



Eyethu Coal

Kromdraai North Colliery

Final Environmental Impact Assessment and Environmental Management Programme

July 2016

Submitted as contemplated in Regulation 30, 31 and 32 of the Environmental Impact Assessment Regulations, 2010 (GNR 543 in Government Gazette 33306 of 18 June 2010)

For the application for Environmental Authorization in terms of the National Environmental Management Act, 1998 (Act No.107 of 1998)

DARDLEA Reference No.: 17/2/3N – 410

Executive Summary

Eyethu Coal (Pty) Limited has applied for a mining right (DMR Ref. MP 30/5/1/1/2/10022 MR) in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002). Eyethu Coal (Pty) Limited proposes to mine coal at Kromdraai North Colliery situated on portions 4, 5, 6 and 18 of the farm Kromdraai 263 IR, situated in the Magisterial District of Delmas (Mpumalanga Province). The application for the mining right has been submitted to the Department of Mineral Resources (DMR) and Eyethu Coal (Pty) Ltd awaits the decision by the DMR. For the above-mentioned application, relevant specialist studies were conducted to compile the Environmental Impact Assessment. Since the specialist studies were conducted for the proposed Kromdraai North Colliery, these studies were therefore used in the compilation of the Environmental Impact Report (EIR).

This document aims to address the activities to be undertaken at the proposed Kromdraai North Colliery. Kromdraai North Colliery is situated approximately 15 km northwest of Leslie/Leandra town, 25 km southeast of Delmas and 15 km south of Kendal. The proposed mining operation will consist of opencast mining activities that will make use of the sequential lateral rollover mining technique and underground mining activities that will make use of the bord and pillar mining technique. The target mineral at the proposed Kromdraai North Colliery is the No. 4 and No. 2 coal seams, which consist of approximately 7 million tons of Run of Mine (R.O.M) coal. The No. 4 seam will be mined using opencast mining methods and the No. 2 coal seam will be mined using underground mining methods.

The proposed mine surface infrastructure at the opencast section will include; a box-cut, a crushing and screening plant, topsoil stockpiles, overburden stockpiles, R.O.M stockpiles, product stockpiles, a weighbridge, a workshop/office complex, fuel storage facilities, access and haul roads, a pollution control dam and associated water management structures.

The proposed mine surface infrastructure at the underground section will include; an access adit, access/haul roads, topsoil stockpiles, R.O.M stockpiles, overburden stockpiles, a weighbridge, power supply facilities, workshop and office complex, equipment yard, fuel storage facilities, a pollution control dam and associated water management structures. The coal product will be transported and sold to Eskom and other markets.

The proposed mining activities at the Colliery will trigger the NEMA listed activities in terms of government notices R544 and R545.

The National Environmental Management Act, 1998 (Act 107 of 1998) requires that any person or entity that intends to undertake activities listed in government notices R544 and R545 must obtain an environmental authorisation in terms of section 24D of the National Environmental Management Act before undertaking such activities.

On evaluation of the proposed Kromdraai North Colliery mining activities, the following listed activities were identified i.e.

GN R544:

Activity 11: The construction of mine associated infrastructure such as pollution control dams (opencast and underground), softs stockpile (at the opencast area), topsoil stockpile (at the opencast area), underground access adit and a substation where such construction occurs within 32m of a temporary/seasonal wetland associated with the Kromdraaispruit.

Activity 22: The construction of access and haul roads where the road is wider than 8 metres, for the transportation of coal and overburden material within and around Kromdraai North Colliery.

GN R545:

Activity 5: The construction of mine associated infrastructure such as pollution control dams, overburden stockpiles, Run of Mine coal stockpiles, opencast pit, and underground access adit which requires a Water Use License in terms of the National Water Act (Act 36 of 1998).

Activity 15: The physical alteration of undeveloped land for the construction of mine related infrastructure where the total area to be transformed is more than 20 hectares.

