of water.	1. Site manager 2. Environmental manager 3. Environmental manager 4. Site manager	1. Once-off inspection of demarcations. 2. Weekly inspections of no-go zones as soon as the areas are demarcated for life of mine. 3. Monthly inspection to ensure activities are proceeding within the designated and demarcated areas. 4. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life.
Opencast excavations	Altered topographical nature and associated drainage.	1. Ensure demarcation of active area and sensitive sites and their buffer zones to prevent disruption to sensitive sites. 2. Ensure activity is proceeding in the correct area to prevent impact to areas not targeted for development. 3. Ensure material is replaced to the mined out cuts as stipulated in the rehabilitation model in order to achieve desired elevations and drainage; to apply soil to filled and contour areas to ensure proper drainage. 4. Ensure that correct elevations are obtained during rehabilitation as per the rehabilitation plan and model.	1. Site manager 2. Environmental manager 3. Site manager 4. Environmental manager	1. Once-off inspection of demarcations. 2. Monthly inspection to ensure activities (including open cast mining) are proceeding within the designated and demarcated areas. 3. Monthly recording of material handling and annual review of the rehabilitation model. 4. Annual topographical surveys over rehabilitated areas until rehabilitation is completed.
ALL material stockpile areas	Stockpiles will change the topographical nature of the area.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and rehabilitation model and stockpile heights are maintained. 2. Ensure that material is replaced to the mined out cuts as soon as possible as stipulated in the rehabilitation model and soil utilisation guide to reduce the need for surface stockpiles. 3. Ensure that only temporary stockpiles are maintained at opencast pits. 4. Ensure all coal is stockpiled in designated areas only.	1. Site manager with the contracting mine manager 2. Site manager with the contracting mine manager 3. Site manager with the contracting mine manager 4. Site manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 3. Monthly inspection of opencast pits to ensure ROM coal is removed for processing for the life of mine. 4. Daily inspection of all coal transfer, transport and handling areas once coal is extracted until final coal is removed from site.
Water storage (dams / reservoirs / tanks) & Slurry dam	Excavation of dams will alter topography and drainage patterns.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Ensure activity is proceeding in the correct area to prevent impact to areas not targeted for development. 3. Ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks,	1. Site manager 2. Environmental manager 3. Site manager	1. Once-off inspection of demarcations. 2. Daily inspection to ensure dam construction is proceeding within the designated and demarcated area. 3. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		optimise water use and minimise wasting of water.		
Opencast excavations & Rehabilitation	Differential settling of material and potential for subsidence will alter topography and drainage patterns.	1. Ensure no differential settling of material or surface cracking that would affect surface water drainage. 2. Ensure that correct elevations are obtained during rehabilitation as per the rehabilitation plan and model.	1. Environmental manager 2. Environmental manager	1. Monthly visual inspection of surface of all rehabilitated areas for the life of mine. 2. Annual topographical surveys over rehabilitated areas until rehabilitation is completed.
Aspect: Geology				
Opencast excavations	Alteration of the geological nature and sequence.	1. Ensure mine plan and rehabilitation model is appropriately implemented. 2. Ensure that opencast mining is proceeding in the correct area to prevent impact to neighbouring areas. 3. Ensure all coal is removed from the opencast pits.	1. Site manager with the contracting mine manager 2. Environmental manager and site manager 3. Site manager with the contracting mine manager	1. Mine plan and rehabilitation model will continuously be implemented and consulted during opencast mining. 2. Monthly inspection to ensure activities are proceeding within the designated and demarcated areas. 3. Monthly inspection of pits to ensure maximised coal extraction during opencast mining.
Blasting	Cracks and disruption to geological layers.	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.
Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Alteration of the geological nature and sequence.	1. Ensure that material is replaced to the mined out cuts as soon as possible as stipulated in the mine and rehabilitation plans to reduce the need for surface stockpiles.	1. Site manager with the contracting mine manager	1. Bimonthly inspection of discard backfilling and compression density until final void is backfilled.
Aspect: Soil & Land Capability - SEE SOIL MONITORING UNDER SECTION 29.1.1				
All infrastructure areas, development footprints and associated activities	Loss in grazing potential, loss of soil and deterioration of soil characteristics.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and stockpile heights are maintained. 2. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 3. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing land capability. 4. Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas.	1. Site manager with the contracting mine manager 2. Environmental manager will contract a soil specialist 3. Site manager with the contracting mine manager 4. Environmental manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 4. Monthly visual inspection of surface of all rehabilitated areas for the life of mine.
Topsoil & subsoil stripping & stockpiling	Loss of fertile topsoil layer.			
Topsoil & subsoil stripping & stockpiling	Potential loss of soil through erosion.			
Topsoil & subsoil stripping & stockpiling	Compaction and alteration of physical characteristics of soil.			
ALL coal handling, storage, processing and conveyance areas & ALL Water management / containment features.	Chemical soil pollution- as a result of mine water spills or irresponsible handling of coal or generation of coal dust and coal spillages.	1. Ensure all coal is in designated stockpiling and handling areas and that all coal spills are cleared regularly and replaced to designated areas. 2. Determine extent of dust generation in terms of NEM:AQA regulations and reporting on NAEIS. 3. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 4.Ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks, optimise water use and minimise wasting of water.	1. Site manager 2. Environmental manager 3. Site manager 4. Site manager 5. Environmental manager	1. Daily inspection of all coal transfer, transport and handling areas once coal is extracted until final coal is removed from site. 2. Monthly dust monitoring will commence during the pre-construction phase in order to obtain baseline data and continue throughout the life of mine. 3. Once-off inspection of demarcations. 4. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 5. Monthly surface water monitoring, quarterly

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		5. Ensure effective storm water management and mine water containment.		groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
Waste generation & storage	Potential contamination of soil with indiscriminately dumped waste.	1. Prevent illegal littering and dumping of waste on site in undesignated areas.	1. Environmental manager	1. Monthly visual inspection of the site for illegal dumping of waste for the life of mine.
Stores, workshops & washbays & Hardpark & Fuel Storage	Potential hydrocarbon contamination of soils. Potential contamination of soil with indiscriminate use of contaminating materials (cement, chemicals, etc.).	1. Ensure no cement spillages and immediate clearing of spillages and rehabilitation of affected areas. 2. Ensure proper storage and handling of chemicals on site, ensure MSDSs are available for all chemicals stored on site and ensure chemical storage area is clean and clear of spills. 3. Ensure proper storage and handling of hydrocarbons on site and prevent hydrocarbon spills, including emptying of oil traps regularly to the used hydrocarbon waste streams to prevent overflowing and spillages and preventing flooding of bunded areas. 4. Ensure vehicles, equipment and machinery are serviced and maintained within operation specifications to prevent excessive noise, emission and reduce risks of leaks. 5. Ensure area is maintained free of spills that could form a source of contamination. 6. Ensure concrete linings of all bunded areas are not compromised which would lead to contaminated seepage.	1. Environmental manager 2. Environmental manager 3. Site manager 4. Site manager 5. Site manager 6. Site manager	1. Daily inspection of cement handling areas during construction. 2. Daily inspection of chemical storage and handling areas while chemicals are stored on site. 3. Daily inspection of bunded areas for as long as hydrocarbons are stored on site. 4. Weekly inspection of all service and maintenance plans/logbooks to ensure maintenance is scheduled in time. 5. Daily inspection of the hard park area will be conducted as long as vehicles and machinery are kept in the area. 6. Annual testing of integrity of concrete bunding for as long as hydrocarbons are stored on site.
Ablutions & change house with sewage treatment plant	Potential contamination of soil with sewage.	1. Record water usage to determine actual use, determine what water conservation measures can be put in place, determine any water spikes which may indicate faulty equipment. 2. Reduce the risk of spills and leaks to optimise water use and minimise wasting of water. 3. Ensure no bacterial contamination of downstream water resources by including bacterial analysis of water sources near to sewage treatment facility.	1. Environmental manager 2. Site manager 3. Environmental manager	1. Continuous water metering and monthly recording for the life of mine. 2. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
Aspect: Surface Water & Associated Wetlands & Aquatic Ecosystems - SEE WATER/WETLAND MONITORING AND BIOMONITORING UNDER SECTIONS 29.1.5, 29.1.3 AND 29.1.4				
All infrastructure areas, development footprints and associated activities	Increased runoff and associated potential silt-loading and contamination of downstream water bodies and associated wetlands.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 3. Ensure activity is proceeding in the correct area to ensure proper storm water management in line with GN704 is achieved. 4. Ensure proper storm water diversion and separation and ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks. 5.Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas. 6. Ensure effective storm water management and mine water containment.	1. Site manager 2. Environmental manager 3. Environmental manager 4. Site manager 5. Environmental manager 6. Environmental manager	1. Once-off inspection of demarcations. 2. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 3. Monthly inspection to ensure activities are proceeding within the designated and demarcated areas. 4. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 5. Monthly visual inspection of surface of all rehabilitated areas for the life of mine. 6. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
All infrastructure areas, development footprints and associated activities	Downstream water quantity of catchment reduced.			
Infrastructure area & Opencast excavations.	Destruction of Sandloop River riparian wetland habitat and loss of wetland ecological status and functioning.			
Opencast excavations	Contamination of Sandloop River through contaminated groundwater baseflow and	1. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 2. Ensure effective storm water management and mine water	1. Environmental manager 2. Environmental manager	1.Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 2. Monthly surface water monitoring, quarterly

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
	seepage.	containment.		groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
All Material stockpiles	Increased runoff and associated potential silt-loading of downstream water bodies and associated wetlands.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and stockpile heights are maintained. 2. Ensure proper storm water diversion and separation and ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks. 3. Ensure effective storm water management and mine water containment. 4. Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas.	1. Site manager with the contracting mine manager 2. Site manager 3. Environmental manager 4. Environmental manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS. 4.Monthly visual inspection of surface of all rehabilitated areas for the life of mine.
East Overburden stockpiles (non-carbonaceous & carbonaceous)	Destruction of pans.	1. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 2. Ensure effective storm water management and mine water containment.	1. Environmental manager 2. Environmental manager	1.Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 2. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
Overburden stockpiles (carbonaceous) & RoM and product coal stockpiles	Increased risk of contamination through contaminated runoff to downstream water bodies and associated wetlands.	1. Ensure stripping and stockpiling is done in accordance with the rehabilitation plan and stockpile heights are maintained. 2. Ensure proper storm water diversion around stockpiles and containment facilities for runoff water from carbonaceous stockpiles to reduce the risk of contaminated water spills and reduce downstream contamination. 3. Ensure effective storm water management and mine water containment.	1. Site manager with the contracting mine manager 2. Site manager 3. Environmental manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Weekly inspections of ALL water management features, including infrastructure for runoff diversion and containment from carbonaceous stockpiles for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
ALL coal handling, storage, processing and conveyance areas	Generation of coal dust and coal spillages could contaminate water bodies in neighbouring areas.	1. Ensure all coal is in designated stockpiling and handling areas and that all coal spills are cleared regularly and replaced to designated areas. 2. Ensure proper storm water diversion around stockpiles and containment facilities for runoff water from carbonaceous stockpiles to reduce the risk of contaminated water spills and reduce downstream contamination. 3. Ensure effective storm water management and mine water containment. 4. Determine extent of dust generation in terms of NEM:AQA regulations and reporting on NAEIS.	1. Site manager 2. Site manager 3. Environmental manager 4. Environmental manager	1. Daily inspection of all coal transfer, transport and handling areas until final coal is removed from site. 2. Weekly inspections of ALL water management features, including infrastructure for runoff diversion and containment from coal stockpiles for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS. 4. Monthly dust monitoring will commence during the pre-construction phase in order to obtain baseline data and continue throughout the life of mine.
Crushing & screening & Processing Plant & Water supply	Irresponsible use of water and water wastage.	1. Record water usage to determine actual use, determine what water conservation measures can be put in place, determine any water spikes which may indicate faulty equipment. 2. Reduce the risk of spills and leaks to optimise water use and minimise wasting of water.	1. Environmental manager 2. Site manager	1. Continuous water metering and monthly recording for the life of mine. 2. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life.
Water storage (dams / reservoirs / tanks) & Slurry dam	Contamination of surface water features with contaminated water runoff, ruptured dam walls.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks,	1. Site manager 2. Site manager 3. Environmental manager	1. Once-off inspection of demarcations. 2. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 3. Monthly surface water monitoring, quarterly

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		optimise water use and minimise wasting of water. 3. Ensure effective storm water management and mine water containment.		groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS. 5. Integrity of all linings will be tested annually.
Water & slurry pipelines	Potential contamination of surface water features with burst pipelines.	1. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 2. Ensure pipelines are properly constructed and operated to reduce the risk of contaminated water spills and leaks and minimise wasting of water. 3. Ensure effective storm water management and mine water containment.	1. Environmental manager 2. Site manager 3. Environmental manager	1. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 2.Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
Explosives magazine	Potential contamination of surface water with explosives materials (largely nitrogen-based compounds).	1. Ensure proper storage and handling of explosives on site and ensure no littering or spillage of explosives material.	1. Environmental manager	1. Daily inspection of explosives handling and storage areas for the as long as explosives are stored on site.
Waste generation & storage	Potential contamination of surface water with indiscriminately dumped waste.	1. Prevent illegal littering and dumping of waste on site in undesignated areas.	1. Environmental manager	1. Monthly visual inspection of the site for illegal dumping of waste for the life of mine.
Stores, workshops & washbays & Hardpark & Fuel Storage	Potential hydrocarbon contamination of surface water. Potential contamination of surface water with indiscriminate use of contaminating materials (cement, chemicals, etc.).	1. Ensure no cement / hydrocarbon spillages and immediate clearing of spillages and rehabilitation of affected areas. 2. Ensure proper storage and handling of chemicals on site, ensure MSDSs are available for all chemicals stored on site and ensure chemical storage area is clean and clear of spills. 3. Ensure proper storage and handling of hydrocarbons on site and prevent hydrocarbon spills, including emptying of oil traps regularly to the used hydrocarbon waste streams to prevent overflowing and spillages and preventing flooding of bunded areas. 4. Ensure concrete linings are not compromised which would lead to contaminated seepage. 5. Ensure vehicles, equipment and machinery are serviced and maintained within operation specifications to prevent excessive noise, emission and reduce risks of leaks.	1. Environmental manager 2. Environmental manager 3. Site manager 4. Site manager 5. Site manager	1. Daily inspection of cement and hydrocarbon handling areas during construction. 2. Daily inspection of chemical storage and handling areas while chemicals are stored on site . 3. Daily inspection of bunded areas for as long as hydrocarbons are stored on site. 4 Annual testing of integrity of concrete bunding for as long as hydrocarbons are stored on site. 5. Daily inspection of the hard park area will be conducted as long as vehicles and machinery are kept in the area
Ablutions & change house with sewage treatment plant	Potential contamination of surface water bodies with sewage.	1. Record water usage to determine actual use, determine what water conservation measures can be put in place, determine any water spikes which may indicate faulty equipment. 2. Reduce the risk of spills and leaks to optimise water use and minimise wasting of water. 3. Ensure no bacterial contamination of downstream water resources by including bacterial analysis of water sources near to sewage treatment facility.	1. Environmental manager 2. Site manager 3. Environmental manager	1. Continuous water metering and monthly recording for the life of mine. 2. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
Aspect: Groundwater - SEE GROUNDWATER MONITORING UNDER SECTION 29.1.5				
All infrastructure areas, development footprints and associated activities	Increased risk of contamination through seepage from any contaminating surface material.	1. Ensure that all areas storing potentially contaminating material (mine water dams, coal stockpile area, hydrocarbon storage areas) are properly prepared to reduce infiltration to groundwater prior to storage of material on site and ensure runoff from these sites is directed to lined mine water dams. 2. Ensure water management measures and AMD reduction measures	1. Site manager 2. Environmental manager	1. Once off inspection of sites to ensure they are adequately prepared/constructed and weekly visual inspection to ensure areas are operated and maintained properly throughout the life of mine. 2. Quarterly groundwater monitoring and quarterly quality

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
		are appropriate.		reports to DWS.
Opencast excavations	Alteration of weathered aquifer flow dynamics and reduction of local groundwater levels.	1. Ensure water management measures and AMD reduction measures are appropriate. 2. Ensure that registered water users are minimally affected through dewatering by measuring groundwater levels in surrounding areas.	1. Environmental manager 2 Environmental manager	1. Quarterly groundwater monitoring and quarterly quality reports to DWS. 2. Quarterly groundwater level monitoring for life of mine.
Opencast excavations & Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Generation of Acid Mine Drainage (AMD)	1. Ensure responsible mining (keeping mine areas dry, sealing major fault lines that are intersected, maximised extraction of coal). 2. Ensure material is replaced to the mined out cuts as stipulated in the rehabilitation plan, specifically the placement and compaction of discard and carbonaceous material at the base of the pit below the original coal seam levels in order to ensure early flooding and reduced risk of AMD formation. 3. Ensure that correct elevations are obtained during rehabilitation as per the rehabilitation plan and model. 4. Ensure water management measures and AMD reduction measures are appropriate. 5. Ensure that registered water users are minimally affected through dewatering by measuring groundwater levels in surrounding areas. 6. Ensure that potential long term impacts are sustainably managed through updating the groundwater contamination model (plume migration and decant potential).	1. Site manager with the contracting mine manager 2. Site manager with the contracting mine manager 3. Environmental manager 4. Environmental manager 5 Environmental manager 6. Environmental manager will ensure that a groundwater specialist is contracted	1. Monthly inspection of all material handling for the life of mine. 2. Bimonthly inspection of discard backfilling and compression until final void is backfilled. 3. Annual topographical surveys over rehabilitated areas until rehabilitation is completed. 4. Quarterly groundwater monitoring and quarterly quality reports to DWS. 5. Quarterly groundwater level monitoring for life of mine. 6. Update of the contaminant transport model for groundwater every two years.
Aspect: Flora & Fauna - SEE FLORA MONITORING UNDER SECTION 29.1.2				
All infrastructure areas, development footprints and associated activities	Alien invasive establishment and bush encroachment.	1. Control, with the aim of eradicating, alien and invasive species listed under CARA and NEM:BA from the relevant properties.	1. Environmental manager	1. Area must be generally inspected every 6 months. Areas where plants were removed must also be revisited to remove any new saplings; frequency will depend on the type of species.
All infrastructure areas, development footprints and associated activities & Opencast excavations	Loss of biodiversity, degradation of vegetation and fragmentation and loss of ecological corridors through vegetation clearance and activity in pans.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development, especially the riverine habitat around the Sandloop River. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 3. Ensure soil amelioration on rehabilitated ground to sustain vegetative cover and proper seeding with indigenous local flora to attain sustainable grazing land. 4. Ensure proper vegetative cover over rehabilitated ground.	1. Site manager 2. Environmental manager 3. Environmental manager 4. Environmental manager	1. Once-off inspection of demarcations. 2. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 3. Soil and flora surveys will be completed annually over rehabilitated areas for the life of mine. 4. Monthly visual inspection of vegetation establishment and germination over rehabilitated areas for the life of mine.
All infrastructure areas, development footprints and associated activities	Destruction of protected species.	1. Ensure permits are in place before destroying or relocating protected species. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and associated ecosystems. 3. Ensure activity is in designated area and surrounding flora and fauna are preserved and monitor protected species on site to allow for appropriate action should such species come under threat from the proposed development.	1. Environmental manager 2. Environmental manager 3. Environmental manager	1. Permits and relocation of species will occur once-off before any activity commences in the area. 2. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 3. Monthly inspections of areas where protected species were observed throughout the life of mine.
All infrastructure areas, development footprints	Alienation of, and disturbance to, animals and loss of roost and	1. Ensure surrounding flora and fauna are preserved and monitor protected species on site to allow for appropriate action should such	1. Environmental manager 2. Environmental manager	1. Monthly inspections will be made of areas where protected species were observed for the life of mine.

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
and associated activities	foraging sites for birds and bats.	species come under threat from the development. 2. Ensure permits are applied for if fauna or protected flora need to be relocated or destroyed and ensure the relevant specialists are contracted.		2. Permits for relocation of protected species will be obtained prior to relocation of species being undertaken.
All water management features	Potential harm to sensitive flora in the riparian habitats associated with the Sandloop River through contaminated runoff and poor rehabilitation	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 3. Ensure proper storm water diversion and separation and ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks. 4. Ensure effective storm water management and mine water containment.	1. Site manager 2. Environmental manager 3. Site manager 4. Environmental manager	1.Once-off inspection of demarcations. 2. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 3. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 4. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
Lighting	Hindrance to nocturnal animals, including nocturnal birds and bats	-	-	-
Waste generation & storage	Potential harm to flora and fauna through littering and waste toxins.	1. Prevent illegal littering and dumping of waste on site in undesignated areas.	1. Environmental manager	1. Monthly visual inspection of the site for illegal dumping of waste for the life of mine.
Stores, workshops & washbays, Fuel storage, Hard Park	Potential hydrocarbon contamination will be source of toxin to flora and fauna.	1. Ensure no cement spillages and immediate clearing of spillages and rehabilitation of affected areas. 2. Ensure proper storage and handling of chemicals on site, ensure MSDSs are available for all chemicals stored on site and ensure chemical storage area is clean and clear of spills. 3. Ensure proper storage and handling of hydrocarbons on site and prevent hydrocarbon spills, including emptying of oil traps regularly to the used hydrocarbon waste streams to prevent overflowing and spillages.	1. Environmental manager 2. Environmental manager 3. Site manager	1. Daily inspection of cement handling areas during construction. 2. Daily inspection of chemical storage and handling areas while chemicals are stored on site . 3. Daily inspection of bunded areas for as long as hydrocarbons are stored on site.
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Lack of functional vegetation due to poor rehabilitation and associated downstream impacts on riparian vegetation	1. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 2. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing land capability. 3. Ensure proper vegetative cover over rehabilitated ground. 4. Ensure that vegetation is establishing on rehabilitated areas and ensure the area is stabilising and self-sustaining in terms of vegetation communities.	1. Environmental manager will contract a soil specialist 2. Site manager with the contracting mine manager 3. Environmental manager 4. Environmental manager will ensure that a flora specialist is contracted	1. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 3. Monthly visual inspection of vegetation establishment and germination over rehabilitated areas for the life of mine. 4. Annual floral surveys of rehabilitated areas for the life of mine.
Aspect: Air Quality - SEE AIRQUALITY MONITORING UNDER SECTION 29.1.7				
All infrastructure areas, development footprints and associated activities	Emissions into the atmosphere through use of diesel powered equipment, machinery and vehicles.	1. Ensure vehicles, equipment and machinery are serviced and maintained within operation specifications to prevent excessive noise, emission and reduce risks of leaks.	1. Site manager	1. Weekly inspection of all service and maintenance plans/logbooks to ensure maintenance is scheduled in time.
All infrastructure areas, development footprints and associated	Dust generation and particulate matter.	1. Ensure that dust levels are within thresholds through dust monitoring.	1. Environmental manager 2. Environmental manager	1. Monthly dust monitoring and recording. 2. Once off registration on NAEIS and annual reporting to

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
activities		2. Ensure legal compliance through registration on NAEIS website.		NAEIS.
Blasting	Dust generation.			
Coal handling (RoM & product coal stockpiling, Coal loading & conveyance, access and hauling, crushing and screening)	Potential for spontaneous combustion and associated emissions.	1. Ensure legal compliance through registration on NAEIS website. 2. Ensure all coal is in designated stockpiling and handling areas and that all coal spills are cleared regularly and replaced to designated areas.	1. Environmental manager 2. Site manager	1. Once off registration on NAEIS and annual reporting to NAEIS 2. Daily inspection of temporary surface discard disposal site and all coal transfer, transport and handling areas once coal is extracted until final coal is removed from site.
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Dust generation associated with material handling.	1. Ensure that dust levels are within thresholds through dust monitoring. 2. Ensure legal compliance through registration on NAEIS website.	1. Environmental manager 2. Environmental manager	1. Monthly dust monitoring and recording. 2. Once off registration on NAEIS and annual reporting to NAEIS.
Aspect: Noise - SEE NOISE MONITORING UNDER SECTION 29.1.7				
All infrastructure areas, development footprints and associated activities. All activities on site.	Increased noise levels.	1. Determine extent of noise generation and success of management measures for noise control and to alter noise management as needed through noise monitoring at boundaries and sensitive receptors.	1. Environmental manager	1. Quarterly environmental noise monitoring.
Aspect: Archaeological/Cultural Sites				
Opencast excavations	Loss of and disturbance to archaeological / heritage sites (Historic farmstead & Abandoned mine).	1. Preserve any heritage and cultural sites that may be identified during construction and excavation.	1. Social manager	1. Once-off prior to activities taking place.
Opencast excavations	Loss of and disturbance to 3 graves associated with Site 5.			
Overburden stockpiles	Loss of and disturbance to archaeological / heritage sites (Site 3 - Historic farmstead / school Foundations).			
Overburden stockpiles	Loss of and disturbance to archaeological / heritage sites (Site 1 and 2 - stone age findings).			
Blasting	Vibrations may damage nearby heritage sites and the Lephalale Cemetery (Site 6).	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.
Aspect: Visual Aesthetic				
All infrastructure areas, development footprints and associated activities	Deterioration in visual aesthetics.	1. Ensure demarcation of active area has been properly implemented to prevent disruption to areas not targeted for development. 2. Inspect complaints register.	1. Site manager 2. Social manager	1. Once-off before any activity takes place in specific area. 2. Daily inspection of complaints register.

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Lighting	Increased visibility of the site.	-	-	-
Waste generation & storage	Deterioration in visual aesthetics.	1. Prevent illegal littering and dumping of waste on site in undesignated areas.	1. Environmental manager	1. Monthly visual inspection of the site for illegal dumping of waste for the life of mine.
Aspect: Nearby Structures - SEE BLAST MONITORING UNDER SECTION 29.1.6				
Blasting	Ground vibration and airblast impact on houses (including SPCA)	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.
Blasting	Ground vibration impact on boreholes			
Blasting	Ground vibration impact on roads			
Blasting	Fly Rock Impact on houses			
Blasting	Fly Rock Impact on boreholes			
Blasting	Fly Rock Impact on roads			
Blasting	Fume impact on houses			
Aspect: Land Use				
All infrastructure areas, development footprints and associated activities	Change in land use to mining.	1. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 2. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing land capability. 3. Ensure proper vegetative cover over rehabilitated ground. 4. Ensure that vegetation is establishing on rehabilitated areas and ensure the area is stabilising and self-sustaining in terms of vegetation communities.	1. Environmental manager will contract a soil specialist 2. Site manager with the contracting mine manager 3. Environmental manager 4. Environmental manager will ensure that a flora specialist is contracted	1. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 3. Monthly visual inspection of vegetation establishment and germination over rehabilitated areas for the life of mine. 4. Annual floral surveys of rehabilitated areas for the life of mine.
Aspect: Traffic & Safety				
Blasting	Danger of fly-rock to surrounding land users.	1. Roads must be inspected after blasts and cleared of any fly rock and any damage repaired in consultation with the roads department.	1. Social manager with the contracting mine manager	1. Inspection of roads for fly rock will be completed after every blast for as long as blasting is conducted on site.
Access and hauling along roads	Increased potential for road incidences. Road degradation.	1. Maintain roads on site to reduce road incidences and that intersections with public roads are maintained with appropriate signage and are as safe as possible for other road users. 2. Ensure that on site speed limits are enforced to reduce dust generation and road incidences.	1. Site manager 2. Site manager	1. Monthly inspections will be undertaken of all internal roads and intersections throughout the life of mine 2. Speed inspections will be undertaken sporadically on site throughout the life of mine.
Aspect: Socio-economic, Health & Safety				
All footprints & All activities	General health and safety - Air Quality.	See Air Quality Aspect	See Air Quality Aspect	See Air Quality Aspect
All footprints & All activities	General health and safety - Noise	See Noise & Nearby Structures (blast) Aspects	See Noise & Nearby Structures (blast) Aspects	See Noise & Nearby Structures (blast) Aspects
All footprints & All activities	Social ills - Disease	To be addressed in the Health & Safety Orientation Programme	To be addressed in the Health & Safety Orientation Programme	To be addressed in the Health & Safety Orientation Programme

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All footprints & All activities	Proximity of mine to residential areas	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects
All footprints & All activities	Property value	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects
All footprints & All activities	Sense of Place	See Visual Aesthetics Aspect	See Visual Aesthetics Aspect	See Visual Aesthetics Aspect
All footprints & All activities	Impact on road infrastructure	1. Maintain roads on site to reduce road incidences and that intersections with public roads are maintained with appropriate signage and are as safe as possible for other road users. 2. Ensure that on site speed limits are enforced to reduce dust generation and road incidences.	1. Site manager 2. Site manager	1. Monthly inspections will be undertaken of all internal roads and intersections throughout the life of mine 2. Speed inspections will be undertaken sporadically on site throughout the life of mine.
All footprints & All activities	City development	-	-	-
All footprints & All activities	Matimba power station ACC's	See Air Quality Aspect	See Air Quality Aspect	See Air Quality Aspect

29.1 Specific Monitoring Plans

29.1.1 Soil Monitoring Plan

A soil monitoring plan should be implemented on site that will assess the following:

- Quality and volume of stockpiles on site,
- Soil acidity and salt pollution analyses (pH, electrical conductivity and sulphate),
- Fertility analysis (exchangeable cations K, Ca, Mg and Na and phosphorus),
- State of erosion on site,
- Assessment of soil thickness over rehabilitated areas and soil characteristics by means of auger observations on a 100 x 100 m grid,
- Soil compaction levels as measured with a penetrometer over the rehabilitated area, and
- Progressive analysis of any hydrocarbon spillages and actions undertaken to remedy these where applicable, especially around areas where machinery is used or where hydrocarbons are stored.

This monitoring plan as well as the results of monitoring must be evaluated through an annual soil audit conducted by a soil specialist. Recommendations and comment made on existing impacts and issues with regards to soil and post mining land capability will be implemented on site as necessary.

29.1.2 Floral Monitoring

- Monitoring of the rehabilitation success should take place for at least five years and include corrective follow-up action.
- Conduct monthly visual surveys of seeded areas for germination and reseed areas with poor germination and consider planting these areas with seedling plugs.
- Conduct annual floral surveys to monitor floral establishment on rehabilitated areas and apply specialist recommendations on site.
- It is recommended that Landscape Functional Analysis (LFA) forms part of the rehabilitation and monitoring process. Landscape function analysis is a process-based technique that was developed specifically to track post-disturbance recovery of ecosystems. It aims to restore specific and measurable elements of ecosystem function rather than focusing purely on attaining floristic targets and thresholds e.g. nutrient cycling, increase in vegetation patches and infiltration are measured (Tongway & Hindley, 2004).

29.1.3 Wetland Monitoring

- Annual monitoring of the Sandloop River must take place, with a focus on riparian vegetation moisture stress. The Vegetation Response Assessment Index (VEGRAI) must be used to monitor the vegetation condition.

- Toxicity testing of the proposed mine's process water facilities should take place concurrently with the biomonitoring program in order to monitor the toxicological risk of the process water system to the receiving environment. Tests should include the following test organisms as a minimum:
    - *Vibrio fischeri*;
    - *Daphnia pulex*; and
    - Algal Growth Potential.
- The mine must be managed as a zero discharge facility, however definitive toxicological testing according to the Direct Estimation of Ecological Effect Potential (DEEEP) protocol should take place should it become evident that process water discharge or decant of groundwater will occur in order to define safe discharge volumes and ensure sufficient dilution;
- All affected riparian and wetland systems must be monitored for moisture stress and monitor all potentially affected riparian zones for changes in riparian vegetation structure.
- Wetland resources need to be monitored on an annual basis using the wetland assessment protocols as defined below unless updated methods are developed in future:
    - Wetland Ecoservices;
    - Wetland PES according to the "WET-Health" rapid assessment methodology;
    - Wetland zonation monitoring to determine whether impacts on wetland base flow levels are occurring;
    - Water quality monitoring as part of the mines water quality monitoring program; and
    - Monitoring of the wetland vegetation assemblage.

29.1.4 Biomonitoring

Biomonitoring of the sites surveyed during the site assessments (report will be made available as soon as it is available) should continue throughout the life of mine and for a period of 3-5 years after mining. Biomonitoring of these sites should take place every 6 months, once during the rainy season and once during the dry season. Although sites may be dry over winter, the sites must still be visited and assessed where possible.

29.1.5 Surface Water and Groundwater Monitoring

The surface and groundwater monitoring points are indicated in Plan 57.

Surface water quality must be assessed monthly where possible. It is likely that the sites will be dry in the winter months, but should still be visited monthly.

As the water management system is established, then internal features must also form part of the monitoring plan and includes:

- East PCD

- West PCD
- Supernatant water at the slurry facility
- West Pit Sump
- East Pit Sump

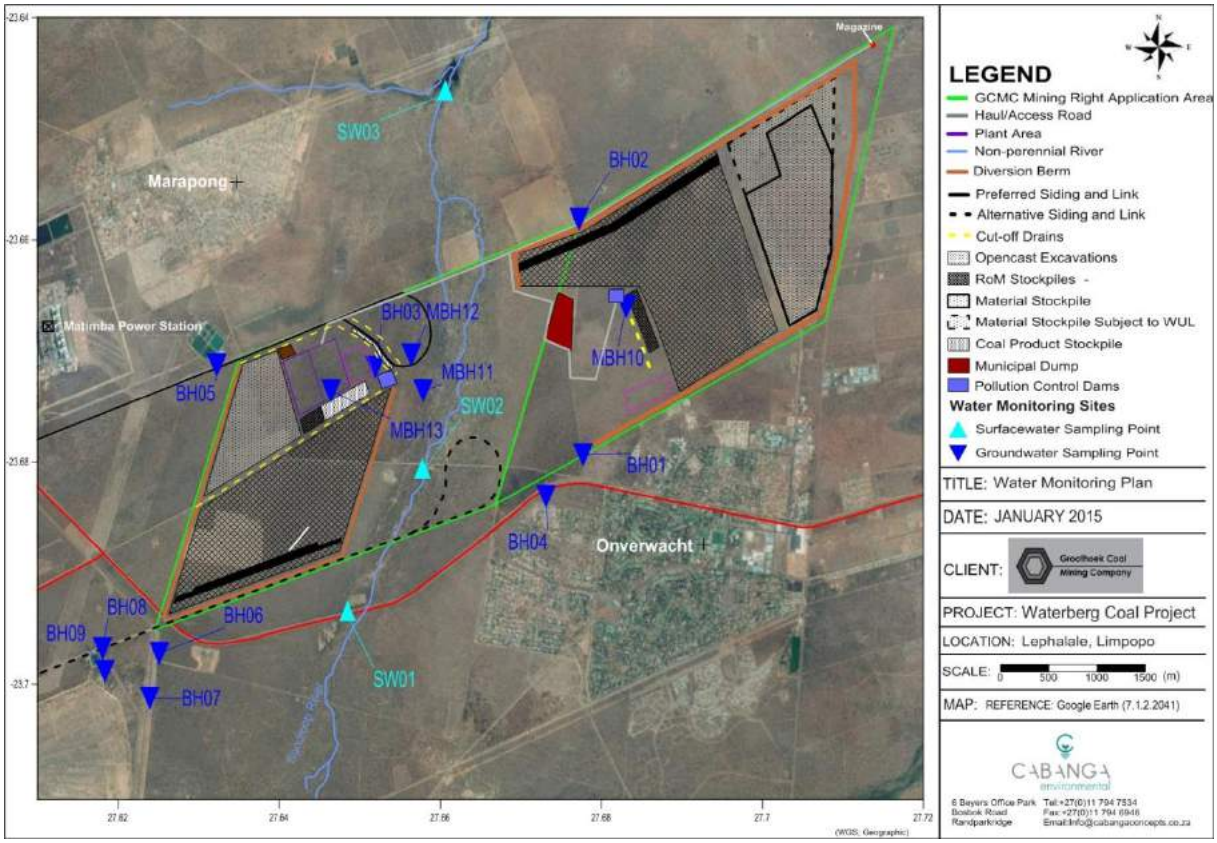
Groundwater level and quality monitoring program must be implemented at monitoring points indicated in Plan 57. During the initial 12 month period it is recommended that the monitoring program be implemented on a monthly basis in order to obtain a background indication of seasonal changes in the area. Once the initial 12 month period is completed the time increments can be increased to quarterly sampling runs, depending on the outcome of the first 12 months of monitoring.

Two years after construction, after the completion and update of the next contaminant transport model, any additional monitoring boreholes that may be required will be drilled and included in the monitoring programme.

Chemical elements that should be analysed for includes:

- General chemistry such as pH, TDS and EC;
- Major elements such as calcium, magnesium, sodium, potassium, sulphate, nitrate;
- An ICP scan of minor elements including aluminium, manganese, cadmium, mercury, chromium, vanadium and zinc.
- In addition, borehole and surface water monitoring site nearest to and downstream from diesel storage facilities will also be assessed for hydrocarbon parameters.
- In addition, borehole and surface water monitoring site nearest to and downstream from the sewage treatment plan will also be assessed for bacterial parameters.

Once groundwater inflow and groundwater level monitoring data is available the 3D numerical model should be updated every 2 years of the life of operations in order to adjust for operational changes as well as improve the level of confidence in the predicted impacts.



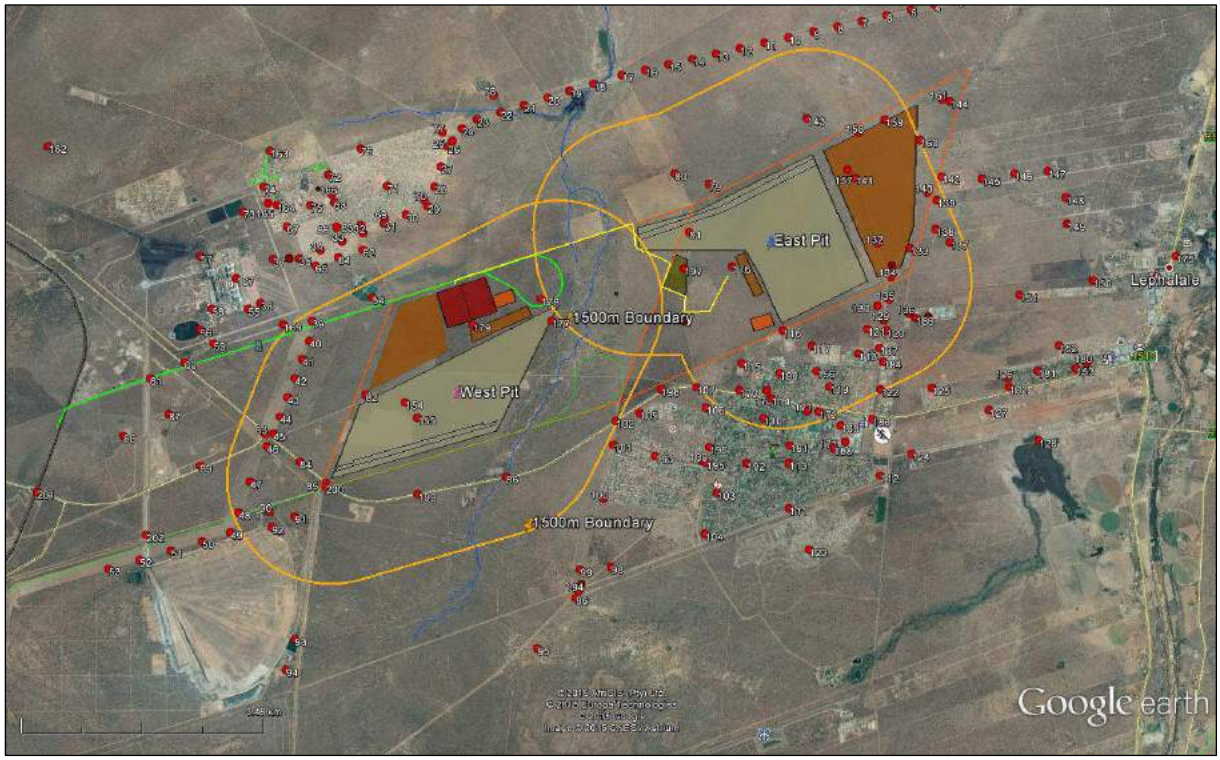
Plan 57: Proposed surface water and groundwater monitoring plan

29.1.6 Blast Monitoring

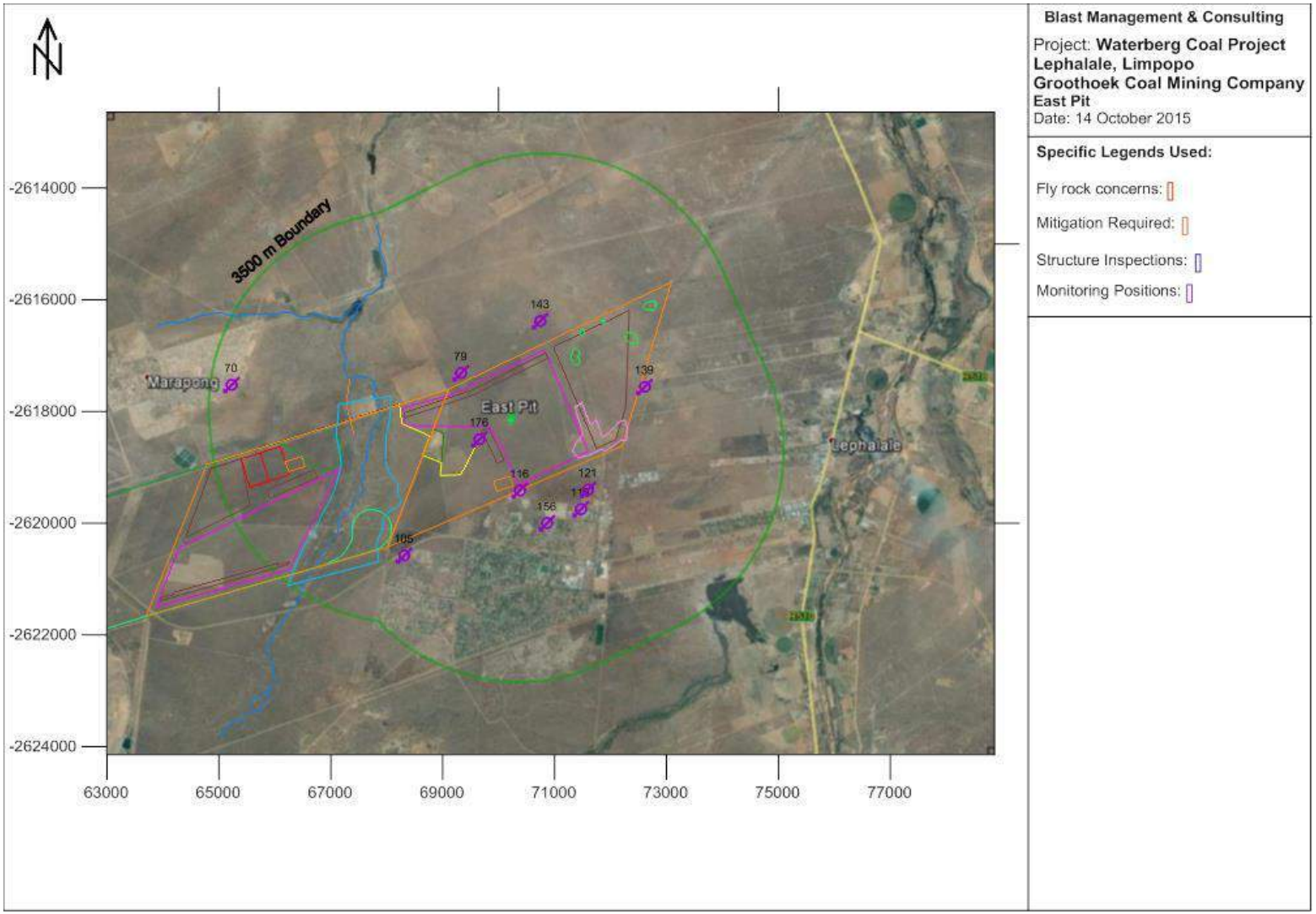
Before blasting, a photographic assessment must be made of structures within 1500m, of the pits, as indicated in Plan 58.

A ground vibration and air blast monitoring programme will be imperative when mining commences for this project. This will need to include monitoring ground vibration and air blast for every blast. Ground vibration and air blast is monitored using a seismograph. In this case it is recommended that permanent stations are used for monitoring of all blasting done. Additionally to this it is recommended that a video of each blast is done as a standard. Monitoring of ground vibration and air blast is done to ensure that the generated levels of ground vibration and air blast comply with recommendations. Proposed positions were selected to indicate the nearest points of interest at which levels of ground vibration and air blast should be within the accepted norms and standards as proposed in this report. The monitoring of ground vibration will also qualify the expected ground vibration and air blast levels and assist in mitigating these aspects properly. This will also contribute to proper relationships with the neighbours. Currently monitoring positions were identified around the mining areas for East and West Pit. 10 monitoring positions were identified for the East pit and 12 positions for the West pit. Monitoring positions are indicated in Plan 59 and Plan 60. These points will need to be finally defined after testing during first blasts. Only after the first

blasts are done can a final decision be made with regards to a monitoring programme which must be shared with all interested and affected parties.

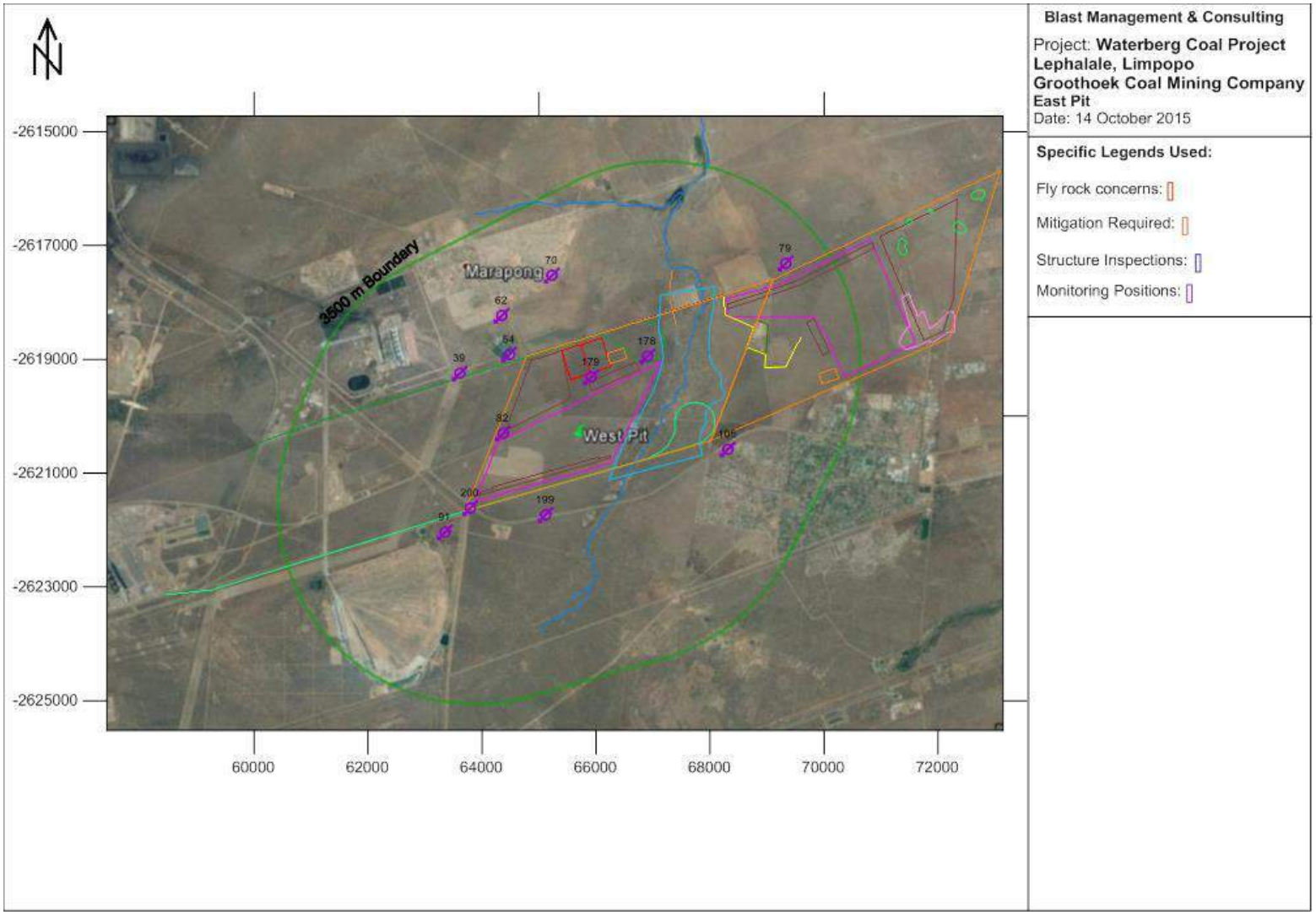


Plan 58: 1500 m area around East Pit identified for structure inspections



(**Note:** this plan still indicates the original extent of West Pit where the noise levels were recorded)

Plan 59: Monitoring Positions suggested for East Pit



(**Note:** this plan still indicates the original extent of West Pit where the noise levels were recorded)

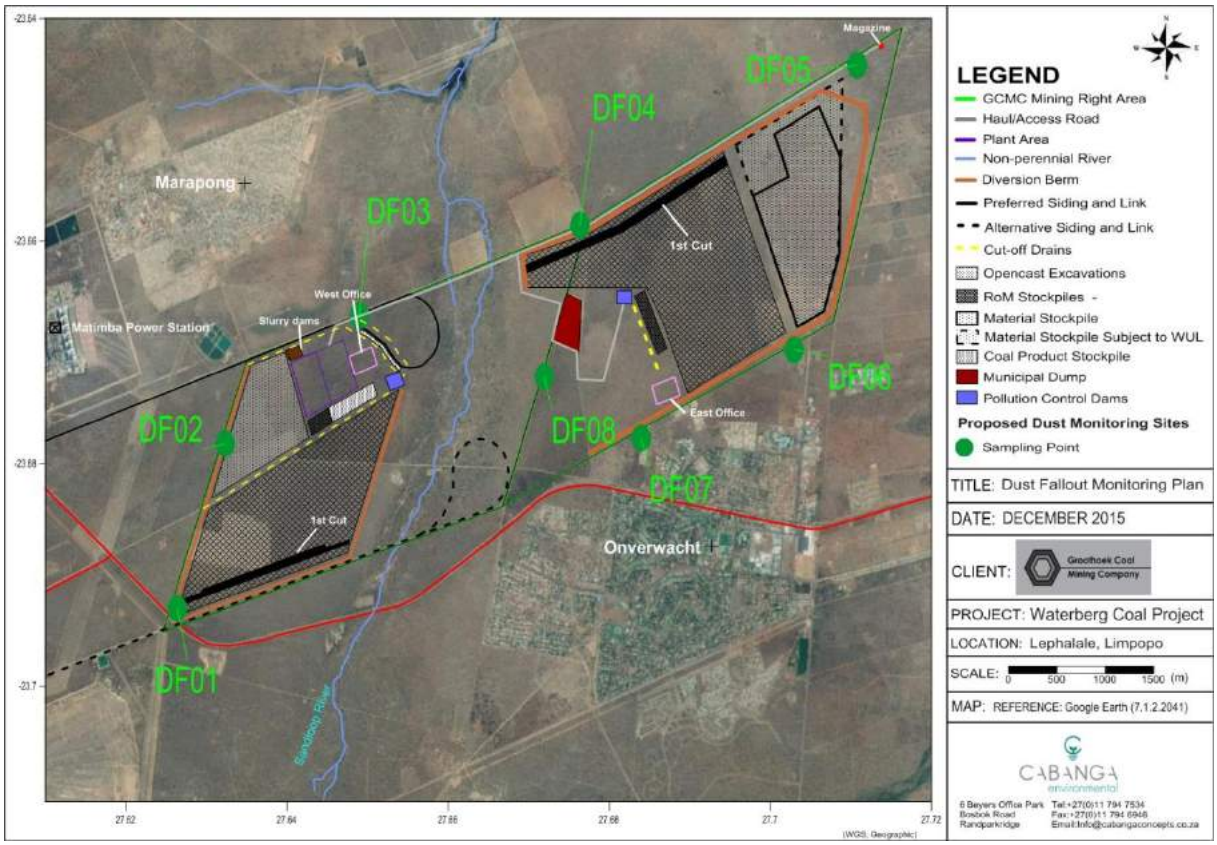
Plan 60: Monitoring Positions suggested for West Pit

29.1.7 Atmospheric Conditions

29.1.7.1 Air Quality

The following air quality monitoring programme is proposed:

- It is recommended that a dust fallout monitoring network be implemented to monitor trends in dust fallout in the surrounding area due to the proposed mining operations.
- The proposed monitoring network is indicated in Plan 61.
- Dust monitoring will be conducted on a monthly basis by an independent contractor.
- A report on the air quality measurements collected will be compiled annually. These reports will be in the public domain and are subject to review by the authorities.