Based on the above, an application for an environmental authorisation for the above listed activities was undertaken with the Department of Agriculture, Rural Development, Land & Environmental Affairs (eMalahleni Regional Office). The application and Scoping Report have been accepted by the Department of Agriculture, Rural Development, Land & Environmental Affairs (DARDLEA) and the Final EIA/EMP Report (this document) is thereby being submitted.

An application for an Integrated Water Use Licence was compiled in terms of section 41 of the National Water Act, 1998 (Act 36 of 1998) (NWA) and submitted the Department of Water and Sanitation regarding the additional water uses for the proposed mining areas.

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Appendix 5	Geohydrological Report for the proposed Kromdraai North Colliery
Appendix 6	Ground Vibration and Air Blast Study for the proposed Kromdraai North Colliery
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Appendix 9	Wetland Delineation and Assessment Report for the proposed Kromdraai North Colliery
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Appendix 13	Social and Labour plan for the proposed Kromdraai North Colliery

SECTION ONE

Introduction

1. INTRODUCTION

1.1 WHO IS DEVELOPING THE EIA/EMP REPORT?

EIA/EMP Report Compilation	:	Geovicon Environmental (Pty) Limited P.O. Box 4050 MIDDELBURG, 1050 Tel: (013) 243 0542 Fax: (086) 632 4936 Contact: Mr. O.T. Shakwane
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Geovicon Environmental (Pty) Limited has been appointed by Eyethu Coal (Pty) Ltd as the independent environmental consultant to compile this EIA/EMP Report and has no vested interest in the project.

Geovicon Environmental (Pty) Limited is a geological and environmental consulting company. The company was formed in 1996, and currently has nineteen years' experience in the geological and environmental consulting field. During the past eleven years, Geovicon Environmental (Pty) Limited has successfully completed consulting projects in the Mining sector (coal, gold, base metal and diamond), Quarrying sector (sand, aggregate and dimension stone), Industrial sector and housing sector. Geovicon Environmental (Pty) Limited has undertaken contracts within all the provinces of South Africa, Swaziland, Botswana and Zambia. During 2001 Geovicon Environmental (Pty) Limited entered the field of mine environmental management and water monitoring.

Geovicon Environmental (Pty) Limited is a Black Economically Empowered Company with the BEE component owning 60% of the company. Geovicon Environmental (Pty) Limited has three shareholders i.e. O.T. Shakwane, J.M. Bate and T.G. Tefu.

Mr. O.T. Shakwane obtained his BSc (Microbiology and Biochemistry) from the University of Durban Westville in 1994, and completed his honours degree in Microbiology in 1995.

Mr. T.G. Tefu is a geologist. He obtained his BSc. in Geology at the University of Witwatersrand. He worked with several mining companies and was also employed by the Department of Mineral Resources' Environmental Management directorate.

Mr. Bate, founder of Geovicon Environmental (Pty) Limited, is used by the company on an ad hoc (consultancy) basis. He is also a qualified geologist. He obtained his BSc (Geology) from the Potchefstroom University for CHE in 1993, and completed his honours degree (cum Laude) in geology in 1994. He obtained his MSc (cum Laude) in 1995.

Over the past years Geovicon Environmental (Pty) Limited has formalised working relationships with companies that offer expertise in the following fields i.e. Geohydrology, Civil and Geotechnical Engineering, Geotechnical Consultancy, Survey and Mine Planning and Soil & Land Use Consultancy.

1.2 WHO WILL EVALUATE THE EIA/EMP REPORT?

Before the proposed listed activities applied for can proceed, the environmental impacts that may result from the proposed project must be assessed.

In the spirit of co-operative governance, other commenting authorities will be consulted with. These include:

Department of Mineral Resources (DMR)

Mpumalanga Tourism and Parks Agency (MTPA)

Department of Water and Sanitation (DWS)

National Department of Agriculture, forestry and fisheries (NDA)

1.3 LEGAL REQUIREMENTS

The National Environmental Management Act, 107 of 1998 (NEMA) requires that a Scoping Report be conducted and that the Environmental Impact Assessment (EIA) be carried out for activities listed activities applied for under the Environmental Impact Assessment Regulations, 2010.

In addition to the NEMA, the following key legislation is also relevant to the EIA/EMP Report:

Minerals and Petroleum Resources Development Act (MPRDA), No. 28 of 2002

Environment Conservation Act (ECA), No. 73 of 1989

The National Environmental Management Waste Act (NEM: WA), No. 59 of 2008, as amended

The National Environmental Management: Protected Areas Act (NEM: PAA), No. 57 of 2003, as amended

The Mine Health and Safety Act (MHSA), No. 29 of 1996, as amended

The National Water Act (NWA), No. 36 of 1998, as amended

The National Environmental Management Biodiversity Act (NEMBA), No. 10 of 2004

The National Environmental Management Air Quality Act (NEM:AQA), No. 39 of 2004.

Relevant Provincial Legislation

Relevant Municipal by Laws

The Final EIA/EMP Report (this report) was finalised based on the comments received from interested and affected parties.

1.4 PURPOSE OF THE EIA/EMP REPORT

The Final EIA/EMP report addresses the requirements as contemplated in the Environmental Impact Assessment Regulations, 2010.

The aim of this EIA/EMP report is to:

- Provide information on the proposed project and present the findings of the EIA/EMP to the authorities.
- Provide information regarding alternatives that have been considered.
- Show how authorities and interested and affected parties were afforded the opportunity to contribute to the project, and to indicate the issues raised and the responses to those issues.
- Describe the baseline receiving environment.
- Describe the extent of environmental consequences for the construction and operating phases of the proposed project.
- Propose mitigation measures for impacts that are considered significant.
- Describe the environmental feasibility of the proposed project.
- Present findings in a manner that facilitates decision-making by the relevant authorities.

SECTION TWO

Project Background & Context

2. PROJECT BACKGROUND AND CONTEXT

2.1 OVERVIEW OF THE PROJECT

2.1.1 Name of the Applicant

Eyethu Coal (Pty) Limited

2.1.2 Name of the Proposed Project

Kromdraai North Colliery

2.1.3 Address of proposed Project

Portions 4, 5, 6 and 18 of the farm Kromdraai 263 IR, situated within the Magisterial District of Delmas, Mpumalanga Province.

2.1.4 Project Manager

Mr. Mike Elliot

2.1.5 Contact Person

Mr. Mike Elliot

Cell: 082 573 2793

2.2 LOCATION

Kromdraai North Colliery is situated on portions 4, 5, 6 and 18 of the farm Kromdraai 263 IR, situated within the Victor Khanye Local Municipality within the Nkangala District Municipality (Mpumalanga Province). Kromdraai North Colliery is situated approximately 15 km northwest of Leslie/Leandra town, 25 km southeast of Delmas and 15 km south of Kendal. Access to the mine will be via the Kendal – Leandra road. Refer to Figure 1 for the Regional Setting and Figure 2 for the Locality Plan of the proposed Kromdraai North Colliery.

2.2.1 Magisterial District & Regional Services Council

Magisterial: Delmas, Mpumalanga

District Municipality: Nkangala District Municipality

Local Municipality: Victor Khanye Local Municipality

2.2.2 Direction and Distance to Nearest Towns

Table 1: Direction and Distance to Nearest Towns.

Town	Direction	Distance (km)
Leslie/Leandra	Northwest	15 km
Delmas	Southeast	25 km
Kendal	South	15 km

2.2.3 Surface Infrastructure

The mining right area covers a vast area (approximately 690 hectares). Kromdraai North Colliery's proposed mining areas are located in an area where extensive agricultural activities are taking place. Surface infrastructure available on the area is limited to farming activities as compared to established towns. District roads (R 50, D 686 and D 2543), telephone lines and heavy duty Eskom power lines transect the mining area. Farmhouses and dams are scattered around the proposed mining area. Figure 3, Figure 4 and Figure 5 depicts the mining layout plan, opencast infrastructure plan and underground infrastructure plan consecutively for the proposed Kromdraai North Colliery.