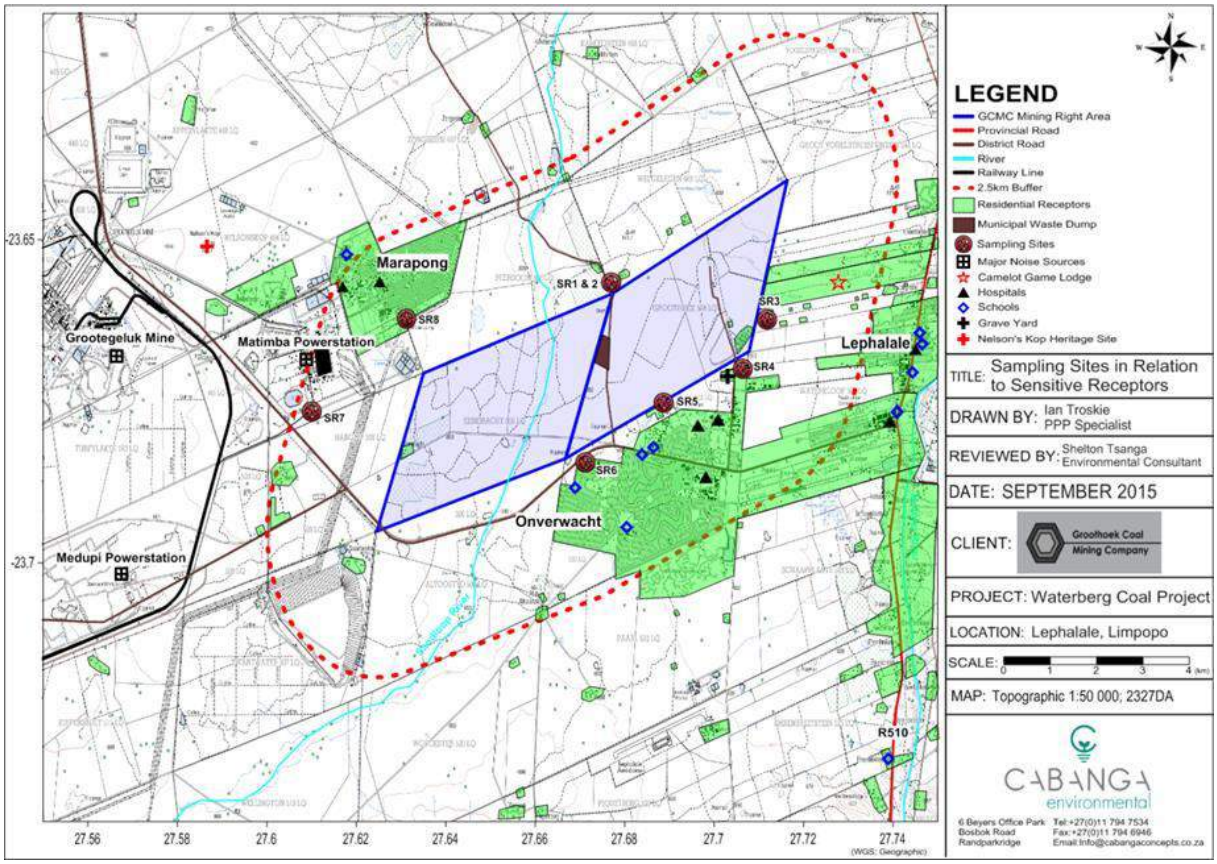


Plan 61: Proposed dust monitoring sites

29.1.7.2 Noise

The following noise level monitoring programme (Plan 62) is proposed:

- Occupational noise will be monitored on a monthly basis.
- Ambient noise will be monitored on a quarterly basis at mine boundaries. Where exceedances are observed at boundaries further assessments will be made at sensitive receptors beyond that boundary to determine if mitigation measures need to be applied regarding noise at these sites.
- Noise level data recorded will be available on site for inspection purposes.



Plan 62: Proposed noise monitoring sites around the GCMC mining right application area

30 INDICATE THE FREQUENCY OF THE SUBMISSION OF THE PERFORMANCE ASSESSMENT REPORT

All information as required by the various Government Departments should be captured and be readily available for submission when required and also for review by the external consultant conducting the performance assessment and audits.

As per NEMA EIA Regulations (GNR982 of 2014), a performance assessment/audit will be conducted by an external consultant throughout the life of mine at intervals stipulated in the EA. Due to the proximity of the mine to residential areas it is recommended to complete the audits annually. This is conducted to assess the adequacy and compliance to the EMP and the relevant legislation. As per NEMA, any amendments to the EMPr that may be required due to the performance assessment findings will be completed if necessary.

The Quantum of the Financial Provision will be reviewed on an annual basis, and submitted to the DMR.

31 ENVIRONMENTAL AWARENESS PLAN

31.1 Manner in Which the Applicant Intends to Inform Employees of Environmental Risk which may Result from their Work

31.1.1 Training Needs

A training needs analysis is performed through all levels of the organization including those within the administration, plant and mining worker sectors. Each of the categories / levels of the organization have different responsibilities and roles, accordingly different knowledge requirements are applicable. These are summarised in the Table 43. After the training needs have been identified, it is the responsibility of the Safety, Health and Environment (SHE) Office to ensure that personnel attend the relevant identified training.

31.1.2 Specialised Skills

The Training Department in conjunction with the SHE Officer are responsible for ensuring job specific training for personnel performing tasks, which can cause significant environmental and social impacts (e.g. receipt of bulk hazardous chemicals/fuel, hazardous materials handling, responding to emergency situations etc.). The Mine Manager with the assistance of the SHE Officer must identify relevant personnel and training courses.

31.1.3 Review of Training Material

Effectiveness of the environmental management training will be done by the management through task observations and during internal and external audits. All training material for presentation to personnel and contractors will be reviewed annually to ensure consistency with organisational requirements and best practice guidelines. In addition to this, annual monitoring reports, audit results and all incident reports will be reviewed; any short comings and non-compliancy will be highlighted and management measures incorporated or improved upon within the training material.

31.1.4 Records

Records from the implementation of this EAP will be kept and controlled in accordance with the SHE Management System Control of Records Procedure, which is required to be implemented so as to provide evidence of conformity and effective operation of the relevant requirements of the SHE management system.

31.2 Manner in which Risks will be Dealt with in order to Avoid Pollution or the Degradation of the Environment

Training, as detailed above, will address the specific measures and actions as listed in the EIA and EMP. In this way each staff member will be provided the knowledge required for

their job to firstly prevent impact and secondly identify if an impact is likely to occur and then to report the possibility of risk or impact immediately so as to ensure immediate response.

The following is a list of the most likely potential environmental emergencies, followed by basic summary of procedures (mine will develop detailed SOPs, which will incorporate detailed requirements under the MPRDA Regulations, for emergency events):

- Fires;
- A hydrocarbon/chemical spill or leak;
- Major water leaks or spills;
- Flooding; and
- Explosions.

In the case of environmental emergencies, the remedial measures and actions as listed in the Emergency Response Plan should be followed, in addition the relevant authorities should be contacted; these are listed below:

Dept. of Water Affairs:	015 – 290 1208
Dept. of Mineral Resources:	015 – 287 4700
Dept. of Economic Development, Environment & Tourism:	015 – 290 7164

31.2.1 Fires

Veldt fires and fires resulting from other sources must be handled with extreme caution. Fire extinguishers should be placed around the mine at accessible locations and needs to be frequently inspected and maintained in working condition. The following procedures apply In the event of a fire:

- An alarm should be activated to alert all employees and contractors.
- Identify the type of fire and the appropriate extinguishing material. For example water for a grass fire, and mono ammonium phosphate based fire extinguisher for chemical and electrical fires.
- In the event of a small fire the fire extinguishers placed around the mine should be used to contain and extinguish the fire.
- In the event of a large fire, the fire department will be notified.
- All staff will receive training in response to a fire emergency on site, including evacuation procedures.
- A Fire Association should be set up with the mine and surrounding land owners to facilitate communication during fire events and assist in fighting fires, where necessary. If such an association exists then the mine will join such an association.
- If possible all surrounding drains, such as storm water drains need to be covered and or protected to prevent any contaminated water from entering the drains.
- In case of a chemical or petroleum fire, run-off from the area should be contained as far as possible using the most appropriate measures e.g. spill absorbent cushions, sand or a physical barrier.

- Contaminated run-off must be diverted into an oil sump, or cleaned up.

31.2.2 Hydrocarbon / Chemical Spills

Hydrocarbons such as diesel, petrol, and oil which are used as fuel for mine machinery will be kept on site; therefore there is the possibility that spillage may occur. As this is a coal mine there is also the possibility of a coal spillage occurring. Further, any chemicals contained on site, such as those associated with explosives may also be detrimental to the environment if spills occur. In the event of a spillage, procedures must be put into place to ensure that there are minimal impacts to the surrounding environment.

The following procedure applies to a hydrocarbon/chemical spill:

- The incident must be reported to the Environmental coordinator immediately.
- The Environmental Coordinator will assess the situation from the information provided, and set up an investigation team. Included in this team could be the Mine Manager, Chief Safety Officer, the employee who reported the incident and any individual responsible for the incident.
- When investigating the incident, priority must be given to safety.
- Once the situation has been assessed, the Environmental Coordinator must report back to the Mine Manager.
- The Mine Manager and the investigation team must make a decision on what measures can be taken to limit the damage caused by the incident, and if possible any remediation measures that can be taken.
- In the event of a small spillage, the soil should be treated in situ, using Hazmat clean up kits and bioremediation.
- Every precaution should be taken to prevent the spill from entering the surface water environment, where the protective soil berms as proposed in Appendix 3 should play an integral role.
- In the event of a large spillage, adequate emergency equipment for spill containment or collection, such as additional supplies of booms and absorbent materials, will be made available and if required, a specialised clean-up crew will be called in to decontaminate the area. The soil should be removed and treated at a special soil rehabilitation facility.
- Reasonable measures must be taken to stop the spread of spills and secure the area to limit access.
- Dispatch necessary services.

31.2.3 Major Water Leaks or Spills

Dam wall failures and burst high-volume dirty water pipelines have been identified as potential emergency situations. Regular monitoring as proposed in Section 29 should prevent overflowing of dams. The following steps should be followed in case of incident:

- Turn off all water supplies to the dam/pipeline.

- Dispatch necessary emergency services.
- Take all reasonable measures to stop the spread of contaminated water. This can be done by placing berms and channels around the spillage area. Again, the proposed protective berm (Appendix 2) should play an integral role in these circumstances.
- The incident must be reported to the Environmental Coordinator immediately.
- The Environmental Coordinator will assess the situation from the information provided, and set up an investigation team or relevant personnel. Included in this team could be the Mine Manager, Chief Safety Officer, the employee who reported the incident and any individual responsible for the incident.
- When investigating the incident, priority must be given to safety.
- Once the situation has been assessed, the Environmental Officer must report back to the Mine Manager.
- The Mine Manager and the investigating team must take a decision on what measures can be taken to limit the damage caused by the incident, and if possible any remediation measures that can be taken.
- The DWS will be notified of the incidence.

31.2.4 Flooding

There is always potential for flooding during the rainy season. This could result in a large volume of water accumulating in a water containment facility and mine pit and could cause major damage to equipment and endanger the lives of employees on site. Procedures must be put in place to ensure that there is a quick response to flood events and damage is kept to a minimum.

The procedure for flooding is as follows:

- DWS's flood warning system should be reviewed annually.
- The use of emergency pumps should occur if the water floods the pit, where it may be exposed to contamination.
- Mine management should be made aware of any such event so they can take appropriate action to ensure production losses are kept to a minimum.
- All dams and water containment facilities should have a 0.8m freeboard and an overflow or outlet to ensure that no damage occurs to the facilities.
- All contaminated water should be contained on site, as far as possible and discharges to the environment should only occur if absolutely necessary in an extreme flood event as per GN704.

31.2.5 Explosions

Other than explosion incidents related to mining, explosions can occur in the workshop areas when working with gas cylinders and chemicals. These could result in large numbers of employees being injured and requiring medical assistance.

The procedure to be followed is:

- Safe evacuation routes should be devised in the event of an uncontrolled explosion and all staff trained on relevant evacuation routes and assembly points.
- Once safe to do so first responders may provide first aid to injured parties.
- All relevant emergency response units must be notified and hospitals informed of incoming patients.
- DMR to be notified of the incident.

Table 43: Environmental Awareness Training Requirements

Occupation Category	Environmental Management Responsibility / Role	Required Knowledge And Input	Training Required	Interval
Senior Management including Process Managers and Head of Department	Managing the S&LP and the Safety, Health & Environmental (SHE) Management System	Understanding the purpose of the SHE Management System Knowledge of the significant impacts as described in the EIA/EMP during the various LoM phases Knowledge of the commitments and management proposed within the EMP Setting and reviewing the mine's Environmental objectives Emergency preparedness and response	General in-house, management training on the EIA and EMP report Training on the applicable environmental legislation	Once off Annually
Environmental Management Representative, SHE Officer & Internal Auditor	Managing the SHE Management System, Monitoring and auditing	Understanding the purpose of the SHE Management System Knowledge of the significant impacts as described in the EIA/EMP during the various LoM phases Knowledge of the commitments and management proposed within the EMP Setting and reviewing the mine's Environmental objectives Directing the SHE management system, and monitoring their progress	General in-house, management training on the EIA and EMP report Training on the applicable environmental legislation and best practice guidelines	Once off Annually
		Emergency preparedness and response Knowledge in spill management, stockpile management, discard management, water management and waste management Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Meetings and Talk Topics	Continuous
		Knowledge of the SABS standards and other relevant legislation regarding the correct storage of chemicals	Training on the SABS standards and other legislation	Annually
		Knowledge of auditing techniques and report writing	Auditor training	Once off
Section Managers & Section Engineers	Implementation and daily management of the SHE Management System	Understanding the purpose of the SHE Management System Knowledge of the significant impacts as described in the EIA/EMP during the various LoM phases Knowledge of the commitments and management proposed within the	General in-house, management training on the EIA and EMP report	Once off

Occupation Category	Environmental Management Responsibility / Role	Required Knowledge And Input	Training Required	Interval
		EMP		
		Emergency preparedness and response Knowledge in spill management, stockpile management, discard management, water management and waste management Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting Knowledge in correct storage of chemicals	Meetings and Talk Topics Environmental Awareness Training as part of the annual induction training	Continuous Annual
Engineering HOD & General Engineering Supervisor	Implementation and daily management of the SHE Management System	Understanding the purpose of the SHE Management System Knowledge of the relevant department's significant impacts as described in the EIA/EMP during the construction and operational phases Actively implementing actions to achieve compliance with the EMP and Environmental Objectives.	General in-house, management training on the EIA and EMP report	Once off
		Emergency preparedness and response Knowledge in spill management, stockpile management, discard management, water management and waste management Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting Knowledge in correct storage of chemicals	Meetings and Talk Topics Environmental Awareness Training as part of the annual induction training	Continuous Annual
Mine Captain & General Engineering Supervisors	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SHE Management System Understanding the EMP relevant to their operations Understanding the requirements for not polluting the environment General understanding of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Environmental Awareness Training as part of the annual induction training	Annual
		Knowledge in spill management and waste management Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Meetings and talk topics	Continuous

Occupation Category	Environmental Management Responsibility / Role	Required Knowledge And Input	Training Required	Interval
		Knowledge in the correct storage and handling of chemicals Understanding the requirements for not polluting the environment		
Supervisors, Shift Boss & Forman	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SHE Management System Understanding the EMP relevant to their operations Understanding the requirements for not polluting the environment General understanding of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Environmental Awareness Training as part of the annual induction training	Annual
Operators, tradespersons & Floor Employees	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SHE Management System Understanding the EMP relevant to their operations Understanding the requirements for not polluting the environment General understanding of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Environmental Awareness Training as part of the annual induction training	Annual
General Administration Staff	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SHE Management System Understanding the EMP relevant to their operations Understanding the requirements for not polluting the environment General understanding of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Environmental Awareness Training as part of the annual induction training	Annual
Security	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SHE Management System Understanding the EMP relevant to their operations Understanding the requirements for not polluting the environment General understanding of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Environmental Awareness Training as part of the annual induction training	Annual

32 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

All information as requested by the DMR and LEDET to date has been incorporated in the EIA/EMPr. It must be stressed that the traffic assessment is still outstanding but will be submitted as soon as it is completed.

33 REFERENCES

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34 UNDERTAKING

The EAP herewith confirms

a) The correctness of the information provided in the reports ☒
b) The inclusion of comments and inputs from stakeholders and I&APs ; ☒
c) The inclusion of inputs and recommendations from the specialist reports where relevant; and ☒
d) The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; ☒

-END-

Appendix 1: The qualifications of the EAP

Curriculum Vitae

BARBARA KASL

Postal address: 49 Eagle Terrace, Apple Street, Randparkrif

Phone: +27 (0) 71 988 6773

E-mail: barbs@cabangaconcepts.co.za

Personal Information

- Full Name: Barbara Kasl
- Marital Status: Single
- Date of Birth: 16 September 1976
- Languages: English, Afrikaans, Czech
- Qualifications: PhD (Animal, Plant and Environmental Sciences)

Education

Tertiary Institute:

University of the Witwatersrand

- 2002-2004: PhD (Animal, Plant and Environmental Sciences)
- 1999-2001: MSc (upgraded to PhD)
- 1998: B.Sc. Hon. (Zoology and Botany)
- 1995-1998: BSc (Zoology and Botany)

Professional Experience

01/2008 – Current: ENVIRONMENTAL SCIENTIST - Cabanga Concepts cc. Environmental consultancy and specialising in all environmental authorisation processes.

09/2004 – 11/2007: UNIT MANAGER FOR THE BIOPHYSICAL DEPARTMENT - Digby Wells and Associates. Specialising in Fauna and Flora Reports and also full environmental authorisation processes including EIA and EMP reports. International projects included Etoile Mine in DRC, Randgold Mine in Mali, Valencia uranium green-field mine in Namibia, Mmamabula coal mine and power plant in Botswana.

09/2003 – 11/2003: **VISITING POSTGRADUATE STUDENT RESEARCHER** - Pole de Protection des Plantes (CIRAD). Projects: to determine sugarcane borer (*Chilo Sacchariphagus*) neonate larval behaviour on two varieties of sugarcane plants and determine if SASEX rearing diet is adequate for *Chilo Sacchariphagus* rearing (Saint Pierre, Reunion Island, France).

1999 –2002: **MSc AND PhD STUDENT** - South African Sugar Experiment Station (SASEX)– On site research for MSc and PhD degrees to determine habitat management strategies to control sugarcane borer (*Eldana saccharina*) in South African sugarcane (Mnt. Edgecombe, R. S. A.).

1999-2000: **RESEARCH TECHNICIAN** - SASEX contract work for Deciduous Fruit Producers Trust (DFPT) (Mnt. Edgecombe, R. S. A.). To determine effects of temperature on fruit fly mortality in fruits.

1997-1999, 2001: **LABORATORY DEMONSTRATOR AND TUTOR** - University of the Witwatersrand (Johannesburg, R. S. A.).

- Teaching assistant for College of Science I and II (1998-1999, 2001)
- Teaching assistant for 1st year Medics (1998-1999, 2001)
- Tutor for College of Science (2001)
- Catering for 3rd year Zoology Field excursion (1999)
- Demonstrating to various age groups at the "Yebo Gogga" insect exhibition at the Johannesburg Zoo (1997-1999)

2001: PRIVATE TUTOR - Private tutoring for first year student.

1993-1998: Part-time jobs

Courses Attended

21 October 2010: NEM: Air Quality Act course through IMBEWU Sustainability Legal Specialists (Pty) Ltd

August 2009: NEMA and NEMWA course through ECOLAW

14 Nov 2007: Environmental Impact Assessment Training

28 Feb – 2 Mar 2007: Project Management for Non-Project Managers Course through Astro Tech

29th Sep2006: Unilever Introduction to Managing Environmental Water Quality - Practical, Theoretical and Policy; through Institute for Water Research – RHODES University.

19-21 Sep 2005: Non-credited course in River health and SASS5 rapid methodology of water quality assessment through NEPID Consultants

20 May 2005: Snake Identification and Snakebite Treatment Course

Awards Received

2004: R 36 000 THRIP Student Bursary

2003: R 36 000 THRIP Student Bursary

2002: R 30 000 THRIP Student Bursary

2000: R 10 000 Merit Award Bursary – University of Witwatersrand

R 18 000 South African Sugar Association Experiment Station Student Bursary

1999: R 10 000 Merit Award Bursary – University of Witwatersrand

Interests

Interests: Reading, photography

- 1994: Open Water II NAUI Advanced Diving with shark, wreck and night diving specialities.

Professional Memberships

- **2008-2012:** Entomological Society of South Africa
- **2008-2011:** International Association for Impact Assessment
- **2001:** Entomological Society of South Africa
- **1999:** Entomological Society of South Africa
- **1998:** Zoological Society of Southern Africa

Conferences & Publications & Talks

Kasl, B.*; Conlong, D. E. and Byrne, M. J. (2003) Push-pull strategy to decrease *Eldana saccharina* Walker (Lepidoptera: Pyralidae) infestations in southern African sugarcane.

4 November 2003, Pole de Protection des Plantes, Saint Pierre, Reunion Island, France

Kasl, B.*; Conlong, D. E. and Byrne, M. J. (2003) Creating semiochemical diversions to control sugarcane borers. *Biocontrol News and Information* 24(2). **Article**

Conlong, D. E.; Kasl, B.* (2001) Stimulo-deterrent diversion, *Eldana saccharina* Walker (Lepidoptera: Pyralidae) and *Xanthopimpla stemmator* Thunberg (Hymenoptera: Ichneumonidae), preliminary results. *Proceedings of the South African Sugar Technologists' Association* 75. **Talk & Paper**

Kasl, B.*; Byrne, M. J. and Conlong, D. E. (2001) Towards a stimulo-deterrent strategy to control *Eldana saccharina* Walker (Lepidoptera: Pyralidae), a sugarcane borer of economic importance. Abstracted in the Proceedings of the 13th Entomological Society of Southern Africa, pg. 32. Pietermaritzburg, Kwa-Zulu Natal, R. S. A., 2-5 July 2001. ISBN: 0-620-27806-4. **Talk**

Conlong, D. E.* and Kasl, B. (2001) Stimulo-deterrent diversion as a control option for *Eldana saccharina* Walker (Lepidoptera: Pyralidae), an indigenous pest of sugarcane in southern Africa. 24th ISSCT conference, Brisbane, Australia, 16-20 September 2001. **Poster**.

Conlong, D. E. *; Kasl, B. (2000) Stimulo-deterrent diversion to decrease infestation in sugarcane by *Eldana saccharina* (Lepidoptera: Pyralidae). *Proceedings of the South African Sugar Technologists' Association* 74. **Talk & Paper**

Kasl, B.*; Knell, R.; Byrne, M. J. (1999) Female mate choice in *Euoniticellus intermedius* (Reiche) (Coleoptera: Scarabaeidae). Abstracted in the Proceedings of the 12th Entomological Society of Southern Africa, pg. 64. Potchefstroom, North-Western Province, R. S. A., 12-15 July 1999. ISBN: 1-86849-122-6. **Talk**.