2.2.4 Presence of Servitudes

Provincial roads and Eskom Power Lines are regarded as servitudes existing within the proposed mining area.

2.3 NAME OF RIVER CATCHMENTS

In terms of the Department of Water and Sanitation demarcations, the proposed Kromdraai North Colliery mining project area falls in the Olifants Water Management area. Within the water management area, the proposed mine falls within the Wilge River catchment area, which is demarcated as tertiary drainage region B20. Kromdraai North Colliery falls into quaternary drainage region B20E. Figure 6, depicts the location of the proposed mine in relation to the tertiary and quaternary drainage regions within the Wilge River catchment.

The Kromdraai catchment area drains towards the Kromdraaispruit which ultimately flows directly into the Wilge River (to the west of the mining area). The Wilge River eventually drains into the Olifants River upstream of the Loskop Dam.

2.4 NAME AND ADDRESS OF LAND OWNER & FARM DESCRIPTION

Table 2 indicates the immediate and adjacent surface owners of the proposed Kromdraai North Colliery. See Figure 7 for the land tenure plan for the proposed Kromdraai North Colliery.

Table 2: Description of immediate and adjacent landowners and their property

Farm name	Farm portion	Surface Owner
Kromdraai 263 IR	Portion 4*	P. J. Schutte
Kromdraai 263 IR	Portion 5*	D. J. O. Bezuidenhout
Kromdraai 263 IR	Portion 6*	D. J. O. Bezuidenhout
Kromdraai 263 IR	Portion 18*	D. J. O. Bezuidenhout
Kromdraai 263 IR	Portion 1	Jerrie & Johan cc
Kromdraai 263 IR	Portion 7	C. H. Boshoff Familie Trust
Kromdraai 263 IR	Portion 8	Retha Boshoff Boerdery cc
Kromdraai 263 IR	Portion 11	Jerrie & Johan cc
Kromdraai 263 IR	Portion 12	Springboklaagte Mining (Pty) LTD
Kromdraai 263 IR	Portion 13	D. J. O. Bezuidenhout
Strehla 261 IR	Portion 0	Ongewis Boerdery (Pty) Ltd
Strehla 261 IR	Portion 8	C. H. Boshoff Familie Trust
Strehla 261 IR	Portion 9	C. H. Boshoff Familie Trust
Darwina Louw 254 IR	Portion 0	L. N. Hoffman Beleggings (Pty) Ltd
Dieplaagte 262 IR	Portion 1	Jongspan Boerdery cc
Dieplaagte 262 IR	Portion 2	Jongspan Boerdery cc
Dieplaagte 262 IR	Portion 3	Hofflou Boerdery (Pty) Ltd
Dieplaagte 262 IR	Portion 4	L. N. Hoffman Beleggings (Pty) Ltd
Brakfontein 264 IR	Portion 5	Norwesco Investments (Pty) Ltd
Haverklip 265 IR	Portion 8	Norwesco Investments (Pty) Ltd
Existing powerlines servitude		Eskom

* Indicate farm portions on which the proposed Kromdraai North Colliery mining activities will be undertaken.

Table 3: Details of immediate and adjacent landowners

SURFACE RIGHT OWNERS	Contact Person	Contact number
P. J. Schutte	P. J. Schutte	082 524 8328
D. J. O. Bezuidenhout	D. J. O. Bezuidenhout	082 415 2292
Jerrie & Johan cc	J. B. Langenhoven	013 665 3519
C. H. Boshoff Familie Trust	J. Boshoff	082 388 0912
Retha Boshoff Boerdery cc	J. Boshoff	082 388 0912
Springboklaagte Mining (Pty) LTD	C. M. Ephron	011 772 0600
Ongewis Boerdery (Pty) Ltd	Louwtjie Hoffman	017 683 0160/ 0834540977
L. N. Hoffman Beleggings (Pty) Ltd	Louwtjie Hoffman	017 683 0160/ 0834540977
Jongspan Boerdery cc	B. J. van der Westhuizen	012 804 8290
Hofflou Boerdery (Pty) Ltd	Louwtjie Hoffman	017 683 0160/ 0834540977
Norwesco Investments (Pty) Ltd	Sunil Mungaroo	013 295 5926/ 079 495 4930
Eskom	Jan Coetzee	011 800 4591

2.5 BRIEF PROPOSED PROJECT OVERVIEW

Eyethu Coal (Pty) Limited has applied for a mining right (DMR Ref. MP 30/5/1/1/2/10022 MR) in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002). Eyethu Coal (Pty) Limited proposes to mine coal at Kromdraai North Colliery situated on portions 4, 5, 6 and 18 of the farm Kromdraai 263 IR, situated in the Magisterial District of Delmas (Mpumalanga Province). The application for the mining right has been submitted to the Department of Mineral Resources (DMR) and Eyethu Coal (Pty) Ltd awaits the decision by the DMR.

Kromdraai North Colliery is situated approximately 15 km northwest of Leslie/Leandra town, 25 km southeast of Delmas and 15 km south of Kendal. The proposed mining operation will consist of opencast mining activities that will make use of the sequential lateral rollover mining technique and underground mining activities that will make use of the bord and pillar mining technique. The target mineral at the proposed Kromdraai North Colliery is the No. 4 and No. 2 coal seams, which consist of approximately 7 million tons of Run of Mine (R.O.M) coal. The No. 4 seam will be mined using opencast mining methods and the No. 2 coal seam will be mined using underground mining methods.

The proposed mine surface infrastructure at the opencast section will include; a box-cut, a crushing and screening plant, topsoil stockpiles, overburden stockpiles, R.O.M stockpiles, product stockpiles, a weighbridge, a workshop/office complex, fuel storage facilities, access and haul roads, a pollution control dam and associated water management structures.

The proposed mine surface infrastructure at the underground section will include; an access adit, access/haul roads, topsoil stockpiles, R.O.M stockpiles, overburden stockpiles, a weighbridge, power supply facilities, workshop and office complex, equipment yard, fuel storage facilities, a pollution control dam and associated water management structures. The coal product will be transported and sold to Eskom and other markets.

2.5.1 NEMA Listed Activities in terms of Government Notice R544 – Listing Notice 1 of 2010

Activity 11: The construction of infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback.

The construction of mine associated infrastructure such as pollution control dams (opencast and underground), softs stockpile (at the opencast area), topsoil stockpile (at the opencast area), underground access adit and a substation where such construction occurs within 32m of a temporary/seasonal wetland associated with the Kromdraaispruit.

Activity 22: The construction of a road, outside urban areas, where no reserve exists where the road is wider than 8 metres.

The construction of access and haul roads where the road is wider than 8 metres, for the transportation of coal and overburden material within and around Kromdraai North Colliery.

2.5.2 NEMA Listed Activities in terms of Government Notice R545 – Listing Notice 2 of 2010

Activity 5: The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.

The construction of mine associated infrastructure such as pollution control dams, overburden stockpiles, R.O.M stockpiles, opencast pit, and underground access adit which requires a Water Use License in terms of the National Water Act (Act 36 of 1998).

Activity 15: Physical alteration of undeveloped vacant or derelict land for residential retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more.

The physical alteration of undeveloped land for the construction of mine related infrastructure where the total area to be transformed is more than 20 hectares.

See Figure 8, depicting the Listed Activities applied for in terms of Government Notice R544 and R454 of 2010.