Kasl, B.*; Mason, M. C.; Passmore, N. I. (1998) The effects of male size and sociality on waving frequency in the fiddler crab, *Uca annulipes*. Abstracted in Zoological Society of Southern Africa (ZSSA) Symposium – African Trends and Future Perspectives, pg. 98. Durban, Kwa-Zulu Natal, R. S. A>, 6-10 July 1998. **Poster**.

(* - presenter)

UNIVERSITY OF THE WITWATERSRAND,
JOHANNESBURG

At a congregation of the University

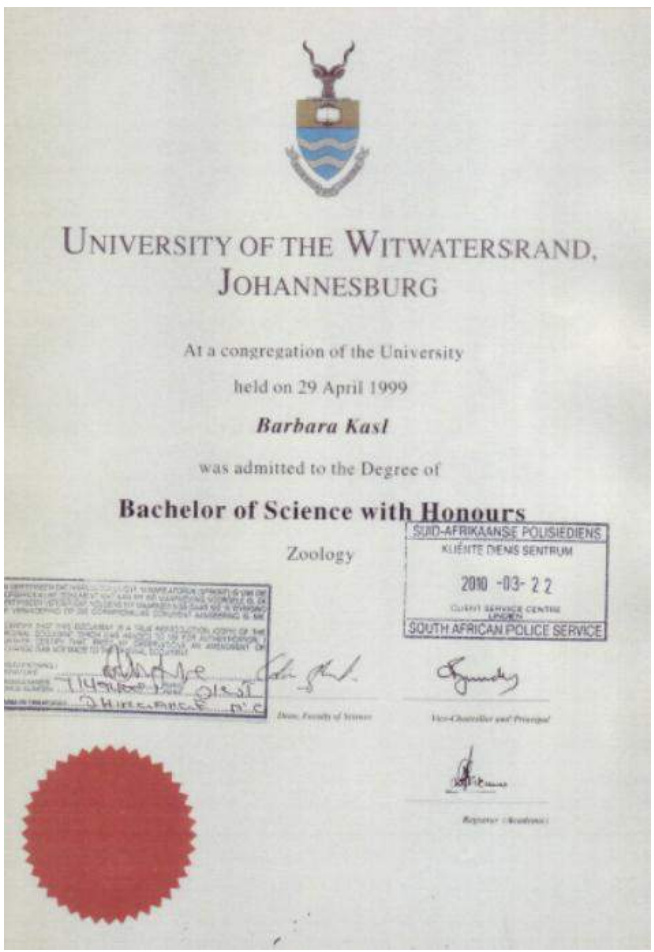
held on 29 April 1999

Barbara Kasl

was admitted to the Degree of

Bachelor of Science

SUID-AFRIKAANSE POLISIEDIENS
KLIËNTE DIENS SENTRUM
2010 -03- 22
CLIENT SERVICE CENTRE
SOUTH AFRICAN POLICE SERVICE



UNIVERSITY OF THE WITWATERSRAND,
JOHANNESBURG

At a congregation of the University

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Barbara Kasl

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Zoology

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UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

At a congregation of the University

held on 25 November 2004

Barbara Kasl

was admitted to the Degree of

Doctor of Philosophy

SUID-AFRIKAANSE POLISIEDIENS
KLIËNTE DIENS SENTRUM
2010 -03- 22
CLIENT SERVICE CENTRE
UNDER
SOUTH AFRICAN POLICE SERVICE

Dean, Faculty of Science

Vice-Chancellor and Principal

Registrar

JANE GAYLE KENNARD CURRICULUM VITAE

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Phone: +27 11 794 7534 (w) 083 236 0169 (C)
E-mail: jane@cabangaconcepts.co.za
Nationality: South African
Languages: English and Afrikaans
Date of Birth: 01 September 1981

EDUCATION

2013 **University of South Africa (completed part time)**
Bachelor of Science Environmental Management: Botany Stream

Majors: Environmental Management and Botany
Minors: Archaeology, Chemistry, Geology, Statistics, Terrestrial & Aquatic Ecology, Hydrology, GIS, Computer Skills, Environmental Law and Ethics
** All practical components were undertaken through the North-West University*

1999 **John Ross College, Richards Bay, Kwa-Zulu Natal**
Matric with exemption

CERTIFICATES

Nov. 2015 **University of Cape Town**
Advanced Project Management

July 2015 **Terra Firma Academy**
Carbon Footprint Analyst

2001 **The Estate Agency Affairs Board South Africa**
South African Property and Real Estate Law (Certified Estate Agent)

AFFILIATIONS AND REGISTRATIONS:

Member of the Environmental Law Association, South Africa
Member of the International Association for Impact Assessment, South Africa
Member of the International Association for Public Participation, Southern Africa

COURSES AND WORKSHOPS

2015 **NEMA: Environmental Impact Assessment Regulations**
Imbewu Sustainability Legal Specialists

2014 **NEMA: Environmental Impact Assessment Regime**
Gauteng Department of Agriculture and Rural Development

2014 **Waste Management Act Amendments**
Mac Roberts Attorneys

2013 **Environmental and Mining Law**
Mac Roberts Attorneys

2012 **Practical Implementation of BEE**
EconoBEE

2011 **Practical Understanding of South African Waste Legislation, Integrated Waste Management Planning & Waste Classification**
CBS Solution

2011 **National Environmental Management Act & NEM:Waste Act**
EcoLaw

WORK EXPERIENCE

2006 - Current **Cabanga Concepts Environmental Consultants**
Environmental Professional / Project Manager

- Project and account management
- Budget management
- Proposals
- Client liaison
- Undertake site investigations (greenfields and operational areas)
- Document quality control
- Compilation of environmental legal registers
- Environmental compliance audits specifically with regards to industry and mining
- Due diligence investigations in support of business merges and/or acquisitions within the mining industry
- Fatal Flaws Analysis for proposed projects
- Compilation of mining right and prospecting right applications in terms of the Mineral and Petroleum Resources Development Act
- Environmental licensing and permitting:
    - Section 102 applications (MPRDA)
    - General Authorisations & Water Use Licensing (NWA)
    - Integrated Water and Waste Management Plans
    - Atmospheric Emission License Applications (NEM:AQA)
    - Waste Management License (NEM:WA)

- Compilation of Scoping Reports, Impacts assessments and Management Plans
- Assisting with the compilation of documents for World Bank Projects (IFC Standards / Equator Principles)
- Compilation of emergency response and environmental handbooks
- Taking of water samples
- Undertaking the Public Participation Process for proposed and existing operations in industry and mining
- Liaison and follow up with licensing authorities
- Collaborating with mineral and environmental lawyers in responding to corrective notices and directives issued in terms of the various legislation
- Applications for permits in terms of the National Heritage Resources Act

2002 – 2006 **Digby Wells & Associates Environmental Consultants**
PA to the Executive Committee

- Assist EXCO board with administration duties, review and formatting of reports, general office management, authorities liaison, assist with public participation and other general ad hoc duties.

2000 – 2002 **Realty Executives**
Candidate Estate Agent

- Management of rental properties, general office management and administration

OTHER

- Proficient in Microsoft Office Suite (Excel, Word, Outlook etc.)
- Familiar with SANBI GIS and Land Use Decision Support Tool (LUDS)
- Proficient in the following South Africa Legislation:
  - The Constitution of South Africa, 1996 (Act 108 of 1996)
  - The Minerals and Petroleum Resources Development Act (Act 28 of 2002)
  - The National Environmental Management Act, 1998 (Act 107 of 1998)
  - The Environmental Conservation Act, 1989 (Act 73 of 1989)
  - The Conservation of Agricultural Resources Act (Act 43 of 1983)
  - The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
  - The National Environmental Management: Protected Areas Act, 2004 (Act 31 of 2004)
  - The National Environmental Management: Air Quality Act (Act 39 of 2004)
  - The National Environmental Management: Waste Management Act (Act 59 of 2008)
  - The National Heritage Act, 1999 (Act 25 of 1999)
  - The National Water Act, 1998 (Act 36 of 1998)
  - The Water Services Act, 1997 (Act 108 of 1997)
  - The National Veld & Forest Fire Act,1998 (Act No 101 of 1998)
  - The National Road Traffic Act, 1996 (Act 93 of 1996)
  - The Hazardous Substances Act, 1973 (Act 15 of 1973)
  - The Petroleum Products Act, 1977 (Act 120 of 1977)
  - The National Nuclear Reactor Act, 1999 (Act 47 of 1999)
  - The Explosives Act, 1956 (Act 73 of 1989)
  - The Fencing Act, 1963 (Act 31 of 1963)

- Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act 36 of 194 7)
- The Occupational Health & Safety Act, 1993 (Act 85 of 1993)
- The Mine Health & Safety Act, 1996 (Act 29 of 1996)
- The Consumer Protection Act, 2008 (Act 68 of 2008)
- The Second Hands Good Act, 2009 (Act 6 of 2009)

LIST OF PROJECTS:

The following is a short list of a sample of projects which I have managed over the last few years:

- IG Chem, 24G Application for Rectification & Continuation Impact Assessment & Management Plan
- Homelands Mining & Energy, Kendal Colliery, 24G Application for Rectification & Continuation Impact Assessment & Management Plan
- G&W Base Minerals Prospect & Sahara, Basic Assessment and Environmental Management Plan
- Worldwide Coal Carolina, Road Deviation Basic Assessment and Environmental Management Plan
- Overlooked Colliery , Prospecting Environmental Management Plan
- Uitkyk Siding, Environmental Management Plan
- BVI Uitkomst Colliery Integrated Water Use License Application
- Pembani Coal Carolina, Water Use License Application and associated Integrated Water & Waste Management Plan
- Black Wattle, EMP Performance Assessment
- Eyethu Coal, Leeuwpoort Colliery, EMP Performance Assessment
- Eyethu Coal, Mooifontein Colliery, EMP Performance Assessment
- Eyethu Coal, Welgelegen Colliery, EMP Performance Assessment
- G&W Base Minerals, Benadeplaats Mine, EMP Performance Assessment
- Sudor Coal, Halfgewonnen Colliery, EMP Performance Assessment
- G&W Base Minerals, Koppies EMP Performance Assessment
- Shiva Uranium, Environmental Compliance Report
- Pembani Coal Carolina, Environmental Compliance Audit
- Droogvallei Rail Siding Company, Environmental Compliance Audit
- Vierfontein Colliery, Environmental Compliance Audit
- Miranda Coal, Sesikhona Colliery, Environmental Compliance Audit
- Miranda Coal, Burnside Colliery, Environmental Compliance Audit
- Droogvallei Rail Siding Company, Integrated Water Use License Compliance Audit
- Pembani Coal Carolina, Integrated Water Use License Compliance Audit
- Umcebo Mining, Kleinfontein Colliery, Integrated Water Use License Compliance Audit

REFERENCES

1. **Ken van Rooyen, Geologist and Environmental Scientist:** kenvr@telkomsa.net
2. **Dr. Barbara Kasl, Entomologist:** barbs@cabangaconcepts.co.za
3. **Esme Ferreira, Environmental Lawyer:** eferreira@tiscali.co.za

UNISA
UNIVERSITY OF SOUTH AFRICA

We certify that

JANE GAYLE KENNARD

having complied with the requirements of the Higher Education Act and the Institutional Statute, was admitted to the degree of

BACHELOR OF SCIENCE

in Environmental Management: Botany Stream

at a congregation of the University on 6 May 2014

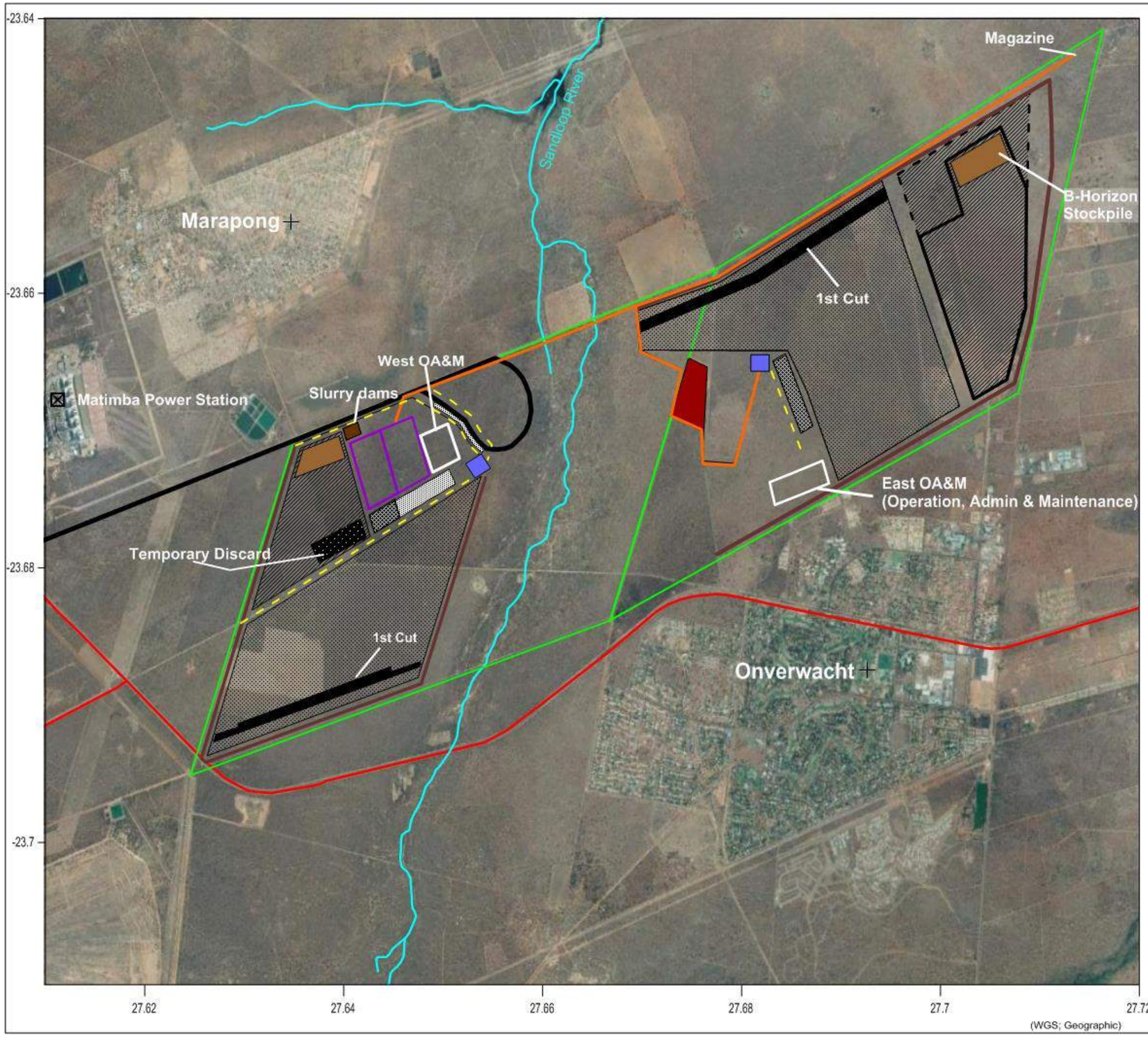
Vice-Chancellor

Executive Dean

University Registrar

1020894583999GC05021

Appendix 2: Final Mine Plan



LEGEND

- GCMC Mining Right Application Area
- Provincial Road
- Haul/Access Road
- Plant Area
- Diversion Berm
- Non-perennial River
- Preferred Siding and Link
- Cut-off Drains
- Opencast Excavations
- RoM Stockpiles
- Material Stockpile
- Material Stockpile Subject to WUL
- Coal Product Stockpile
- Municipal Dump
- Pollution Control Dams

TITLE: Infrastructure Plan

DRAWN BY: Shelton Tsanga
Environmental Consultant

REVIEWED BY: Ian Troskie
PPP Specialist

DATE: JANAURY 2016

CLIENT: Groothoek Coal Mining Company

PROJECT: Waterberg Coal Project

LOCATION: Lephalale, Limpopo

SCALE: 0 500 1000 1500 (m)

MAP: REFERENCE: Google Earth (7.1.2.2041)

CABANGA environmental

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Bosbok Road
Randparkridge

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Appendix 3: Air Quality Assessment and Dispersion Model

Appendix 4: Soil and Land Capability Assessment

Appendix 5: Floodline Delineation Report

Appendix 6: Hydrology Assessment

Appendix 7: Geohydrology Assessment

Appendix 8: Ecology Assessment (AGES, 2012)

Appendix 9: Floral Assessment (Dimela, 2015)

Appendix 10: Socio-Economic Impact Assessment

Appendix 11: Wetland Characterisation

Appendix 12: Cultural and Heritage Assessment (Archaetnos, 2015)

Appendix 13: Cultural and Heritage Assessment (AGES, 2012)

Appendix 14: Blast Impact Assessment

Appendix 15: Public Participation Process Report

Appendix 16: Full Impact Assessment Table

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
Aspect: Topography																										
All infrastructure areas, development footprints and associated activities	Excavation and creation of infrastructure foundations and servitudes will alter the topographical nature of the site and associated drainage.	Construction Operational Decommission	Neg	2	1	3	3	9	5	45	Y	-	REMEDY Rehabilitate all disturbed areas when they are no longer needed, including contouring areas properly to ensure no pooling of water on site. CONTROL Complete pre-mining topographical surveys to aid in compilation of rehabilitation plan. Demarcate designated activity area as small as possible and maintain activity within this area only. Establish approved erosion control measures to reduce the risk of formation of erosion gullies. Install flow dissipaters in any areas where concentrated runoff flow is experienced, including silt traps in areas where flow becomes laden with sediment.	Reduce impact to neighbouring areas. Restore natural catchment drainage patterns as far as possible. Restore land to grazing land use.	1	1	3	3	8	5	40	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Pre-mining topographical surveys will be completed before any activity takes place on site. Storm water runoff management features will be established around demarcated activity areas prior to other activities commencing and where necessary flow dissipaters and/or silt traps will be installed. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 3. Ensure activity is proceeding in the correct area to prevent impact to areas not targeted for development. 4. Ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks, optimise water use and minimise wasting of water.	1. Site manager 2. Environmental manager 3. Environmental manager 4. Site manager	1. Once-off inspection of demarcations. 2. Weekly inspections of no-go zones as soon as the areas are demarcated for life of mine. 3. Monthly inspection to ensure activities are proceeding within the designated and demarcated areas. 4. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life.
Opencast excavations	Altered topographical nature and associated drainage.	Construction Decommission	Neg	5	1	3	3	12	5	60	Y	-	REMEDY Ensure rehabilitation is continuously completed in a roll over fashion as soon as steady state mining is achieved. CONTROL. Compile a full rehabilitation model before any mining commences on site and apply on site throughout life of mine. Demarcate designated activity area. Conduct soil handling as per soil utilisation guide	Reduce impact to neighbouring areas. Restore natural catchment drainage patterns as far as possible. Retain soil to achieve rehabilitation objectives. Restore land to grazing land use.	4	1	3	3	11	5	55	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Pre-mining topographical surveys will be completed before any activity takes place on site. A full rehabilitation model will be compiled before mining commences on site and reviewed	1. Ensure demarcation of active area and sensitive sites and their buffer zones to prevent disruption to sensitive sites. 2. Ensure activity is proceeding in the correct area to prevent impact to areas not targeted for development. 3. Ensure material is replaced to the mined out cuts as stipulated in the	1. Site manager 2. Environmental manager 3. Site manager 4. Environmental manager	1. Once-off inspection of demarcations. 2. Monthly inspection to ensure activities (including open cast mining) are proceeding within the designated and demarcated areas. 3. Monthly recording of material handling and annual review of the rehabilitation model. 4. Annual topographical surveys over rehabilitated

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
													in the soil report. Rehabilitated areas must be contoured and free draining to prevent ingress and pooling of water.									stipulated in licenses/rights/permits.	annually. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil utilisation guide will be implemented as soon as the first soil is stripped and stockpiled for the life of mine, until topsoil is applied to the final rehabilitated surface.	rehabilitation model in order to achieve desired elevations and drainage; to apply soil to filled and contour areas to ensure proper drainage. 4. Ensure that correct elevations are obtained during rehabilitation as per the rehabilitation plan and model.		areas until rehabilitation is completed.
ALL material stockpile areas	Stockpiles will change the topographical nature of the area.	Construction Operational Decommission	Neg	3	1	3	3	10	5	50	Y	-	REMEDY Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berms to shield visual impacts or divert clean water runoff from site. Ensure rehabilitation is continuously completed in a roll over fashion as soon as steady state mining is achieved to reduce need and extent for surface material stockpiles. CONTROL Stockpile heights must not exceed 2m for topsoil, 3m for coal stockpiles, 6m for subsoil, 25m for overburden. Move coal stockpiles on a first-in-first-out basis to reduce extent of coal stockpile areas. Coal stockpile and handling must be in designated areas only. Demarcate stockpile areas and strip soil from these areas. Conduct soil handling as per soil utilisation guide in the soil report.	Reduce impact to neighbouring areas. Keep disturbed area as small as possible. Reduce coal stockpile load on site. Restore natural catchment drainage patterns as far as possible. Restore land to grazing land use.	1	1	3	3	8	5	40	NEMA & MPRDA principals and regulations regarding stockpile management, decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and rehabilitation model commencing once the first cut is started for the duration of operations. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. ROM coal handling at open pits will be temporary and coal will be removed on a continuous basis to the processing facility once the first coal is extracted until final coal is removed from site. Coal RoM feed and product stockpiles will be maintained at appropriate height and moved on a first-in-first-out basis once coal stockpiling and processing commences until the final coal is removed from site.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and rehabilitation model and stockpile heights are maintained. 2. Ensure that material is replaced to the mined out cuts as soon as possible as stipulated in the rehabilitation model and soil utilisation guide to reduce the need for surface stockpiles. 3. Ensure that only temporary stockpiles are maintained at opencast pits. 4. Ensure all coal is stockpiled in designated areas only.	1. Site manager with the contracting mine manager 2. Site manager with the contracting mine manager 3. Site manager with the contracting mine manager 4. Site manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 3. Monthly inspection of opencast pits to ensure ROM coal is removed for processing for the life of mine. 4. Daily inspection of all coal transfer, transport and handling areas once coal is extracted until final coal is removed from site.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
Water storage (dams / reservoirs / tanks) & Slurry dam	Excavation of dams will alter topography and drainage patterns.	Construction Operational Decommission	Neg	2	1	3	3	9	5	45	Y	-	REMEDY Ensure dams are adequately sized and inspect, maintain and repair all water management features. CONTROL Necessary measure to ensure water separation and dirty water containment on site as per GN704 requirements. Slurry dam is a necessary measure to ensure slurry can be reclaimed for blending.	Containment of mine water runoff up to the runoff generated during a 1:50 year 24hr storm event. Maximising product retrieval and reducing mine residue waste.	1	1	3	3	8	5	40	Water will be managed in terms of GN704; can only be released with permission from DWS. NEM:WA regulations regarding mine residue handling and management , where relevant for surface stockpiling of slurry prior to blending. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. An engineer will oversee dam construction in line with approved designs and will sign-off once dam is completed.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Ensure activity is proceeding in the correct area to prevent impact to areas not targeted for development. 3. Ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks, optimise water use and minimise wasting of water.	1. Site manager 2. Environmental manager 3. Site manager	1. Once-off inspection of demarcations. 2. Daily inspection to ensure dam construction is proceeding within the designated and demarcated area. 3. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life.
Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Temporary discard disposal to surface will alter topography, but this is within the designated stockpile area	Operation	Pos	2	1	1	1	5	5	25	N	-	MODIFY Alternative would be a permanent discard dump facility which would impact negatively on topography and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on visual aesthetics.	Temporary discard dump must be fully designed and comply with NEM:WA GNR636, 2013. Backfilling must be conducted as per the rehabilitation plan and IWWMP once approved.	1	1	1	1	4	4	16	NEMA & MPRDA principals and regulations regarding stockpile and mine residue management . NWA GN704 & NEM:WA GNR636 (2013) regulations regarding backfilling with discard. Conditions stipulated in licenses/rights/permits.	Discard backfilling and compression at the base of pits will be initiated as soon as steady state mining is achieved to reduce the need for surface stockpiling and continue until the final void is backfilled.	1. Ensure that material is replaced to the mined out cuts as soon as possible as stipulated in the mine and rehabilitation plans to reduce the need for surface stockpiles.	1. Site manager with the contracting mine manager	1. Bimonthly inspection of discard backfilling and compression density until final void is backfilled.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
Opencast excavations & Rehabilitation	Differential settling of material and potential for subsidence will alter topography and drainage patterns.	Operation Decommission Closure Post Closure	Neg	4	1	1	3	9	3	27	Y	-	REMEDY Fill all cracks and rehabilitate the area. CONTROL Topographical and visual surveys must be conducted of mined areas for differential settling of material. Rehabilitated areas must be free draining to prevent ingress and pooling of water.	Restore natural catchment drainage patterns as far as possible. Restore land to grazing land use.	2	1	1	3	7	2	14	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Pre-mining topographical surveys will be completed before any activity takes place on site. Rehabilitated areas will be graded and contoured and erosion control measures will be implemented at any sites with poor water drainage and / or erosion as soon as these are observed on site.	1. Ensure no differential settling of material or surface cracking that would affect surface water drainage. 2. Ensure that correct elevations are obtained during rehabilitation as per the rehabilitation plan and model.	1. Environmental manager 2. Environmental manager	1. Monthly visual inspection of surface of all rehabilitated areas for the life of mine. 2. Annual topographical surveys over rehabilitated areas until rehabilitation is completed.
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Eradication of voids & stockpiles. Replacement of material and profiling.	Operation Decommission Closure	Pos	4	1	5	1	11	4	44	N	-	MODIFY Treatment options for decant and contamination plume will be finalised and may require retaining a final void. REMEDY Rehabilitation must be on-going as soon as steady state mining is achieved. CONTROL Rehabilitation model and plan must be implemented throughout the life of mine. STOP Discard material can only be placed in the pit once exemption is obtained under the NWA.	Restore natural catchment drainage patterns as far as possible. Restore land to grazing land use.	4	1	5	1	11	4	44	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Areas will be rehabilitated completely as per the rehabilitation model and soil utilisation guide soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil utilisation guide will be implemented as soon as the first soil is stripped and stockpiled for the life of mine, until topsoil is applied to the final rehabilitated surface.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and stockpile heights are maintained. 2. Ensure that material is replaced to the mined out cuts as soon as possible as stipulated in the rehabilitation model to reduce the need for surface stockpiles. 3. Ensure that correct elevations are obtained during rehabilitation as per the rehabilitation plan and model.	1. Site manager with the contracting mine manager 2. Site manager with the contracting mine manager 3. Environmental manager	1. Monthly inspection and recording of material handling and annual review of the rehabilitation model. 2. Annual topographical surveys over rehabilitated areas until rehabilitation is completed.
Aspect: Geology																										
Opencast excavations	Alteration of the geological nature and sequence.	Construction Operational Decommission	Neg	2	1	5	5	13	5	65	N	High	Nature of mining developments.	Maximise extraction of coal resources.	2	1	5	5	13	5	65	Mining will be carried out in line with MPRDA regulations and standard industry practices. Conditions stipulated in	Mine plan and rehabilitation model will continuously be implemented on site and will be consulted regularly with regard to new cuts or if geological anomalies are encountered as long as opencast mining and	1. Ensure mine plan and rehabilitation model is appropriately implemented. 2. Ensure that opencast mining is proceeding in the correct area to prevent impact to	1. Site manager with the contracting mine manager 2. Environmental manager and site manager 3. Site manager with	1. Mine plan and rehabilitation model will continuously be implemented and consulted during opencast mining. 2. Monthly inspection to ensure activities are proceeding within the designated and

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																						licenses/rights/permits.	successive backfilling and rehabilitation continues.	neighbouring areas. 3. Ensure all coal is removed from the opencast pits.	the contracting mine manager	demarcated areas. 3. Monthly inspection of pits to ensure maximised coal extraction during opencast mining.
Blasting	Cracks and disruption to geological layers.	Operation	Neg	2	1	5	5	13	5	65	Y	Mod	MODIFY Alternative blasting methods will be considered to reduce outward impact. CONTROL Blasting specialists must be contracted. Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Severe impact must be contained to 500m radius; evacuation of 600m radius based on current blast design.	1	1	3	5	10	5	50	Blasting will comply with MHSA and MPRDA Regulations. See "Nearby Structures" aspects in this table for specific blast limits. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.
Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Alteration of the geological nature and sequence.	Operation Decommission Closure Post closure	Neg	2	1	5	5	13	5	65	N	Mod	MODIFY Alternative would be a permanent discard dump facility which would impact negatively on topography and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on visual aesthetics.	Temporary discard dump must be fully designed and comply with NEM:WA GNR636, 2013. Backfilling must be conducted as per the rehabilitation plan and IWWMP once approved.	2	1	5	5	13	5	65	NEMA & MPRDA principals and regulations regarding stockpile and mine residue management. NWA GN704 & NEM:WA GNR636 (2013) regulations regarding backfilling with discard. Conditions stipulated in licenses/rights/permits.	Discard backfilling and compression at the base of pits will be initiated as soon as steady state mining is achieved to reduce the need for surface stockpiling and continue until the final void is backfilled.	1. Ensure that material is replaced to the mined out cuts as soon as possible as stipulated in the mine and rehabilitation plans to reduce the need for surface stockpiles.	1. Site manager with the contracting mine manager	1. Bimonthly inspection of discard backfilling and compression density until final void is backfilled.
Aspect: Soil & Land Capability																										

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All infrastructure areas, development footprints and associated activities	Loss in grazing potential, loss of soil and deterioration of soil characteristics.	Construction Operation Decommission Closure	Neg	3	1	3	3	10	5	50	Y	High	REMEDY Rehabilitate all disturbed areas as soon as they are no longer required and cordon off areas until vegetation has established. Revegetate all bare soils. Incorporate herbaceous vegetation into soil stockpiles. Ameliorate soils as needed to establish stable vegetation communities on rehabilitated areas. CONTROL Demarcate designated activity area and keep as small as possible. Strip topsoil from all activity areas and stockpile as berms as per mine infrastructure plan. Conduct soil handling as per soil utilisation guide in the soil report. Construct drainage and erosion controls in advance of mining activities. These can include gabion baskets, levees and reseeding of areas not being used. Divert storm water runoff away from areas with high erosion potential. Install silt traps and/or flow dissipaters as needed to prevent erosion and associated silt loading.	Impact to neighbouring areas avoided. Soil on site will be preserved. Grazing land capability will be restored.	1	1	3	3	8	4	32	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. Soil surveys will be undertaken annually over areas that have been rehabilitated and topsoiled until all rehabilitated areas are self-sustaining. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and stockpile heights are maintained. 2. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 3. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing land capability. 4. Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas.	1. Site manager with the contracting mine manager 2. Environmental manager will contract a soil specialist 3. Site manager with the contracting mine manager 4. Environmental manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 4. Monthly visual inspection of surface of all rehabilitated areas for the life of mine.
Topsoil & subsoil stripping & stockpiling	Loss of fertile topsoil layer.	Construction Operation Decommission	Neg	3	1	2	3	9	5	45	Y	Low	REMEDY Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berm to shield visual impacts. As far as possible, plan	Visual impact reduced. Soil will be preserved for rehabilitation requirements.	1	1	1	3	6	2	12	NEMA & MPRDA principals and regulations regarding stockpile management, decommissio	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Material handling (removal, stockpiling and	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and stockpile heights are maintained. 2. Ensure soil quality over rehabilitated areas	1. Site manager with the contracting mine manager 2. Environmental manager will contract a soil specialist 3. Site	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to

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													soil stripping activities in the dry season. CONTROL Minimize the area which is disturbed at any one time. Topsoil and underlying material should be stored separately as per stripping guidelines. All excavated topsoil will be stored for use during rehabilitation of the mine. Topsoil should be stripped and stockpiled with herbaceous vegetation to retain organic content. All stockpiles / berms which will be in place for more than 6 months must be vegetated to reduce risk of erosion. Topsoil stockpiled as perimeter berms must not exceed 2 m. Subsoil stockpiles must not exceed not exceed 6 m in height. All stockpiles must have an outer slope of approximately 1 V: 3 H (to limit the potential for erosion of the outer pile face). Construct top perimeter berms on subsoil stockpiles. Cut off drain must be constructed upslope of all stockpiles. Seed all stockpiles - Seeding must be completed within seven (7) days of stockpiling.										ning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine.	is adequate for vegetation establishment. 3. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing land capability.	manager with the contracting mine manager	ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated.

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Topsoil & subsoil stripping & stockpiling	Potential loss of soil through erosion.	Construction Operation Decommission	Neg	3	1	2	3	9	4	36	Y	Low	REMEDY Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berm to shield visual impacts. As far as possible, plan soil stripping activities in the dry season. CONTROL Minimize the area which is disturbed at any one time, Construct drainage and erosion controls in advance of mining activities. Divert storm water runoff away from areas with high erosion potential. Incorporate measures to reduce the flow velocity of storm water runoff. Topsoil stockpiled as perimeter berms must not exceed 2 m. Subsoil stockpiles must not exceed 6 m in height. Demarcate stockpile areas and strip the topsoil from stockpile areas. Conduct soil handling as per soil utilisation guide in the soil report. All stockpiles must have an outer slope of approximately 1 V: 3 H (to limit the potential for erosion of the outer pile face). Construct top perimeter berms on subsoil stockpiles. Cut off drain must be constructed upslope of all stockpiles. Seed all stockpiles - Seeding must be completed within seven (7) days of stockpiling.	Visual impact reduced. Soil will be preserved for rehabilitation requirements.	2	1	1	1	5	2	10	NEMA & MPRDA principals and regulations regarding stockpile management, decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and stockpile heights are maintained. 2. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 3. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing land capability. 4. Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas.	1. Site manager with the contracting mine manager 2. Environmental manager will contract a soil specialist 3. Site manager with the contracting mine manager 4. Environmental manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 4. Monthly visual inspection of surface of all rehabilitated areas for the life of mine.

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Topsoil & subsoil stripping & stockpiling	Compaction and alteration of physical characteristics of soil.	Construction Operation Decommission	Neg	2	1	2	3	8	5	40	Y	Low	REMEDY Material stockpile and soil berm placement should consider remediation of other impacts, such as utilising material as a berm to shield visual impacts. As far as possible, plan soil stripping activities in the dry season. CONTROL Minimise operation and machinery movement to stipulated mining area only. Soils must not be trafficked if wetter than the plastic limit. Artificial drainage can help increase the number of trafficable days on poorly drained soil. Rip or disc any compacted soils as needed. Stockpile heights must not exceed 2m for topsoil and 6m for subsoil. Demarcate stockpile areas and strip the topsoil from stockpile areas. Reduce the storage life of the stockpiles by replacing the topsoil once profiling has been completed on backfilled area. Biological amelioration must be conducted so as to promote soil microbial activity which will in turn allow for the release of nutrients once seeding takes place.	Visual impact reduced. Soil will be preserved for rehabilitation requirements.	1	1	1	1	4	2	8	NEMA & MPRDA principals and regulations regarding stockpile management, decommissioning and rehabilitation. CARA, NEMA and MPRDA regulations regarding erosion control. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and stockpile heights are maintained. 2. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 3. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing land capability. 4. Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas.	1. Site manager with the contracting mine manager 2. Environmental manager will contract a soil specialist 3. Site manager with the contracting mine manager 4. Environmental manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 4. Monthly visual inspection of surface of all rehabilitated areas for the life of mine.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
ALL coal handling, storage, processing and conveyance areas & ALL Water management / containment features.	Chemical soil pollution- as a result of mine water spills or irresponsible handling of coal or generation of coal dust and coal spillages.	Construction Operation	Neg	3	1	2	1	7	4	28	Y	Low	REMEDY Coal spillages must be cleared. CONTROL Coal stockpile and handling must be in designated areas with compacted base and must form part of the dirty water footprint. Manage dust through water carts or sprinklers. Trucks must not be overloaded. Wagons must not be overloaded and must be covered with tarpaulin. Ensure water separation and dirty water containment on site as per GN704 requirements. All dams will be constructed and lined as per designs and operated with a 0.8m freeboard.	Dust fallout will be managed. Surface area kept clean through good housekeeping practices. Impact to neighbouring areas avoided. Mine water will be contained on site; soil contamination prevented.	2	1	2	1	6	2	12	Dust fallout will be monitored and managed as per GNR827 and compared to baseline limits (which already exceed NEM:AQA limits). Water will be managed in terms of GN704; can only be released with permission from DWS. Conditions stipulated in licenses/rights/permits.	All coal handling, transfer and stockpiling will be within designated areas only and coal will be processed and removed from site regularly as soon as coal is extracted until final coal is removed from site. Coal will be encouraged to maintain its moisture content to reduce dust generation. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life.	1. Ensure all coal is in designated stockpiling and handling areas and that all coal spills are cleared regularly and replaced to designated areas. 2. Determine extent of dust generation in terms of NEM:AQA regulations and reporting on NAEIS. 3. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 4.Ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks, optimise water use and minimise wasting of water. 5. Ensure effective storm water management and mine water containment.	1. Site manager 2. Environmental manager 3. Site manager 4. Site manager 5. Environmental manager	1. Daily inspection of all coal transfer, transport and handling areas once coal is extracted until final coal is removed from site. 2. Monthly dust monitoring will commence during the pre-construction phase in order to obtain baseline data and continue throughout the life of mine. 3. Once-off inspection of demarcations. 4. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 5. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
Waste generation & storage	Potential contamination of soil with indiscriminately dumped waste.	Construction Operation	Neg	3	1	2	1	7	4	28	Y	Mod	REMEDY Inspect and clear all litter and waste. CONTROL Waste should be recycled as far as possible and sold/given to interested contractors. Waste will be stored according to the Norms and Standards for Storage of Waste. Recyclable waste should	Attain "cradle to grave" management of waste on site.	2	1	2	1	6	2	12	Waste characterised, classified, handled and stored as per NEM:WA and its regulations: GNR634 & GNR926. Conditions stipulated in licenses/right	Good housekeeping practices will be applied over mining and infrastructure areas and areas will be kept clear of litter and illegally dumped waste from the onset of construction throughout the life of mine.	1. Prevent illegal littering and dumping of waste on site in undesignated areas.	1. Environmental manager	1. Monthly visual inspection of the site for illegal dumping of waste for the life of mine.

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													not be stored for excessive periods. Refuse bins will be placed around site to collect waste for separation, recycling and disposal.									s/permits.				
Stores, workshops & washbays & Hardpark & Fuel Storage	Potential hydrocarbon contamination of soils. Potential contamination of soil with indiscriminate use of contaminating materials (cement, chemicals, etc.).	Construction Operation	Neg	2	1	2	3	8	3	24	Y	Low	REMEDY Oil from oil traps will be removed to used hydrocarbon drums for removal from site by a reputable hydrocarbon waste contractor. Spill kits must be available on site and personnel trained to utilise these to clear spills. CONTROL Cement will be handled over protected ground or sheeting. Chemicals will be stored as per requirements with the MSDS. Wet and dry chemicals, reducing and oxidising agents, will be stored separately. All vehicles / machinery on site will be up-to-date with their service and maintenance plans. The use of persistently leaky equipment will be discontinued until repairs are made. Equipment will not be parked over bare ground; where unavoidable, drip trays will be placed under the equipment to collect potential leaks. Minimise direct spillages of oils or diesels as result of machinery use. Ensure action and emergency response plans are in place for all	Dangerous goods managed appropriately as per SANS standards. Maintained vehicles, machinery and equipment reduces safety & environmental risks.	1	1	1	1	4	2	8	Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. Waste oil handled and stored as per NEM:WA and its regulation: GNR926. Conditions stipulated in licenses/right s/permits.	Cement handling will occur in designated areas or over protective sheeting during construction and whenever cement is brought to and utilised on site. Storage and handling of chemicals will be conducted in terms of the chemical's specifications and / or MSDS as long as chemicals are stored on site . Hydrocarbons will only be stored on site once bunded areas are constructed and storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance with the EMP as soon as hydrocarbons are brought to site for the life of mine. Hydrocarbon storage infrastructure, including concrete bunding and oil traps will be maintained as long as hydrocarbons are stored on site. Vehicles, machinery and equipment will be maintained within their operating specifications through servicing, calibration and general maintenance for the life of mine. Good housekeeping practices will be applied	1. Ensure no cement spillages and immediate clearing of spillages and rehabilitation of affected areas. 2. Ensure proper storage and handling of chemicals on site, ensure MSDSs are available for all chemicals stored on site and ensure chemical storage area is clean and clear of spills. 3. Ensure proper storage and handling of hydrocarbons on site and prevent hydrocarbon spills, including emptying of oil traps regularly to the used hydrocarbon waste streams to prevent overflowing and spillages and preventing flooding of bunded areas. 4. Ensure vehicles, equipment and machinery are serviced and maintained within operation specifications to prevent excessive noise, emission and reduce risks of leaks. 5. Ensure area is	1. Environmental manager 2. Environmental manager 3. Site manager 4. Site manager 5. Site manager 6. Site manager	1. Daily inspection of cement handling areas during construction. 2. Daily inspection of chemical storage and handling areas while chemicals are stored on site . 3. Daily inspection of bunded areas for as long as hydrocarbons are stored on site . 4.Weekly inspection of all service and maintenance plans/logbooks to ensure maintenance is scheduled in time. 5. Daily inspection of the hard park area will be conducted as long as vehicles and machinery are kept in the area. 6. Annual testing of integrity of concrete bunding for as long as hydrocarbons are stored on site.

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													hydrocarbon spills. Spills must be reported and attended to immediately. Bunding / concrete flooring and oil traps must be constructed in areas of hydrocarbon storage and transfer and in workshop areas where diesel-driven equipment is serviced. Bunds in workshop and washbay will be fitted with an outlet valve or drain to an oil trap.											to the hard park area and the area will be kept clear of spills for as long as vehicles and machinery are kept in the area.	maintained free of spills that could form a source of contamination. 6. Ensure concrete linings of all bunded areas are not compromised which would lead to contaminated seepage.		
Ablutions & change house with sewage treatment plant	Potential contamination of soil with sewage.	Construction Operation	Neg	2	2	3	1	8	4	32	Y	Low	MODIFY Alternative to utilise existing municipal facilities not feasible as these facilities are already highly stressed due to the growth of Lephalale. REMEDY Inspect and repair all aspects of the sewage treatment facility as needed, including any plumbing associated with the bathrooms and toilets. CONTROL Standard operating procedure (SOP) will be devised and implemented for the sewage treatment facility. Bacterial assessment of all monitoring points downstream of the sewage treatment plant.	Reduced bacterial contamination on neighbouring areas.	1	2	3	1	7	2	14	Downstream water quality will be within background quality limits and compared to SAN 2011 drinking water quality guidelines for bacteria. Conditions stipulated in licenses/rights/permits.	Water use will be monitored for the life of mine as soon as water use commences. Construction of ALL water management features, including the sewage treatment plant, will be completed before other activities commence in the area and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Sites downstream of the sewage treatment plant will also be tested for bacterial counts.	1. Record water usage to determine actual use, determine what water conservation measures can be put in place, determine any water spikes which may indicate faulty equipment. 2. Reduce the risk of spills and leaks to optimise water use and minimise wasting of water. 3. Ensure no bacterial contamination of downstream water resources by including bacterial analysis of water sources near to sewage treatment facility.	1. Environmental manager 2. Site manager 3. Environmental manager	1. Continuous water metering and monthly recording for the life of mine. 2. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

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Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Soil replacement and amelioration.	Operation Decommission Closure	Pos	4	2	1	3	10	5	50	N	-	REMEDY Rehabilitation must be on-going. Biological amelioration must be conducted so as to promote soil microbial activity which will in turn allow for the release of nutrients once seeding takes place. The utilizable soil (150 mm) removed during the construction and operation phases shall be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the approved post-mining land use (low intensity grazing), and will attain a free draining surface profile. Fertilization and amelioration of rehabilitated areas will be undertaken as per soil fertility assessments. Seedbed preparation must be undertaken using agricultural equipment. Seeding must be undertaken in accordance with a vegetation specialist's recommendations. Restriction of vehicle movement over rehabilitated areas and do not allow any grazing for the first two years. CONTROL Roll over mining and successive rehabilitation must be ongoing. Rehabilitation model and plan must be implemented throughout the life of mine. Soil handling and utilisation guide must be implemented at all times	Restore natural catchment drainage patterns as far as possible. Restore land to grazing land use.	4	2	1	3	10	5	50	NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. Conditions stipulated in licenses/rights/permits.	Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. Soil quantity and quality will be maintained over rehabilitated areas to ensure adequate vegetative cover for grazing land use until rehabilitated areas are stable and self-sustaining.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and stockpile heights are maintained. 2. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 3. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing land capability. 4. Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas.	1. Site manager with the contracting mine manager 2. Environmental manager will contract a soil specialist 3. Site manager with the contracting mine manager 4. Environmental manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 4. Monthly visual inspection of surface of all rehabilitated areas for the life of mine.

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													on site. Reduce the storage life of the stockpiles by replacing the topsoil once profiling has been completed on backfilled area.														
Aspect: Surface Water & Associated Wetlands & Aquatic Ecosystems																										
All infrastructure areas, development footprints and associated activities	Increased runoff and associated potential silt-loading and contamination of downstream water bodies and associated wetlands.	Construction Operation Decommission	Neg	4	2	4	3	13	4	52	Y	Mod	Apply soil management measures as stipulated above. REMEDY Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. CONTROL Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Clean and dirty water separation and dirty water containment features must be established on site. This will include upslope berms to divert clean water around the site of activity into natural drainage lines and internal channels to drain dirty water from the active footprint to lined containment dams. Line all dirty water dams to prevent seepage. Line all trenches carrying high or continuous loads of dirty water runoff to prevent seepage. Establish protective berms between active areas and wetlands, outside wetland buffer zones, where activity is near to such areas. Road surfaces must be compacted in order to	Impact to neighbouring areas avoided. Surface water quality in neighbouring areas will be maintained close to baseline conditions. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES.	4	1	4	1	10	2	20	Water will be managed in terms of GN704; can only be released with permission from DWS. Surface water quality in neighbouring areas will be maintained close to baseline conditions or to IWULA RWQOs and compared to SANS drinking water standards for pH, sulphate. Iron, TDS and EC. Erosion control measures will be considered in terms of CARA and MPRDA regulations. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 3. Ensure proper storm water diversion and separation and ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks. 4.Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas. 5. Ensure effective storm water management and mine water containment.	1. Site manager 2. Environmental manager 3. Site manager 4. Environmental manager 5. Environmental manager	1.Once-off inspection of demarcations. 2. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 3. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 4. Monthly visual inspection of surface of all rehabilitated areas for the life of mine. 5. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
											increase stability. Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed. Install flow dissipaters where rapid flow of diverted clean storm water runoff occurs as necessary. Install silt traps / flow dissipaters if necessary to trap silt in highly silt-laden runoff. STOP 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained where necessary.														
All infrastructure areas, development footprints and associated activities	Downstream water quantity of catchment reduced.	Construction Operation Decommission	Neg	2	2	3	3	10	5	50	N	Mod	REMEDY Keep dirty water runoff areas as small as possible to increase clean water runoff footprint area. Runoff from the rehabilitated areas must be allowed to flow naturally to the environment as soon as such areas become stable. Upstream dewatering boreholes should be considered in order to minimise the creation of dirty water within the opencast pit, and this clean water should be used to recharge the natural systems downstream of the mining rights areas at a rate similar to the volume being contained in the dirty footprint. CONTROL	Dirty mine water contained on site.	2	2	3	3	10	5	50	Mine water will be contained on site as per GN704. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 3. Ensure activity is proceeding in the correct area to ensure proper storm water management in line with GN704 is achieved. 4. Ensure proper storm water	1. Site manager 2. Environmental manager 3. Environmental manager 4. Site manager 5. Environmental manager	1.Once-off inspection of demarcations. 2. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 3. Monthly inspection to ensure activities are proceeding within the designated and demarcated areas. 4. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 5. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
													Necessary measure to contain dirty water runoff.											diversion and separation and ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks. 5. Ensure effective storm water management and mine water containment.		
Infrastructure area & Opencast excavations.	Destruction of Sandloop River riparian wetland habitat and loss of wetland ecological status and functioning.	Construction Operation Decommission	Neg	5	2	5	5	17	5	85	Y	Mod	CONTROL Demarcate designated activity area and demarcate 100m buffer zone from wetlands and rivers as no-go areas. Establish protective berms outside wetland buffer zones between wetlands and active areas. Where the riparian wetland will be impacted (section of the loop siding), the activity will only commence once all authorisation are in place to do so and activity will proceed as per the approved IWWMP. Area activity within the wetland will be maintained as small as possible Berms will be erected on the immediate downslope side of the loop siding where this infringes into the wetland area. The trains entering the wetland area will be empty (trains will enter the siding clockwise) to prevent potential coal spillages in the wetland area. Area will be kept clear of rubble, waste, spills at all times and vegetation	Impact to neighbouring areas avoided. IWWMP measures will be implemented once approved. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions.	1	2	3	1	7	5	35	Water will be managed in terms of GN704. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Erosion control measures will be established as soon as any erosion is observed in an area for the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 3. Ensure proper storm water diversion and separation and ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks. 4.Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas. 5. Ensure effective storm water management and mine water containment.	1. Site manager 2. Environmental manager 3. Site manager 4. Environmental manager 5. Environmental manager	1.Once-off inspection of demarcations. 2. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 3. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 4. Monthly visual inspection of surface of all rehabilitated areas for the life of mine. 5. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
													within the area will be maintained as far as possible to reduce impact on ecological functioning. STOP 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland)													
Opencast excavations	Contamination of Sandloop River through contaminated groundwater baseflow and seepage.	Post-closure	Neg	1	2	5	5	13	3	39	Y	Mod	CONTROL Element concentrations are not expected to exceed IFC effluent quality guidelines, or the GN635 (2013) Leach Test LCT0 quality guidelines. If monitoring indicates deterioration in water quality, then treatment options for contamination plume: utilisation of a proposed water treatment plant; a pump and treat system to continuously pump the water from the rehabilitated workings to surface dams to keep the water levels below decant level; cut-off intercept drain installed until the hard rock is exposed to capture any seepage/decant and drain water to the PCD; retaining a final void. Passive treatment can also be investigated and the mine can establish passive water ponds/wetlands. Specific trees can be planted over the opencast working to keep water levels low and to take up	Impact to neighbouring areas avoided. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions.	1	2	5	5	13	3	39	Water will be managed in terms of GN704. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Conditions stipulated in licenses/rights/permits.	Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine and through to post closure phase to ensure water management is effective.	1. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 2. Ensure effective storm water management and mine water containment.	1. Environmental manager 2. Environmental manager	1.Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 2. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
													contaminants.													
All Material stockpiles	Increased runoff and associated potential silt-loading of downstream water bodies and associated wetlands.	Construction Operation Decommissi on	Neg	4	2	3	3	12	4	48	Y	Mod	REMEDY Rehabilitate all disturbed areas as soon as they are no longer required. Revegetate all bare soils. Apply soil management measures as stipulated above. CONTROL Conduct soil handling as per soil utilisation guide in the soil report. Vegetation removal must be over a minimal area as possible. All bare surface areas must be re-vegetated. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish approved erosion control measures such as top and toe berms around stockpiles. All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities. Stockpile heights must not exceed 2m for topsoil, 6m for subsoil and 25m for overburden. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes. All overburden stockpiles and waste stockpiles must have	Impact to neighbouring areas avoided. Visual impact reduced. Soil will be preserved for rehabilitation purposes.	3	2	3	1	9	3	27	Water will be managed in terms of GN704. Erosion control measures and soil handling will be considered in terms of CARA and MPRDA regulations and best practices in industry. NEMA & MPRDA principals and regulations regarding soil handling and rehabilitation. Conditions stipulated in licenses/right s/permits.	Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and stockpile heights are maintained. 2. Ensure proper storm water diversion and separation and ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks. 3. Ensure effective storm water management and mine water containment. 4. Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas.	1. Site manager with the contracting mine manager 2. Site manager 3. Environmental manager 4. Environmental manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS. 4.Monthly visual inspection of surface of all rehabilitated areas for the life of mine.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
											berms and/catchment paddocks at their toe to contain runoff from the facilities. Vegetate soil stockpiles.														
East Overburden stockpiles (non-carbonaceous & carbonaceous)	Destruction of pans.	Construction Operation Decommission	Neg	4	1	5	5	15	5	75	Y	High	MODIFY The eastern stockpile area should occupy the southern area (as indicated in the latest mine plan) in order to preserve the pans in the far north until such time that an IWUL is issued for activity in the pans. CONTROL Pans and 100m buffer zones should be preserved if IWUL to conduct activities in these areas is not granted. The following is relevant if pans remain in situ: Establish storm water control measures before any other activities commence to ensure clean water diversion around the pans. Establish approved erosion control measures such as top and toe berms around stockpiles to prevent sedimentation into the pans. STOP The pans can only be disturbed / destroyed once an IWUL is issued. Until such time, the	Impact to neighbouring areas avoided. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions.	3	1	2	3	9	3	27	Water will be managed in terms of GN704. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Conditions stipulated in licenses/rights/permits.	Wetland buffers will be maintained free of obstacles, sedimentation and rubble. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine and through to post closure phase to ensure water management is effective.	1. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 2. Ensure effective storm water management and mine water containment.	1. Environmental manager 2. Environmental manager	1.Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 2. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
													eastern stockpile area must remain outside the pans and their 100m buffer zone.														
Overburden stockpiles (carbonaceous) & RoM and product coal stockpiles	Increased risk of contamination through contaminated runoff to downstream water bodies and associated wetlands.	Construction Operation Decommission	Neg	5	2	3	1	11	4	44	Y	Mod	CONTROL Demarcate stockpile areas and manage as dirty footprint. Stockpile areas must be adequately prepared and compacted and be managed as part of the dirty water footprint area. Coal stockpile area will have a Class C lining system. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment from stockpile area.	Surface water quality in neighbouring areas will be maintained close to baseline conditions or necessary action taken. Class C barrier system for Type III Waste will be implemented at coal stockpile areas (GNR636, 2013). Dirty mine water contained on site.	4	1	3	1	9	2	18	Water will be managed in terms of GN704; can only be released with permission from DWS. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. NEM:WA regulations regarding mine residue handling and management. NEM:WA regulations regarding waste to landfill. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. The base of the stockpile area will be prepared (compacted and sloped to drain into the dirty water management area) before any material stockpiling takes place. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	1. Ensure stripping and stockpiling is done in accordance with the rehabilitation plan and stockpile heights are maintained. 2. Ensure proper storm water diversion around stockpiles and containment facilities for runoff water from carbonaceous stockpiles to reduce the risk of contaminated water spills and reduce downstream contamination. 3. Ensure effective storm water management and mine water containment.	1. Site manager with the contracting mine manager 2. Site manager 3. Environmental manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Weekly inspections of ALL water management features, including infrastructure for runoff diversion and containment from carbonaceous stockpiles for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
ALL coal handling, storage, processing and conveyance areas	Generation of coal dust and coal spillages could contaminate water bodies in neighbouring areas.	Construction Operation	Neg	5	2	3	3	13	4	52	Y	Mod	REMEDY Coal spillages must be cleared. CONTROL Coal stockpile and handling must be in designated areas with compacted base and must form part of the dirty water footprint. Slopes must be stable and must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes. Manage dust through water carts or sprinklers. Wagons must not be overloaded and must be covered with tarpaulin. Trucks must not be overloaded.	Dust fallout will be managed. Surface area kept clean through good housekeeping practices.	2	1	3	1	7	2	14	Dust fallout will be monitored and managed as per GNR827 and compared to baseline limits (which already exceed NEM:AQA limits). Water management on site will be as per GN704. Conditions stipulated in licenses/rights/permits.	All coal handling, transfer and stockpiling will be within designated areas only, which will be incorporated into the dirty water footprint, and coal will be processed and removed from site regularly as soon as coal is extracted until final coal is removed from site. The base of the stockpile areas will be prepared (compacted and sloped to drain into the dirty water management area) before any material stockpiling takes place. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	1. Ensure all coal is in designated stockpiling and handling areas and that all coal spills are cleared regularly and replaced to designated areas. 2. Ensure proper storm water diversion around stockpiles and containment facilities for runoff water from carbonaceous stockpiles to reduce the risk of contaminated water spills and reduce downstream contamination. 3. Ensure effective storm water management and mine water containment. 4. Determine extent of dust generation in terms of NEM:AQA regulations and reporting on NAEIS.	1. Site manager 2. Site manager 3. Environmental manager 4. Environmental manager	1. Daily inspection of all coal transfer, transport and handling areas until final coal is removed from site. 2. Weekly inspections of ALL water management features, including infrastructure for runoff diversion and containment from coal stockpiles for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS. 4. Monthly dust monitoring will commence during the pre-construction phase in order to obtain baseline data and continue throughout the life of mine.
Crushing & screening & Processing Plant & Water supply	Irresponsible use of water and water wastage.	Construction Operation	Neg	5	3	3	1	12	3	36	Y	Mod	REMEDY Inspection of ALL water features for leaks and immediate repair CONTROL Saving water initiatives will be included in environmental awareness training. Utilise water on site responsibly. Record all water usage on site.	Affected registered water users of same water source will be provided access to similar water quality and quantity. Maximise water recycling.	3	2	1	1	7	3	21	Conditions stipulated in licenses/rights/permits.	Water use will be monitored for the life of mine as soon as water use commences. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life.	1. Record water usage to determine actual use, determine what water conservation measures can be put in place, determine any water spikes which may indicate faulty equipment. 2. Reduce the risk of spills and leaks to optimise water use and minimise	1. Environmental manager 2. Site manager	1. Continuous water metering and monthly recording for the life of mine. 2. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life.

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																								wasting of water.		
Water storage (dams / reservoirs / tanks) & Slurry dam	Contamination of surface water features with contaminated water runoff, ruptured dam walls.	Construction Operation	Neg	5	2	3	3	13	4	52	Y	Mod	REMEDY Inspect, maintain and repair all water management features. Follow emergency response plan for spills. Keep back-up pumps and pipes on site. CONTROL Ensure water separation and dirty water containment on site as per GN704 requirements. Ensure all dirty water containment facilities are adequately sized, designed and constructed. All dams will be constructed and lined as per designs and managed with a 0.8m freeboard. All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs Slurry removed from dams will be stockpiled in the dirty footprint area and be blended into product or disposed of onto the discard dump in compacted layers.	Surface water quality in neighbouring areas will be maintained close to baseline conditions. Class C barrier system for Type III Waste will be implemented at all dirty water dams. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES. Dirty mine water contained on site.	2	2	3	3	10	2	20	Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Mine water will be contained on site as per GN704. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development. 2. Ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks, optimise water use and minimise wasting of water. 3. Ensure effective storm water management and mine water containment.	1. Site manager 2. Site manager 3. Environmental manager	1. Once-off inspection of demarcations. 2. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS. 5. Integrity of all linings will be tested annually.
Water storage (dams / reservoirs / tanks) & Storm water runoff management	Containment of contaminated water.	Construction Operation	Pos	5	2	3	1	11	4	44	N	-	None.	Dirty mine water contained on site.	5	2	3	1	11	4	44	Mine water will be contained on site as per GN704. Conditions stipulated in licenses/right	Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water	1. Ensure effective storm water management and mine water containment.	1. Environmental manager	1. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

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features																						s/permits.	management is effective.			
Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Reduce risk of lowered surface elevation during rehabilitation and reduce risk of permanent alteration to surface drainage patterns.	Operation Decommission Closure Post closure	Pos	3	1	5	1	10	4	40	N	-	None.	Rehabilitation plan can be implemented to attain catchment flow dynamics similar to pre-mining.	3	1	5	1	10	4	40	NEM:WA regulations regarding mine residue handling and management where relevant prior to backfilling. Conditions stipulated in licenses/rights/permits.	Discard backfilling and compression at the base of pits will be initiated as soon as steady state mining is achieved to reduce the need for surface stockpiling and continue until the final void is backfilled.	1. Ensure that material is replaced to the mined out cuts as soon as possible as stipulated in the mine and rehabilitation plans to reduce the need for surface stockpiles.	1. Site manager with the contracting mine manager	1. Bimonthly inspection of discard backfilling and compression until final void is backfilled.
Water & slurry pipelines	Potential contamination of surface water features with burst pipelines.	Construction Operation	Neg	4	2	3	3	12	4	48	Y	Mod	REMEDY Inspect, maintain and repair pipelines and pumps. Follow emergency response plan for spills. Keep back-up pumps and pipes on site. CONTROL Pipelines should be laid in paddocks which will serve to contain any leaks. Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur. STOP Dirty water pipelines will remain outside 100m buffer zones / 1:100 year floodlines until authorisations under NWA have been obtained where needed.	Impact to neighbouring areas avoided. Dirty mine water contained on site.	2	2	3	3	10	2	20	Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Mine water will be contained on site as per GN704. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Construction of ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	1. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 2. Ensure pipelines are properly constructed and operated to reduce the risk of contaminated water spills and leaks and minimise wasting of water. 3. Ensure effective storm water management and mine water containment.	1. Environmental manager 2. Site manager 3. Environmental manager	1. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 2.Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
Explosives magazine	Potential contamination of surface water with explosives materials (largely nitrogen-based compounds).	Construction Operation	Neg	3	1	3	3	10	2	20	N	Mod	CONTROL All explosives will be stored as per Legislative / SANS requirements.	Dangerous goods stored and managed appropriately.	2	1	3	1	7	2	14	Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Good housekeeping practices will be applied at the explosives handling and storage areas for the duration that explosives are stored on site.	1. Ensure proper storage and handling of explosives on site and ensure no littering or spillage of explosives material.	1. Environmental manager	1. Daily inspection of explosives handling and storage areas for the as long as explosives are stored on site.
Waste generation & storage	Potential contamination of surface water with indiscriminately dumped waste.	Construction Operation	Neg	3	1	3	3	10	3	30	Y	Mod	REMEDY Inspect and clear all litter and waste. CONTROL Waste storage area will be treated as a dirty area and any runoff from site must be contained. Waste should be recycled as far as possible and sold/given to interested contractors. Waste will be stored according to the Norms and Standards for Storage of Waste. Recyclable waste should not be stored for excessive periods. Refuse bins will be placed around site to collect waste for separation, recycling and disposal. General waste must be collected and disposed of at a registered waste disposal site.	Attain "cradle to grave" management of waste on site.	2	1	3	3	9	2	18	Waste characterised, classified, handled and stored as per NEM:WA and its regulations: GNR634 & GNR926. Conditions stipulated in licenses/rights/permits.	Good housekeeping practices will be applied over mining and infrastructure areas and areas will be kept clear of litter and illegally dumped waste from the onset of construction throughout the life of mine.	1. Prevent illegal littering and dumping of waste on site in undesignated areas.	1. Environmental manager	1. Monthly visual inspection of the site for illegal dumping of waste for the life of mine.

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Stores, workshops & washbays & Hardpark & Fuel Storage	Potential hydrocarbon contamination of surface water. Potential contamination of surface water with indiscriminate use of contaminating materials (cement, chemicals, etc.).	Construction Operation	Neg	4	1	3	3	11	4	44	Y	Mod	REMEDY Oil from oil traps will be removed to the used hydrocarbon drum for removal from site by a reputable hydrocarbon waste contractor. Spill kits must be available on site and personnel trained to utilise these to clear spills. CONTROL Areas will be treated as a dirty areas and any runoff from sites must be contained. Maintenance of vehicles must be conducted on a demarcated area with a concrete slab and oil collection system. Cement will be handled over protected ground or sheeting. Chemicals will be stored as per requirements with the MSDS. Wet and dry chemicals, reducing and oxidising agents, will be stored separately. All diesel storage must be within concrete bunded areas that contain 110% of storage capacity if roofed or 120% storage capacity if not roofed; must be to SANS standards, refuelling areas will be over concrete platform. Bunds in workshop, washbay and fuel storage facility will be fitted with an outlet valve or drain to an oil trap. The outflow will flow through an oil trap and water component will be treated and recycled as process water. Oil from oil traps will be removed to the used hydrocarbon drums which will be	Dangerous goods managed appropriately as per SANS standards. Maintained vehicles, machinery and equipment reduces safety & environmental risks.	4	1	3	3	11	1	11	Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. Waste oil handled and stored as per NEM:WA and its regulation: GNR926. Conditions stipulated in licenses/rights/permits.	Cement handling will occur in designated areas or over protective sheeting during construction and whenever cement is brought to and utilised on site. Storage and handling of chemicals will be conducted in terms of the chemical's specifications and / or MSDS as long as chemicals are stored on site . Hydrocarbons will only be stored on site once bunded areas are constructed and storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance with the EMP as soon as hydrocarbons are brought to site for the life of mine. Hydrocarbon storage infrastructure, including concrete bunding and oil traps will be maintained as long as hydrocarbons are stored on site. Vehicles, machinery and equipment will be maintained within their operating specifications through servicing, calibration and general maintenance for the life of mine. Good housekeeping practices will be applied to the hard park area and the area will be kept clear of spills for as long as vehicles and machinery are kept in the area.	1. Ensure no cement / hydrocarbon spillages and immediate clearing of spillages and rehabilitation of affected areas. 2. Ensure proper storage and handling of chemicals on site, ensure MSDSs are available for all chemicals stored on site and ensure chemical storage area is clean and clear of spills. 3. Ensure proper storage and handling of hydrocarbons on site and prevent hydrocarbon spills, including emptying of oil traps regularly to the used hydrocarbon waste streams to prevent overflowing and spillages and preventing flooding of bunded areas. 4. Ensure concrete linings are not compromised which would lead to contaminated seepage. 5. Ensure vehicles, equipment and machinery are serviced and maintained within operation specifications to prevent excessive noise, emission and reduce risks of leaks.	1. Environmental manager 2. Environmental manager 3. Site manager 4. Site manager 5. Site manager	1. Daily inspection of cement and hydrocarbon handling areas during construction. 2. Daily inspection of chemical storage and handling areas while chemicals are stored on site . 3. Daily inspection of bunded areas for as long as hydrocarbons are stored on site. 4 Annual testing of integrity of concrete bunding for as long as hydrocarbons are stored on site. 5. Daily inspection of the hard park area will be conducted as long as vehicles and machinery are kept in the area

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													temporarily stored in concrete bunded areas prior to removal from site by a reputable hydrocarbon waste contractor. All vehicles / machinery on site will be up-to-date with their service and maintenance plans. The use of persistently leaky equipment will be discontinued until repairs are made. Equipment will not be parked over bare ground; where unavoidable, drip trays will be placed under the equipment to collect potential leaks.														
Ablutions & change house with sewage treatment plant	Potential contamination of surface water bodies with sewage.	Construction Operation	Neg	5	2	3	1	11	4	44	Y	Low	MODIFY Alternative to utilise existing municipal facilities not feasible as these facilities are already highly stressed due to the growth of Lephalale. REMEDY Inspect and repair all aspects of the sewage treatment facility as needed, including any plumbing associated with the bathrooms and toilets. CONTROL Package Sewage treatment plant must be designed to have enough capacity. Standard operating procedure (SOP) will be devised and implemented for the sewage treatment facility. Bacterial assessment of all monitoring points downstream of the sewage treatment plant.	Reduced bacterial contamination on neighbouring areas.	1	2	3	1	7	2	14	Downstream water quality will be within background quality limits and compared to SAN 2011 drinking water quality guidelines for bacteria. Conditions stipulated in licenses/rights/permits.	Water use will be monitored for the life of mine as soon as water use commences. Construction of ALL water management features, including the sewage treatment plant, will be completed before other activities commence in the area and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Sites downstream of the sewage treatment plant will also be tested for bacterial counts.	1. Record water usage to determine actual use, determine what water conservation measures can be put in place, determine any water spikes which may indicate faulty equipment. 2. Reduce the risk of spills and leaks to optimise water use and minimise wasting of water. 3. Ensure no bacterial contamination of downstream water resources by including bacterial analysis of water sources near to sewage treatment facility.	1. Environmental manager 2. Site manager 3. Environmental manager	1. Continuous water metering and monthly recording for the life of mine. 2. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 3. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

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Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Free drainage restored to area. Poor drainage if area is not adequately rehabilitated.	Operation Decommission Closure	Pos	4	1	5	1	11	4	44	N	-	REMEDY Rehabilitation must be on-going and the areas contoured to ensure catchment flow dynamics are similar to pre-mining conditions and prevent pooling of water over rehabilitated areas. Soil must be ameliorated in order to sustain a vegetative cover and adequate vegetative cover established. CONTROL Rehabilitation model and plan must be implemented throughout the life of mine. Mine responsibly. Carbonaceous material placed and compacted in the bottom of the pit. Runoff from the rehabilitated areas must be allowed to flow naturally to the environment.	Surface water quality in neighbouring areas will be maintained close to baseline conditions. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES. Rehabilitation will aim to restore topographic elevations so that natural drainage patterns and catchment areas remain largely similar to pre-mining dynamics.	4	1	5	1	11	4	44	Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. Conditions stipulated in licenses/rights/permits.	Areas will be rehabilitated completely as soon as activity in those areas cease and must be implemented throughout the life of mine. Material handling (removal, stockpiling and replacement) will be conducted as per the soil utilisation guide and EMP commencing once the first cut is started for the duration of operations. Soil quantity and quality will be maintained over rehabilitated areas to ensure adequate vegetative cover for grazing land use until rehabilitated areas are stable and self-sustaining. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	1. Ensure stripping and stockpiling is done in accordance with the soil utilisation guide and stockpile heights are maintained. 2. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 3. Reduce erosion, pooling of water and soil compaction in the general area and over rehabilitated areas. 4. Ensure effective storm water management and mine water containment and that rehabilitated areas are not contributing to downstream contamination.	1. Site manager with the contracting mine manager 2. Environmental manager will contract a soil specialist 3. Environmental manage 4. Environmental manager	1. Monthly inspection of material handling as soon as soil stripping commences for the life of mine. 2. Annual soil surveys until area are self-sustaining and stable. 3.Monthly visual inspection of surface of all rehabilitated areas for the life of mine. 4. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
Aspect: Groundwater																										
All infrastructure areas, development footprints and associated activities	Increased risk of contamination through seepage from any contaminating surface material.	Construction Operation	Neg	5	2	4	1	12	4	48	Y	High	Apply all surface water management measures as containment of dirty water on site within lined facilities will prevent seepage of contaminants to groundwater. REMEDY Keep all materials within properly prepared and designated areas and apply good housekeeping practices by keeping surface clear of all materials. CONTROL Ensure all storage areas for potentially contaminating material (coal, carbonaceous	Groundwater quality in neighbouring areas will be maintained close to baseline conditions. Good surface housekeeping practices in line with industry best practices and NEMA & NWA duty of care. Class C barrier system for Type III Waste will be implemented	3	2	3	1	9	2	18	Groundwater quality in neighbouring areas will be maintained close to baseline conditions for pH, sulphate. Iron, TDS and EC. NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. Conditions	Good housekeeping practices will be applied over mining and infrastructure areas and areas will be kept clear of any potentially contaminated material, which will only be stored in designated areas, from the onset of construction throughout the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	1. Ensure that all areas storing potentially contaminating material (mine water dams, coal stockpile area, hydrocarbon storage areas) are properly prepared to reduce infiltration to groundwater prior to storage of material on site and ensure runoff from these sites is directed to lined mine water dams. 2. Ensure water management measures and AMD	1. Site manager 2. Environmental manager	1. Once off inspection of sites to ensure they are adequately prepared/constructed and weekly visual inspection to ensure areas are operated and maintained properly throughout the life of mine. 2. Quarterly groundwater monitoring and quarterly quality reports to DWS.

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											material, hydrocarbons, chemicals and various wastes) are designed and appropriately lined to reduce seepage.			at all dirty water dams.								stipulated in licenses/rights/permits.		reduction measures are appropriate.		
Opencast excavations	Alteration of weathered aquifer flow dynamics and reduction of local groundwater levels.	Construction Operation Decommission	Neg	3	2	3	3	11	5	55	Y	High	REMEDY Ensure rehabilitation is continuously completed in a roll over fashion as per the rehabilitation plan. Ensure registered affected water users are compensated in some way with alternative water supply. CONTROL Seal off individual seepage zones in the fractured rock. Reduce vertical flows into the underlying aquifers: seal floor using concrete lining; compact floor area.	Reduce negative impacts on surrounding land owners/users.	2	1	3	3	9	5	45	Affected registered water users will be compensated for loss of water quality and quantity as per the Constitution and NWA. Conditions stipulated in licenses/rights/permits.	Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Groundwater level monitoring will commence before construction and continue for life of mine at nearby user boreholes.	1. Ensure water management measures and AMD reduction measures are appropriate. 2. Ensure that registered water users are minimally affected through dewatering by measuring groundwater levels in surrounding areas.	1. Environmental manager 2 Environmental manager	1. Quarterly groundwater monitoring and quarterly quality reports to DWS. 2. Quarterly groundwater level monitoring for life of mine.

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Opencast excavations & Discard disposal (initial temporary surface stockpiling and backfilling once first cut is completed)	Generation of Acid Mine Drainage (AMD)	Operation Decommissioning Closure Post-Closure	Neg	5	2	5	5	17	5	85	Y	High	MODIFY Alternative would be a permanent discard dump facility which would still impact negatively on groundwater and have additional environmental impacts associated with dust, spontaneous combustion, contaminated surface water runoff, spills from RWDs and intrusion on topography and visual aesthetics. Treatment options for contamination plume: utilisation of a proposed water treatment plant; a pump and treat system to continuously pump the water from the rehabilitated workings to surface dams to keep the water levels below decant level; cut-off intercept drain installed until the hard rock is exposed to capture any seepage/decant and drain water to the PCD; retaining a final void. Passive treatment can also be investigated and the mine can establish passive water ponds/wetlands. Specific trees can be planted over the opencast working to keep water levels low and to take up contaminants. REMEDY Ensure rehabilitation is continuously completed in a roll over fashion as per the rehabilitation plan. Ensure registered affected water users are compensated in some way with alternative water supply. CONTROL	Temporary discard dump must be fully designed and comply with NEM:WA GNR636, 2013. Backfilling must be conducted as per the rehabilitation plan and IWWMP once approved. Groundwater quality in neighbouring areas will be maintained close to baseline conditions. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES. Rehabilitation will aim to restore topographic elevations so that natural drainage patterns and catchment areas remain largely similar to pre-mining dynamics. Backfilling must be conducted as per the rehabilitation plan. Affected	4	1	5	5	15	5	75	Groundwater quality in neighbouring areas will be maintained close to baseline conditions for pH, sulphate. Iron, TDS and EC. NEMA & MPRDA principals and regulations regarding decommissioning and rehabilitation. Affected registered water users will be compensated for loss of water quality and quantity as per the Constitution and NWA GN704 & NEM:WA GNR636 (2013) regulations regarding backfilling with discard. Conditions stipulated in licenses/rights/permits.	Conduct mining responsible and apply EMP measures from the onset of mining, including proper material handling (stripping, stockpiling and replacement) activities until final void is fully rehabilitated. Discard backfilling and compression at the base of pits will be initiated as soon as steady state mining is achieved to reduce the need for surface stockpiling and continue until the final void is backfilled. Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective. Groundwater level monitoring will commence before construction and continue for life of mine at nearby user boreholes. Update the contaminant transport model for groundwater throughout operations (every two years) to ensure proactive response to potential decant and contaminated plumes at the time of decommissioning and closure.	1. Ensure responsible mining (keeping mine areas dry, sealing major fault lines that are intersected, maximised extraction of coal). 2. Ensure material is replaced to the mined out cuts as stipulated in the rehabilitation plan, specifically the placement and compaction of discard and carbonaceous material at the base of the pit below the original coal seam levels in order to ensure early flooding and reduced risk of AMD formation. 3. Ensure that correct elevations are obtained during rehabilitation as per the rehabilitation plan and model. 4. Ensure water management measures and AMD reduction measures are appropriate. 5. Ensure that registered water users are minimally affected through dewatering by measuring groundwater levels in surrounding areas. 6. Ensure that potential long term impacts are sustainably managed through updating the groundwater contamination model (plume	1. Site manager with the contracting mine manager 2. Site manager with the contracting mine manager 3. Environmental manager 4. Environmental manager 5 Environmental manager 6. Environmental manager will ensure that a groundwater specialist is contracted	1. Monthly inspection of all material handling for the life of mine. 2. Bimonthly inspection of discard backfilling and compression until final void is backfilled. 3. Annual topographical surveys over rehabilitated areas until rehabilitation is completed. 4. Quarterly groundwater monitoring and quarterly quality reports to DWS. 5. Quarterly groundwater level monitoring for life of mine. 6. Update of the contaminant transport model for groundwater every two years.

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													Keep mining areas as dry as possible and replace and compact carbonaceous material at the bottom of the pit during rehab to ensure early flooding and oxygen displacement. Seal off individual seepage zones in the fractured rock. Rehabilitated areas must be free draining to prevent ingress of water.	registered water users will be provided access to similar water quality and quantity.										migration and decant potential).		
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Groundwater levels will start to recover.	Operation Decommission Closure	Pos	1	1	5	1	8	5	40	N	-	-	Groundwater quality in neighbouring areas will be maintained close to baseline conditions.	1	1	5	1	8	5	40	Groundwater quality in neighbouring areas will be maintained close to baseline conditions for pH, sulphate. Iron, TDS and EC. Conditions stipulated in licenses/rights/permits.	Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	1. Ensure effective storm water management and mine water containment.	1. Environmental manager	1. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.
Aspect: Flora & Fauna																										

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All infrastructure areas, development footprints and associated activities	Alien invasive establishment and bush encroachment.	Construction Operation Decommission Closure	Neg	4	3	5	3	15	3	45	Y	Mod	REMEDY Rehabilitate all disturbed areas and seed with local indigenous species. CONTROL Clear all vehicles coming to site of any vegetative material to prevent introduction and spread of potential alien and invasive species. Eradicate and control all alien invasive species, removing those identified during the specialist study before construction commences to prevent spread of these species. Mechanical methods should be utilised in preference to chemical methods. Dispose of the eradicated plant material at an approved solid waste disposal site. Compile and implement an alien and invasive species management plan. Leave as much natural vegetation intact as possible. Do not disturbed soil unnecessary. Ensure that areas outside of the operational footprint that were disturbed, are adequately rehabilitated and that dense stands of encroacher species are prevented. Develop a burning, cutting and/or grazing management plant with an ecologist which takes into account safety of the operation, local by-laws and national legislation, in order to effectively manage veld areas.	Alien and invasive species managed with the view to eradicate species from the properties and preserve indigenous flora and fauna.	1	2	5	3	11	1	11	Alien and invasive species managed in terms of CARA and NEM:BA.	An alien and invasive management plan must be implemented on site from the onset of construction throughout the life of mine.	1. Control, with the aim of eradicating, alien and invasive species listed under CARA and NEM:BA from the relevant properties.	1. Environmental manager	1. Area must be generally inspected every 6 months. Areas where plants were removed must also be revisited to remove any new saplings; frequency will depend on the type of species.

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All infrastructure areas, development footprints and associated activities & Opencast excavations	Loss of biodiversity, degradation of vegetation and fragmentation and loss of ecological corridors through vegetation clearance and activity in pans.	Construction Operation	Neg	4	2	3	5	14	5	70	Y	Mod	REMEDY Rehabilitate all disturbed areas. Revegetate all bare soils. Consider establishment of a nursery in which to store some of the local indigenous flora for use during rehabilitation. Incorporate herbaceous vegetation into soil stockpiles. CONTROL Demarcate designated activity area to ensure only flora in that area is affected. Prioritise low sensitivity areas and then conduct activities in medium sensitivity areas. An independent Ecological Control Officer (ECO) should be appointed to oversee construction. The ECO should be knowledgeable on the protected species that may occur within the development footprint as per the identification guide (Appendix D of the ecological report attached as Appendix 9). Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas. Prevent access to sensitive environs, particularly pans and the Sandloop River. Apply soil management measures to provide adequate substrate for vegetation establishment and growth. Apply surface water	Impact to neighbouring areas avoided. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES. Rehabilitation will aim to replace and ameliorate soils in order to restore grazing land capability supporting local indigenous species.	2	1	3	3	9	4	36	Erosion control measures will be considered in terms of CARA and MPRDA regulations and best practice. NEMA & MPRDA principals and regulations regarding rehabilitation. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Soil and flora surveys will be completed over rehabilitated areas once the first cut is fully rehabilitated for the life of mine to ensure adequate indigenous flora cover over rehabilitated areas to support grazing land use.	1. Ensure demarcation of active area and sensitive sites have been properly implemented to prevent disruption to areas not targeted for development, especially the riverine habitat around the Sandloop River. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 3. Ensure soil amelioration on rehabilitated ground to sustain vegetative cover and proper seeding with indigenous local flora to attain sustainable grazing land. 4. Ensure proper vegetative cover over rehabilitated ground.	1. Site manager 2. Environmental manager 3. Environmental manager 4. Environmental manager	1. Once-off inspection of demarcations. 2. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 3. Soil and flora surveys will be completed annually over rehabilitated areas for the life of mine. 4. Monthly visual inspection of vegetation establishment and germination over rehabilitated areas for the life of mine.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
											management measures to ensure ecosystems associated with wetlands and streams are maintained. Maintain connectivity of ecological corridors as far as possible by protecting the Sandloop River and associated riverine vegetation. Staff / contractors may not tamper or remove these trees where they are not within the construction footprint. No open fires must be allowed on site such as for cooking. Prohibit the harvesting of trees for firewood. Do not hinder, harm, trap animals. Noise control measures will be applied. STOP 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland). Pans will be preserved in situ until IWUL is obtained to conduct activities in these areas.													
All infrastructure areas, development footprints and associated activities	Destruction of protected species.	Construction Operation	Neg	5	2	5	5	17	5	85	Y	High	REMEDY As far as possible species (such as young saplings) should be transplanted or placed into nursery and replanted on site. A permit to collect the seeds of these trees could be obtained from DAFF and seeds can be grown in a small nursery on site to be replanted	Conserve protected species as far as is practically possible.	2	1	3	3	9	4	36	Permits will be obtained under NEM:BA to relocate / destroy protected species. Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Protected species on or near site must be monitored to prevent destruction to species and permits must be	1. Ensure permits are in place before destroying or relocating protected species. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and associated ecosystems. 3. Ensure activity is	1. Environmental manager 2. Environmental manager 3. Environmental manager	1. Permits and relocation of species will occur once-off before any activity commences in the area. 2. Weekly inspections of no-go zones soon as the areas are demarcated for life of mine. 3. Monthly inspections of areas where

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											as part of rehabilitation. CONTROL Demarcate designated activity area and only remove species from the active area. Specialist will have to walk area and plot all protected species. Preserve all other species in situ. Staff / contractors may not tamper or remove these trees where they are not within the construction footprint. No open fires must be allowed on site such as for cooking. Prohibit the harvesting of trees for firewood. STOP Protected species cannot be removed until the necessary permits are obtained under NEM:BA. Northern rail link will affect fewer protected species.											obtained for any species that will be removed or destroyed during construction and opencast mining before any activity tales place on site.	in designated area and surrounding flora and fauna are preserved and monitor protected species on site to allow for appropriate action should such species come under threat from the proposed development.		protected species were observed throughout the life of mine.
All infrastructure areas, development footprints and associated activities	Alienation of, and disturbance to, animals and loss of roost and foraging sites for birds and bats.	Construction Operation Decommissi on	Neg	3	2	3	1	9	5	45	Y	Low	CONTROL Maintain connectivity of ecological corridors. Keep areas of tree clearance to a minimal in opencast areas and include a tree-planting in the rehabilitation plan. Do not hinder, harm, trap animals. Animals or protected flora under threat from the development will be relocated from site by specialists Noise control measures will be considered.	Impact to neighbouring areas, which will provide refuge for animals leaving site, avoided.	2	2	3	1	8	4	32	Conditions stipulated in licenses/right s/permits.	Protected species on or near site must be monitored to prevent destruction to species and permits must be obtained for any species that will be removed or destroyed during construction and opencast mining before any activity tales place on site.	1. Ensure surrounding flora and fauna are preserved and monitor protected species on site to allow for appropriate action should such species come under threat from the development. 2. Ensure permits are applied for if fauna or protected flora need to be relocated or destroyed and ensure the relevant specialists are contracted.	1. Environmental manager 2. Environmental manager	1. Monthly inspections will be made of areas where protected species were observed for the life of mine. 2. Permits for relocation of protected species will be obtained prior to relocation of species being undertaken.
All water management features	Potential harm to sensitive flora in the	Operation Decommissi on Closure	Neg	5	2	5	5	17	5	85	Y	High	REMEDY Contain all dirty water on site by establishing appropriately sized,	Impact to neighbouring areas avoided. Surface water	2	1	3	3	9	2	18	Water will be managed in terms of GN704; can	Demarcation of active areas and nearby sensitive areas will be established before any	1. Ensure demarcation of active area and sensitive sites have	1. Site manager 2. Environmental	1.Once-off inspection of demarcations. 2. Weekly inspections of no-go zones soon

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	riparian habitats associated with the Sandloop River through contaminated runoff and poor rehabilitation												designed and lined mine water dams on site. Line all dirty water dams to prevent seepage. Line all trenches carrying high or continuous loads of dirty water runoff to prevent seepage. CONTROL Demarcate designated activity area. Establish storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. Establish protective berms / fence outside wetland buffer zones between wetlands and active areas. Establish clean water diversion berms upslope of activity footprint to prevent clean water runoff flowing onto site. Drain all water runoff on activity area to PCDs and dirty water containment features. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area. STOP 100m buffer zones / 1:100 year floodlines will be demarcated as no-go areas until authorisations under NWA and NEMA have been obtained. (NOTE: West mine pit area was moved outside the 100m buffer zone; only siding loop will encroach into the riparian wetland). The northern rail way link and siding is preferred due to much	and groundwater quality in neighbouring areas will be maintained close to baseline conditions. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES.								only be released with permission from DWS. Surface water quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for pH, sulphate. Iron, TDS and EC. Conditions stipulated in licenses/rights/permits.	activity takes place in specific area and maintained for life of mine. ALL water management features, water containment facilities, and all water-related infrastructure will be completed before other activities commence in the areas and will be maintained for their operational life. Surface water monitoring, groundwater monitoring and biomonitoring will commence before construction and continue for life of mine to ensure water management is effective.	been properly implemented to prevent disruption to areas not targeted for development. 2. Maintain wetland and riverine buffer zones as no-go areas to protect wetland areas and maintain buffer zone ecological services. 3. Ensure proper storm water diversion and separation and ensure adequately sized storm water management features and dams to reduce the risk of contaminated water spills and leaks. 4. Ensure effective storm water management and mine water containment.	manager 3. Site manager 4. Environmental manager	as the areas are demarcated for life of mine. 3. Weekly inspections of ALL water management features, water containment facilities, and all water-related infrastructure for their operational life. 4. Monthly surface water monitoring, quarterly groundwater monitoring, biannual biomonitoring and quarterly quality reports to DWS.

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											smaller footprint encroaching into the buffer zone.															
Lighting	Hindrance to nocturnal animals, including nocturnal birds and bats	Construction Operation	Neg	3	2	3	1	9	3	27	Y	Low	REMEDY Utilise lights in the orange and yellow light ranges rather than white. This has the added benefit of reducing strong light and dark contrasts which also has safety benefits for staff. CONTROL Conduct activities during day as far as possible. Ensure directional floodlights are utilised to reduce light pollution to surrounds.	Visual impact reduced. Reduced attraction of nocturnal animals into potentially hazardous areas.	1	2	3	1	7	2	14	No standards, but principals of reduced light pollution have been considered. Conditions stipulated in licenses/rights/permits.	-	-	-	-
Waste generation & storage	Potential harm to flora and fauna through littering and waste toxins.	Construction Operation	Neg	3	1	3	3	10	3	30	Y	Low	REMEDY Inspect and clear all litter and waste. CONTROL Waste storage area will be treated as a dirty area and any runoff from site must be contained. Waste should be recycled as far as possible and sold/given to interested contractors. Waste will be stored according to the Norms and Standards for Storage of Waste. Recyclable waste should not be stored for excessive periods. Refuse bins will be placed around site to collect waste for separation, recycling and disposal.	Attain "cradle to grave" management of waste on site.	2	1	3	3	9	2	18	Waste characterised, classified, handled and stored as per NEM:WA and its regulations: GNR634 & GNR926. Conditions stipulated in licenses/rights/permits.	Good housekeeping practices will be applied over mining and infrastructure areas and areas will be kept clear of litter and illegally dumped waste from the onset of construction throughout the life of mine.	1. Prevent illegal littering and dumping of waste on site in undesignated areas.	1. Environmental manager	1. Monthly visual inspection of the site for illegal dumping of waste for the life of mine.

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Stores, workshops & washbays, Fuel storage, Hard Park	Potential hydrocarbon contamination will be source of toxin to flora and fauna.	Construction Operation	Neg	4	1	3	3	11	2	22	Y	Low	REMEDY Oil from oil traps will be removed to used hydrocarbon drums for removal from site by a reputable hydrocarbon waste contractor. Spill kits must be available on site and personnel trained to utilise these to clear spills. CONTROL Cement will be handled over protected ground or sheeting. Chemicals will be stored as per requirements with the MSDS. Wet and dry chemicals, reducing and oxidising agents, will be stored separately. Bunds in workshop and washbay will be fitted with an outlet valve or drain to an oil trap. All diesel storage must be within concrete bunded areas to SANS standards. Bunds will be fitted with an outlet. All vehicles / machinery on site will be up-to-date with their service and maintenance plans. Trucks and equipment should only be washed in dedicated areas and the dirty water is not allowed to discharge into the watercourse or surrounding natural vegetation. The use of persistently leaky equipment will be discontinued until repairs are made. Equipment will not be parked over bare ground; where unavoidable, drip trays will be placed under the equipment to collect	Dangerous goods stored and managed appropriately. Surface water and groundwater quality in neighbouring areas will be maintained close to baseline conditions and regularly compared to SANS 241 standards or to IWULA RWQOs for hydrocarbon contamination. Wetland systems and Aquatic ecosystem integrity will be maintained close to natural conditions with regards to PES.	3	1	3	3	10	1	10	Dangerous goods stored and managed as per SANS 10228:2006 and MSDSs and MPRDA Regulations. MHSA will be complied with regarding signage and access control. Surface water and groundwater quality in neighbouring areas will be maintained close to baseline conditions, SANS 241:2011 standards or to IWULA RWQOs for hydrocarbons . Any conditions stipulated in licenses/rights/permits will be carried out on site and will be audited annually or at a frequency stipulated in the licenses/rights/permits.	Cement handling will occur in designated areas or over protective sheeting during construction and whenever cement is brought to and utilised on site. Storage and handling of chemicals will be conducted in terms of the chemical's specifications and / or MSDS as long as chemicals are stored on site . Hydrocarbons will only be stored on site once bunded areas are constructed and storage and handling of hydrocarbons (including used hydrocarbons) will be managed in accordance with the EMP as soon as hydrocarbons are brought to site for the life of mine.	1. Ensure no cement spillages and immediate clearing of spillages and rehabilitation of affected areas. 2. Ensure proper storage and handling of chemicals on site, ensure MSDSs are available for all chemicals stored on site and ensure chemical storage area is clean and clear of spills. 3. Ensure proper storage and handling of hydrocarbons on site and prevent hydrocarbon spills, including emptying of oil traps regularly to the used hydrocarbon waste streams to prevent overflowing and spillages.	1. Environmental manager 2. Environmental manager 3. Site manager	1. Daily inspection of cement handling areas during construction. 2. Daily inspection of chemical storage and handling areas while chemicals are stored on site . 3. Daily inspection of bunded areas for as long as hydrocarbons are stored on site.

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													potential leaks.													
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Lack of functional vegetation due to poor rehabilitation and associated downstream impacts on riparian vegetation	Operation Decommission Closure	Neg	4	1	5	1	11	4	44	N	-	REMEDY Rehabilitation must be on-going. Soil must be ameliorated in order to sustain a vegetative cover. Local indigenous species must be utilised during rehabilitation. AMD management plan must be implemented as per the groundwater management measures. The area should be re-landscaped and resemble the land form prior to the open cast activities. The areas should be planted with indigenous vegetation typical of the area and monitored to ensure that the vegetation progress through succession stages. Runoff water needs to be trapped by either the mechanical breaking of the soil surface to trap water, packing of stones, tyres or brush along contours to trap mulch, slow down water movement and reduce the impact on bare soil. Pitter basins work well on fine textured soil and must be orientated and shaped to face upslope. The basins trap seeds, organic matter and water which could lead to rapid colonisation	Rehabilitation will aim to replace and ameliorate soils in order to restore grazing land capability supporting local indigenous species.	3	1	5	1	10	2	20	Conditions stipulated in licenses/rights/permits.	Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil quantity and quality will be maintained over rehabilitated areas to ensure adequate vegetative cover for grazing land use until rehabilitated areas are stable and self-sustaining.	1. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 2. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing land capability. 3. Ensure proper vegetative cover over rehabilitated ground. 4. Ensure that vegetation is establishing on rehabilitated areas and ensure the area is stabilising and self-sustaining in terms of vegetation communities.	1. Environmental manager will contract a soil specialist 2. Site manager with the contracting mine manager 3. Environmental manager 4. Environmental manager will ensure that a flora specialist is contracted	1. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 3. Monthly visual inspection of vegetation establishment and germination over rehabilitated areas for the life of mine. 4. Annual floral surveys of rehabilitated areas for the life of mine.

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													after rains. Mulch and brush also reduces the force of raindrops, limiting the dispersion of clay and the extent of mineral crusting. It also traps dust, sand and seeds to ensure plant establishment. Monitoring of the rehabilitation success should take place for at least five years and include corrective follow-up action. It is recommended that Landscape Functional Analysis (LFA) forms part of the rehabilitation and monitoring process.													
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Seeding and vegetative cover and plant community succession. Influx of Animals to the area once vegetation establishes.	Operation Decommission Closure	Pos	4	1	5	1	11	4	44	N	-	REMEDY Rehabilitation must be on-going. Soil must be ameliorated in order to sustain a vegetative cover. Local indigenous species must be utilised during rehabilitation.	Rehabilitation will aim to replace and ameliorate soils in order to restore grazing land capability supporting local indigenous species.	4	1	5	1	11	4	44	Conditions stipulated in licenses/rights/permits.	Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil quantity and quality will be maintained over rehabilitated areas to ensure adequate vegetative cover for grazing land use until rehabilitated areas are stable and self-sustaining.	1. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 2. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing land capability. 3. Ensure proper vegetative cover over rehabilitated ground. 4. Ensure that vegetation is establishing on rehabilitated areas and ensure the area is stabilising and self-sustaining in terms of vegetation communities.	1. Environmental manager will contract a soil specialist 2. Site manager with the contracting mine manager 3. Environmental manager 4. Environmental manager will ensure that a flora specialist is contracted	1. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 3. Monthly visual inspection of vegetation establishment and germination over rehabilitated areas for the life of mine. 4. Annual floral surveys of rehabilitated areas for the life of mine.
Aspect: Air Quality																										

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All infrastructure areas, development footprints and associated activities	Emissions into the atmosphere through use of diesel powered equipment, machinery and vehicles.	Construction Operation Decommission	Neg	2	2	3	1	8	5	40	Y	Low	CONTROL Machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of excessive emissions.	Keep equipment, machinery and vehicles operating within their manufacturing specifications.	1	2	3	1	7	5	35	Keep equipment, machinery and vehicles operating within their manufacturing specifications.	Vehicles, machinery and equipment will be maintained within their operating specifications through servicing, calibration and general maintenance for the life of mine. Good housekeeping practices will be applied to the hard park area and the area will be kept clear of spills for as long as vehicles and machinery are kept in the area.	1. Ensure vehicles, equipment and machinery are serviced and maintained within operation specifications to prevent excessive noise, emission and reduce risks of leaks.	1. Site manager	1. Weekly inspection of all service and maintenance plans/logbooks to ensure maintenance is scheduled in time.
All infrastructure areas, development footprints and associated activities	Dust generation and particulate matter.	Construction Operational Decommission	Neg	5	3	4	3	15	5	75	Y	Mod	REMEDY Ensure rehabilitation and seeding is continuously completed in a roll over fashion. CONTROL Wagons must not be overloaded and must be covered with tarpaulin. Speed limits must be established. Stockpile heights must not exceed 2m for topsoil, 6m for subsoil and 25m for overburden. Vegetate soil stockpiles and all exposed areas. Manage dust through water carts or sprinklers. Consider reducing activities when windy. Consider windbreaks, enclosures, shelters or misting of very dusty areas.	Dust fallout will be managed to not exceed baseline levels as current baseline levels already exceed standards.	3	1	3	1	8	4	32	Dust fallout will be monitored and managed as per GNR827. Baseline conditions already exceed standards and emissions will be compared to baseline data. Conditions stipulated in licenses/rights/permits.	Dust suppression will commence from the onset of construction and continue for the life of mine. As a controlled Group C emitter, the mine must register and report to the NAEIS site from the onset of construction for the life mine.	1. Ensure that dust levels are within thresholds through dust monitoring. 2. Ensure legal compliance through registration on NAEIS website.	1. Environmental manager 2. Environmental manager	1. Monthly dust monitoring and recording. 2. Once off registration on NAEIS and annual reporting to NAEIS.

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Blasting	Dust generation.	Operation	Neg	5	2	4	3	14	5	70	Y	Mod	MODIFY Alternative blasting methods will be considered to reduce outward impact. CONTROL Blasting specialists must be contracted who are fully compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015). Blasts methods used to reduce outward impact radius. Blasting should not be conducted when it is very windy. Utilise free-digging as far as possible.	Dust fallout will be managed to not exceed baseline levels as current baseline levels already exceed standards. Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015)	3	1	3	1	8	4	32	Blasting will comply with MHSA and MPRDA Regulations. Dust fallout will be monitored and managed as per GNR827. Baseline conditions already exceed standards and emissions will be compared to baseline data. Conditions stipulated in licenses/rights/permits.	Dust suppression will commence from the onset of construction and continue for the life of mine. As a controlled Group C emitter, the mine must register and report to the NAEIS site from the onset of construction for the life mine.	1. Ensure that dust levels are within thresholds through dust monitoring. 2. Ensure legal compliance through registration on NAEIS website.	1. Environmental manager 2. Environmental manager	1. Monthly dust monitoring and recording. 2. Once off registration on NAEIS and annual reporting to NAEIS.
Coal handling (RoM & product coal stockpiling, Coal loading & conveyance, access and hauling, crushing and screening)	Potential for spontaneous combustion and associated emissions.	Construction Operation	Neg	5	2	3	1	11	3	33	Y	Mod	REMEDY Inspect for and treat spontaneous combustion by covering areas with fine subsoil to douse the combustion. Coal spillages must be cleared. CONTROL Move coal stockpiles on a first-in-first-out basis.	Coal and temporary discard disposal areas will be monitored daily for signs of smoke which may indicate spontaneous combustion. Emissions in any areas of spontaneous combustion will be monitored for SOx and NOx to ensure limits are within NEM:AQA thresholds.	3	1	3	1	8	2	16	Emissions in any areas of spontaneous combustion will be monitored for SOx and NOx to ensure limits are within NEM:AQA thresholds. Conditions stipulated in licenses/rights/permits.	As a controlled Group C emitter, the mine must register and report to the NAEIS site from the onset of construction for the life mine. All coal handling, transfer and stockpiling will be within designated areas only and coal will be processed and removed from site regularly as soon as coal is extracted until final coal is removed from site. Backfilling with discard will commence as soon as the first cut is completed.	1. Ensure legal compliance through registration on NAEIS website. 2. Ensure all coal is in designated stockpiling and handling areas and that all coal spills are cleared regularly and replaced to designated areas.	1. Environmental manager 2. Site manager	1. Once off registration on NAEIS and annual reporting to NAEIS 2. Daily inspection of temporary surface discard disposal site and all coal transfer, transport and handling areas once coal is extracted until final coal is removed from site.

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Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Dust generation associated with material handling.	Operation Decommission	Neg	4	2	3	1	10	5	50	N	Mod	REMEDY Ensure rehabilitation and seeding is continuously completed in a roll over fashion. CONTROL Manage dust through water carts or sprinklers.	Dust fallout will be managed to not exceed baseline levels as current baseline levels already exceed standards.	3	2	3	1	9	3	27	Dust fallout will be monitored and managed as per GNR827. Baseline conditions already exceed standards and emissions will be compared to baseline data. Conditions stipulated in licenses/rights/permits.	Dust suppression will commence from the onset of construction and continue for the life of mine. As a controlled Group C emitter, the mine must register and report to the NAEIS site from the onset of construction for the life mine.	1. Ensure that dust levels are within thresholds through dust monitoring. 2. Ensure legal compliance through registration on NAEIS website.	1. Environmental manager 2. Environmental manager	1. Monthly dust monitoring and recording. 2. Once off registration on NAEIS and annual reporting to NAEIS.
Aspect: Noise																										
All infrastructure areas, development footprints and associated activities. All activities on site.	Increased noise levels.	Construction Operation Decommission	Neg	2	2	3	1	8	5	40	Y	-	CONTROL Machinery and equipment will be regularly serviced. Noise control measures will be considered such as erecting sound barriers (berms), soundproofing of point sources, use of silencers, using strobe lights rather than beepers where feasible and where this won't compromise safety of people on site. Machinery will be maintained within operational noise limits and will be switched off when not in use. Mine will consider conducting noisy activities during the day as far as possible. If complaints are received and elevated noise levels are recorded at sensitive receptors, and management measures are not aiding in	Noise level at mineral boundary and sensitive receptor maintained at baseline levels and less than 70dB at mineral boundary.	1	2	3	1	7	5	35	Environmental noise managed to baseline conditions and SANS 10103:2008 can be consulted (note baseline levels are already higher than SANS standards and mine cannot be expected to operate at SANS standards). Conditions stipulated in licenses/rights/permits.	Quarterly environmental noise monitoring should be established during the pre-construction phase in order to obtain baseline data and continue for the life of mine.	1. Determine extent of noise generation and success of management measures for noise control and to alter noise management as needed through noise monitoring at boundaries and sensitive receptors.	1. Environmental manager	1. Quarterly environmental noise monitoring.

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											reducing the impact, then the mine should consider increasing operational distance from the sensitive receptors.															
Aspect: Archaeological/Cultural Sites																										
Opencast excavations	Loss of and disturbance to archaeological / heritage sites (Historic farmstead & Abandoned mine).	Construction Operational Decommission	Neg	2	1	5	5	13	5	65	Y	High	CONTROL Site must be properly document by specialists and permit must be obtained from SAHRA prior to destruction of site. STOP Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained. Should other sites / graves be uncovered on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialists will need to be consulted and responsible action considered, whether destruction / grave relocation / ceasing activity completely and maintaining site in situ.	Preservation and responsible handling of heritage sites.	1	1	5	5	12	5	60	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to destruction or relocation of such sites.	1. Preserve any heritage and cultural sites that may be identified during construction and excavation.	1. Social manager	1. Once-off prior to activities taking place.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
Opencast excavations	Loss of and disturbance to 3 graves associated with Site 5.	Construction Operational Decommission	Neg	5	2	5	5	17	5	85	N	High	CONTROL Permits must be obtained prior to relocation of sites (cemetery area with minimum of 2 graves). Site must be properly documented by a specialists and once permits are obtained the site can be exhumed and remains reburied. STOP Sites identified in the HIA will be cordoned off with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained. Should other sites / graves be uncovered on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialists will need to be consulted and responsible action considered, whether destruction / grave relocation / ceasing activity completely and maintaining site in situ.	Preservation and responsible handling of heritage sites.	4	2	5	5	16	5	80	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to relocation of such sites.	1. Preserve any heritage and cultural sites that may be identified during construction and excavation.	1. Social manager	1. Once-off prior to activities taking place.
Overburden stockpiles	Loss of and disturbance to archaeological / heritage sites (Site 3 - Historic farmstead / school Foundations).	Construction Operational Decommission	Neg	2	1	5	5	13	5	65	N	High	CONTROL Site must be properly document by specialists and permit must be obtained from SAHRA prior to destruction of site (recent farm structure / school). STOP Consideration should be given to adjusting stockpiling areas to preserve site and 50m buffer in situ where possible. Sites identified in the HIA will be cordoned off	Preservation and responsible handling of heritage sites.	1	1	5	5	12	5	60	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to destruction or relocation of such sites.	1. Preserve any heritage and cultural sites that may be identified during construction and excavation.	1. Social manager	1. Once-off prior to activities taking place.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
													with no mining allowed within 100m of such sites and no infrastructure within 50m of such sites until necessary permits are obtained.														
Overburden stockpiles	Loss of and disturbance to archaeological / heritage sites (Site 1 and 2 - stone age findings).	Construction Operational Decommission	Neg	1	1	5	5	12	5	60	N	Low	HIA report to be approved by SAHRA. No mitigation or permit required.	Preservation and responsible handling of heritage sites.	1	1	5	5	12	5	60	SAHRA will be complied with regarding permits for destruction and relocation or management of sites in situ. Conditions in permits will be adhered to.	Once off inspection of all activity areas will be completed prior to construction and opencast mining. Permits must be obtained prior to destruction or relocation of such sites.	1. Preserve any heritage and cultural sites that may be identified during construction and excavation.	1. Social manager	1. Once-off prior to activities taking place.
Blasting	Vibrations may damage nearby heritage sites and the Lephalale Cemetery (Site 6).	Operation	Neg	5	2	5	3	15	5	75	Y	High	MODIFY Alternative blasting methods will be considered to reduce outward impact. REMEDY A conservation management plan will be compiled for all sites that are not targeted for destruction or relocation and sites will be fenced off. Ensure heritage management plan includes procedures to compensate for damage. Ensure baseline photographs are taken of all structures within 1500m of the mine pits which may be impacted for photographic evidence prior to any blasting. CONTROL Evacuate 600m radius prior to blasting. Blasting specialists must be contracted. Blasts methods used to reduce outward impact	Severe impact must be contained to 500m radius; evacuation of 600m radius based on current blast design. Affected property will be compensated, repaired or replaced. Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015)	5	2	3	3	13	4	52	Blasting will comply with MHSA and MPRDA Regulations. SAHRA will be complied with regarding management of site in situ. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
													radius. Utilise free-digging as far as possible.													
Aspect: Visual Aesthetic																										
All infrastructure areas, development footprints and associated activities	Deterioration in visual aesthetics.	Construction Operational Decommission	Neg	5	1	3	3	12	5	60	Y	-	REMEDY Visual screens (vegetated berms, trees or wind breaks) will be considered where necessary. All berms and soil stockpiles will be vegetated. Apply dust control measures and other environmental measures to ensure impact area is contained. Apply good housekeeping practices.	Visual impact reduced. Impact to neighbouring areas reduced. Surface area kept clean through good housekeeping practices.	3	1	3	3	10	4	40	Conditions stipulated in licenses/rights/permits.	Demarcation of active areas and nearby sensitive areas will be established before any activity takes place in specific area and maintained for life of mine. Good housekeeping practices will be applied over mining and infrastructure areas and areas will be kept clear of any potentially contaminated material, which will only be stored in designated areas, from the onset of construction throughout the life of mine. Regular communications with I&APs.	1. Ensure demarcation of active area has been properly implemented to prevent disruption to areas not targeted for development. 2. Inspect complaints register.	1. Site manager 2. Social manager	1. Once-off before any activity takes place in specific area. 2. Daily inspection of complaints register.
Lighting	Increased visibility of the site.	Construction Operation	Neg	3	2	3	1	9	5	45	Y	-	REMEDY Utilise lights in the orange and yellow light ranges rather than white. This has the added benefit of reducing strong light and dark contrasts which also has safety benefits for staff. CONTROL Conduct activities during day as far as possible. Ensure directional floodlights are utilised to reduce light pollution to surrounds and prevent these from shining directly on adjacent land users and road users.	Visual impact reduced. Impact to neighbouring areas reduced.	2	2	3	1	8	5	40	Conditions stipulated in licenses/rights/permits.	-	-	-	-

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Waste generation & storage	Deterioration in visual aesthetics.	Construction Operation	Neg	3	2	3	3	11	3	33	Y	-	REMEDY Inspect and clear all litter and waste. CONTROL Waste should be recycled as far as possible and sold/given to interested contractors. Waste will be stored according to the Norms and Standards for Storage of Waste. Recyclable waste should not be stored for excessive periods. Refuse bins will be placed around site to collect waste for separation, recycling and disposal.	Visual impact reduced. Surface area kept clean through good housekeeping practices. Attain "cradle to grave" management of waste on site.	2	1	3	3	9	1	9	Waste characterised, classified, handled and stored as per NEM:WA and its regulations: GNR634 & GNR926. Conditions stipulated in licenses/rights/permits.	Good housekeeping practices will be applied over mining and infrastructure areas and areas will be kept clear of litter and illegally dumped waste from the onset of construction throughout the life of mine.	1. Prevent illegal littering and dumping of waste on site in undesignated areas.	1. Environmental manager	1. Monthly visual inspection of the site for illegal dumping of waste for the life of mine.
Rehabilitation (including backfilling, infilling, profiling, topsoiling, seeding)	Improved visual aesthetic.	Operation Decommission Closure	Pos	4	1	5	1	11	4	44	N	-	REMEDY Soil must be ameliorated in order to sustain a vegetative cover and all bare soils seeded and maintain adequate vegetative cover.	Visual impact reduced.	4	1	5	1	11	4	44	Conditions stipulated in licenses/rights/permits.	Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil quantity and quality will be maintained over rehabilitated areas to ensure adequate vegetative cover for grazing land use until rehabilitated areas are stable and self-sustaining.	1. Ensure proper vegetative cover over rehabilitated ground. 2. Ensure that vegetation is establishing on rehabilitated areas and ensure the area is stabilising and self-sustaining in terms of vegetation communities.	1. Environmental manager 2. Environmental manager will ensure that a flora specialist is contracted	1. Monthly visual inspection of vegetation establishment and germination over rehabilitated areas for the life of mine. 2. Annual floral surveys of rehabilitated areas for the life of mine.
Aspect: Nearby Structures																										

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
Blasting	Ground vibration and airblast impact on houses (including SPCA)	Operation	Neg	4	2	3	1	10	5	50	N	-	MODIFY Consider a blast design to reduce charge mass near structures OR increase mining buffer area OR increase blast distance. REMEDY Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures. CONTROL Stemming control and audit, use proper stemming materials, Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Ground Vibration Limit of 25mm/s for sturdy houses, 12.5mm/s for constructed houses with lesser foundations, 6mm/s for rural structures. Airblast limit of 134dB. Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).	4	2	3	1	10	2	20	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.
Blasting	Ground vibration impact on boreholes	Operation	Neg	5	2	3	1	11	5	55	N	-	MODIFY Consider a blast design to reduce charge mass near structures OR increase mining buffer area OR increase blast distance. REMEDY Drill new boreholes at similar locations and similar depths to continue with groundwater monitoring. CONTROL Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Ground Vibration Limit of 50mm/s. Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).	4	2	3	1	10	2	20	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.
Blasting	Ground vibration impact on roads	Operation	Neg	4	2	3	1	10	5	50	N	-	MODIFY Consider a blast design to reduce charge mass near structures OR increase mining buffer area. REMEDY Reroute the road if damage to the road is severe.	Ground Vibration Limit of 150mm/s. Blasting will be compliant with the requirements of MHSA regulations pertaining to	4	2	3	1	10	2	20	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting

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													CONTROL Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	explosives (GNR584 of 2015).										events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.		schedule.
Blasting	Fly Rock Impact on houses	Operation	Neg	4	2	3	1	10	5	50	N	-	REMEDY Complete photographic surveys of structures within 1500m to ensure that appropriate remediation can be applied to relevant damage to structures. CONTROL Stemming control and audit, use proper stemming materials, re-design of blasts.	600m radius to be evacuated (distance is liable to change based on final blast plan). Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).	2	2	3	1	8	2	16	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.
Blasting	Fly Rock Impact on boreholes	Operation	Neg	2	2	3	1	8	2	16	N	-	REMEDY Drill new boreholes at similar locations and similar depths to continue with groundwater monitoring. CONTROL Stemming control and audit, use proper stemming materials, re-design of blasts.	600m radius to be evacuated (distance is liable to change based on final blast plan). Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).	2	2	3	1	8	1	8	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.

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Blasting	Fly Rock Impact on roads	Operation	Neg	4	2	3	1	10	5	50	N	-	REMEDY Reroute the road if damage to the road is severe. CONTROL Stemming control and audit, use proper stemming materials, re-design of blasts.	600m radius to be evacuated (distance is liable to change based on final blast plan). Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).	2	2	3	1	8	2	16	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.
Blasting	Fume impact on houses	Operation	Neg	3	2	3	1	9	3	27	N	-	CONTROL Quality explosives to be used. Do not sleep over explosives for extended periods of time. If water is in blast holes use appropriate explosives. Consider wind direction prior to blasting.	600m radius to be evacuated (distance is liable to change based on final blast plan). Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).	2	2	3	1	8	2	16	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Continuous metering of vibrations and monthly recording as soon as blasting activities commence and as long as blasting is undertaken on site.	1. Ensure blasting impact radius is as small as possible and vibration events are kept as small as possible to reduce impact on surface structures. 2. Correlate any major vibration events at sensitive locations / structures with blasting activities at mine to determine if the mine carries responsibility regarding any damage to surface structures.	1. Social manager must ensure installation of seismometers 2. Social manager in conjunction with blast technician	1. Seismometers will be installed before blasting commences and be periodically maintained and calibrated as needed. 2. Continuous metering of vibrations and correlation to mine's blasting schedule.
Aspect: Land Use																										
All infrastructure areas, development footprints and associated activities	Change in land use to mining.	Construction Operational Decommission	Neg	3	1	2	3	9	5	45	N	-	Nature of mining activities. A change in land use rezoning to mining must be applied for with the municipality.	Rehabilitation will aim to replace soils in order to restore grazing land capability in order to reinstate current land uses post-mining.	3	1	2	3	9	5	45	Conditions stipulated in licenses/rights/permits.	Areas will be rehabilitated completely as soon as activity in those areas ceases and must be implemented throughout the life of mine. Soil quantity and quality will be maintained over rehabilitated areas to ensure adequate vegetative cover for grazing land use until	1. Ensure soil quality over rehabilitated areas is adequate for vegetation establishment. 2. Ensure soil is reapplied at appropriate topographical locations and appropriate depths to obtain grazing	1. Environmental manager will contract a soil specialist 2. Site manager with the contracting mine manager 3. Environmental manager 4.	1. Annual soil surveys until area are self-sustaining and stable. 3. Monthly inspection of rehabilitation to ensure correct sequence and handling of material replacement once steady-state mining is achieved until final void is rehabilitated. 3. Monthly visual

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																							rehabilitated areas are stable and self-sustaining.	land capability. 3. Ensure proper vegetative cover over rehabilitated ground. 4. Ensure that vegetation is establishing on rehabilitated areas and ensure the area is stabilising and self-sustaining in terms of vegetation communities.	Environmental manager will ensure that a flora specialist is contracted	inspection of vegetation establishment and germination over rehabilitated areas for the life of mine. 4. Annual floral surveys of rehabilitated areas for the life of mine.
Aspect: Traffic & Safety																										
Blasting	Danger of fly-rock to surrounding land users.	Operation	Neg	4	1	3	3	11	3	33	Y	-	MODIFY Alternative blasting methods will be considered to reduce outward impact. CONTROL Evacuate 600m radius prior to blasting and with stop traffic on roads within 600m radius. Blasting specialists must be contracted. Blasts methods used to reduce outward impact radius. Utilise free-digging as far as possible.	Severe impact must be contained to 500m radius; evacuation of 600m radius based on current blast design. Blasting will be compliant with the requirements of MHSA regulations pertaining to explosives (GNR584 of 2015).	2	1	3	3	9	3	27	Blasting will comply with MHSA and MPRDA Regulations. Conditions stipulated in licenses/rights/permits.	Responsible and qualified blast specialists will be utilised to conduct blasting on site throughout the life of mine. Evacuation procedure will be communicated and finalised with affected parties and implemented prior to each blast.	1. Roads must be inspected after blasts and cleared of any fly rock and any damage repaired in consultation with the roads department.	1. Social manager with the contracting mine manager	1. Inspection of roads for fly rock will be completed after every blast for as long as blasting is conducted on site.
Coal loading and conveyance on railway	Reduces need for trucks on roads and reduces traffic.	Construction Operational	Pos	5	2	3	1	11	5	55	N	-	None - positive impact.	-	5	2	3	1	11	5	55	Operate in terms of Transnet conditions.	-	-	-	-
Access and hauling along roads	Increased potential for road incidences. Road degradation.	Construction Decommission	Neg	5	2	1	5	13	3	39	Y	-	REMEDY Rail transport will be used. CONTROL Speed limits will be established on the dirt road. Drivers, contractors and visitors will enforce speed limits. Intersections with main tarred roads will be clearly signposted. Trucks will be in road-worthy condition with	High safety standards on site with reduced safety risks.	4	2	1	5	12	2	24	Operations will comply with MHSA and Regulations. Conditions stipulated in licenses/rights/permits. Vehicles will be serviced and maintained in road worthy	Internal roads and intersections with public roads will be maintained from the onset of construction throughout the life of mine Speed inspections will be undertaken sporadically on site throughout the life of mine to ensure contractors are obeying speed limits.	1. Maintain roads on site to reduce road incidences and that intersections with public roads are maintained with appropriate signage and are as safe as possible for other road users. 2. Ensure that on site speed limits are enforced to reduce dust generation and	1. Site manager 2. Site manager	1. Monthly inspections will be undertaken of all internal roads and intersections throughout the life of mine 2. Speed inspections will be undertaken sporadically on site throughout the life of mine.

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													reflective strips. A fund will be set aside to maintain the serviceability of the road verge where the trucks approach or depart from the main road.									condition.		road incidences.		
Aspect: Socio-economic, Health & Safety																										
All footprints & All activities	General health and safety - Air Quality.	Construction Operational Decommission	Neg	3	2	4	3	12	4	48	Y	-	Apply management measures for air quality	See Air Quality Aspect	2	2	4	1	9	3	27	See Air Quality Aspect	See Air Quality Aspect	See Air Quality Aspect	See Air Quality Aspect	See Air Quality Aspect
All footprints & All activities	General health and safety - Noise	Construction Operational Decommission	Neg	3	2	4	3	12	4	48	Y	-	Apply management measures for Noise & Nearby Structures (blast).	See Noise & Nearby Structures (blast) Aspects	2	2	4	1	9	3	27	See Noise & Nearby Structures (blast) Aspects	See Noise & Nearby Structures (blast) Aspects	See Noise & Nearby Structures (blast) Aspects	See Noise & Nearby Structures (blast) Aspects	See Noise & Nearby Structures (blast) Aspects
All footprints & All activities	Social ills - Disease	Construction Operational Decommission	Neg	4	4	5	5	18	3	54	Y	-	MODIFY Ensure workers have information available and sign a “code of conduct” at the start of employment which gives an overview of acceptable behaviour and information regarding health & safety on the site. CONTROL GCMC should appoint a service provider or local NGO to develop, implement and manage a “Health & Safety Orientation Programme” which must include information on HIV/AIDS, TB, and alcohol abuse prevention, with all temporary and permanent workers on the site. This must include encouragement to connect with local community programmes and NGO’s, health training and information which can be provided on-site to workers at the	Rights of people must not be infringed upon.	3	2	4	3	12	2	24	Comply with MHSA and MPRDA Regulations.	To be addressed in the Health & Safety Orientation Programme	To be addressed in the Health & Safety Orientation Programme	To be addressed in the Health & Safety Orientation Programme	To be addressed in the Health & Safety Orientation Programme

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													start of the project.													
All footprints & All activities	Proximity of mine to residential areas	Construction Operational	Neg	5	2	4	5	16	4	64	Y	-	Apply management measures for Nearby Structures (blast) REMEDY Should any of these activities prove ineffective, and in the case of scientifically proven health and safety risks, the last resort would be to negotiate resettlement with the affected residents. CONTROL GCMC to continuously engage with affected communities regarding mitigation practices.	See Nearby Structures (blast) Aspects	4	2	4	5	15	4	60	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects
All footprints & All activities	Property value	Construction Operational	Neg	4	2	4	5	15	4	60	N	-	Note that mitigation would not be possible in this instance. Should GCMC decide to negotiate a buyout of affected properties as part of a mining housing scheme, this concern would effectively be managed. This option has however not been raised by any of the parties involved and as such, no mitigation measures are presented. NOTE: This area has been targeted as a power generation / coal mining hub over the last 5 to 10 years. Furthermore property in South Africa has gone through severe fluctuations over the last 10 years. Lephalale's development plan report states that the property development exceeded requirements, which will negatively affect housing prices in the area. There are many factors that will play a role in overall property value.	Rights of people must not be infringed upon.	4	2	4	5	15	4	60	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects	See Nearby Structures (blast) Aspects

Activity	Impact	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Degree of loss of resource	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Responsible person	Frequency of monitoring & reporting
All footprints & All activities	Employment opportunities	Construction Operational Decommission	Pos	4	4	4	3	15	4	60	N	-	Implementing a “local first” recruitment policy. Ensure that the local jobs created are linked to a skills development programme for permanent employment.	Ensure that the principles underpinned by Black Economic Empowerment Act of 2003 is honoured.	4	4	4	3	15	4	60	Ensure that the principles underpinned by Black Economic Empowerment Act of 2003 is honoured. Conditions stipulated in S&LP	As per S&LP requirements	As per S&LP requirements	As per S&LP requirements	As per S&LP requirements
All footprints & All activities	Local / Regional business	Construction Operational Decommission	Pos	3	4	4	3	14	3	42	N	-	GCMC to adopt a preferential procurement policies towards local suppliers and distributors. Ensuring that principle of “local first” when procuring consumables, construction materials etc.	Ensure that the principles underpinned by Black Economic Empowerment Act of 2003 is honoured.	3	4	4	3	14	3	42	Ensure that the principles underpinned by Black Economic Empowerment Act of 2003 is honoured. Conditions stipulated in S&LP	As per S&LP requirements	As per S&LP requirements	As per S&LP requirements	As per S&LP requirements
All footprints & All activities	Sense of Place	Operation	Neg	4	3	4	3	14	4	56	Y	-	Apply management measures for visual aesthetics	See Visual Aesthetics Aspect	3	2	4	3	12	3	36	See Visual Aesthetics Aspect	See Visual Aesthetics Aspect	See Visual Aesthetics Aspect	See Visual Aesthetics Aspect	See Visual Aesthetics Aspect
All footprints & All activities	Impact on road infrastructure	Construction Operational Decommission	Neg	4	3	4	3	14	4	56	Y	-	MODIFY Preference should be given to rail transport where ever possible REMEDY Part of the construction phase needs to include the continuous maintenance of the road to be able to handle the increase in traffic and excessive dust and noise as a result of the gravel roads. CONTROL Limit traffic to roads indicated specifically for the project. Limit use of unimproved roads to emergency use only. Instruct and require all personnel and contractors to adhere to speed limits to ensure safe and efficient traffic flow. Limit mine-related	High safety standards on site and roads with reduced safety risks.	3	2	4	3	12	3	36	Operations will comply with MHSA and Regulations. Conditions stipulated in licenses/rights/permits. Vehicles will be serviced and maintained in road worthy condition.	Internal roads and intersections with public roads will be maintained from the onset of construction throughout the life of mine Speed inspections will be undertaken sporadically on site throughout the life of mine to ensure contractors are obeying speed limits.	1. Maintain roads on site to reduce road incidences and that intersections with public roads are maintained with appropriate signage and are as safe as possible for other road users. 2. Ensure that on site speed limits are enforced to reduce dust generation and road incidences.	1. Site manager 2. Site manager	1. Monthly inspections will be undertaken of all internal roads and intersections throughout the life of mine 2. Speed inspections will be undertaken sporadically on site throughout the life of mine.

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													vehicle traffic on public roadways to off-peak commuting times to minimize impacts on local commuters.														
All footprints & All activities	City development	Construction Operational Decommission	Neg	5	3	5	5	18	4	72	Y	-	No mitigation can be applied. See Section 7.4.1.1.14 of the EIA report for full detailed discussion of municipal development plans. Communication with LLM must continue.	-	5	3	5	5	18	4	72	-	-	-	-	-
All footprints & All activities	Matimba power station ACC's	Construction Operational Decommission	Neg	3	3	4	5	15	4	60	Y	-	Apply management measures for air quality	See Air Quality Aspect	2	2	4	3	11	3	33	See Air Quality Aspect	See Air Quality Aspect	See Air Quality Aspect	See Air Quality Aspect	See Air Quality Aspect
Aspect: Additional I&AP Issues not addressed in the above aspects																										
All footprints & All activities	Public perception	Construction Operational									Y	-	Impact cannot be assessed as some perceptions are positive and some are negative Ensure complaints register is established at mine entrances for I&APs to record their issues and check the register daily and take appropriate action in a timely manner. Ensure that the PPP includes stakeholders directly affected. Address impacts which have been determined to adversely affect, or cause a disproportionate effect on stakeholders, through appropriate measures, specific to the impact Develop and implement focused public information campaigns to provide technical and environmental health information directly to	At least biannual meetings must be scheduled with all I&APs.								Follow due process as stipulated in NEMA PPP guidelines	Complaints register will be established at the start of activities. From the onset of mining, meetings must be scheduled quarterly for the first year and thereafter at least biannually.	To provide a platform for I&APs to raise any issues.	Social Manager with Environmental manager	Complaints register will be checked daily and action taken in a timely manner. PPP meetings to be scheduled quarterly for the first year and then biannually.

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													most affected stakeholder groups or to local agencies and representative groups. Ensure that health & safety procedures are followed, monitored and communicated													