SECTION THREE

Baseline Information

3. BASELINE INFORMATION

3.1 GEOLOGY

3.1.1 Regional Geology

The Kromdraai North Colliery mining area is situated in the Witbank Coalfield of the well-known Middle Ecca stage Coal Province. Several coal mines have been, or are operating within this coalfield. The Witbank coalfield extends from Springs in the west to Belfast in the east and from Middelburg in the north to Rietspruit in the south. The Witbank Coalfield includes the districts of Benoni, Nigel, Brakpan/Springs, Delmas, Dryden, Bronkhorstspuit, Kendal, Ogies, Witbank, Middelburg, Arnot and Belfast encompassing a surface area of approximately 568 000 ha. The Witbank Coalfield bounds the Highveld coalfield to the south, the South Rand coalfield to the southwest and the Ermelo coalfield to the southeast.

The coal seams of the Witbank coalfield are at a shallow depth, with the lowest seam seldom reaching 100 metres in the deepest lying parts of the field. Due to erosion of the sediments, all that remains of the Karoo System in this area is a portion from the lower part of the Middle Ecca Stage to the Dwyka tillite. Within the Witbank coalfield, the Karoo System unconformably overlays the Witwatersrand System, the Waterberg System and the Bushveld Igneous Complex.

The strata in which the coal seams (Middle Ecca Stage) occur consist predominantly of fine, medium and coarse-grained sandstone with subordinate mudstone, shale, siltstone and carbonaceous shale. Ideally there are seven coal seams with varying degrees of persistence numbered from below as No. 1, No. 2, No. 3, No. 4 lower, No. 4 upper, No. 4 A and No. 5 seams.

The layers of carbonaceous shale are usually confined to the beds between the No. 2 and No. 4 A Seams, with a glauconite sandstone marker present immediately above the No. 4 A Seam.

3.1.2 Local Geology

The target mineral at the Kromdraai North Colliery is the No. 4 and 2 coal seams, which consist of approximately 7 million R.O.M tons.

Boreholes drilled at the proposed opencast area intersected the No. 4 coal seam between 10.00 m and 28.34 m below surface. Most of the required infrastructure needed to undertake the proposed mining operation will be constructed within the mining area.

Boreholes drilled in the inferred underground area intersected the No. 2 coal seam between 45.90 m and 73.00 m below surface.

The No. 2 coal seam dips to the south-east. A number of boreholes were drilled that did not intersect the coal seam due to dolerite intrusions. The thickness of the No. 2 seam and depth below surface correlates in some boreholes. Continuity of the coal seam is therefore inferred considering the drilling information.

The No. 2 coal seam has a variable thickness of more than 2.3 m in the inferred underground coal resource area. The No. 2 coal seam is recognised by > 2 m roof shale in the hanging wall and speckled shale in the footwall. The average internal parting between the No. 2 seam and No. 4 lower coal seam is 29.4 m. Figure 9 depicts the generalised stratigraphic section of the proposed mining area.

3.2 CLIMATE

3.2.1 Regional Climate

The mean annual precipitation of the site is 669 mm. The mean annual evaporation of the site is 1677 mm (S-Pan). The Mpumalanga Highveld has distinct wet and dry seasons. 91% of the proposed Colliery's mean annual rainfall falls between October and April inclusively. 68% of the area's mean annual evaporation occurs in this period (Midgley *et al.*, 1990).

3.2.2 Mean Monthly Rainfall

The mean annual precipitation of the site is 669 mm. The mean annual evaporation of the site is 1677 mm (S-Pan). The monthly average rainfall, rainfall days, and evaporation are presented in Table 4.

Table 4: Mean monthly rainfall, rain days and evaporation data for the proposed Colliery

Month	Ave Rainfall (mm)	Ave rain days	Ave Evaporation (mm S-Pan)
October	69.1	6.1	180.8
November	105.5	9	170.6
December	118.5	8.9	187.8
January	113.8	9.2	184.5
February	87	6.6	153.8
March	78.3	6	151.8
April	39.6	3.7	116.7
May	17.1	1.8	98.3
June	7.7	0.8	79.8
July	5.4	0.5	87.4
August	7.6	0.8	115.7
September	19.8	1.8	149.9

3.2.3 Mean Monthly Maximum and Minimum Temperatures

No weather stations are located in close proximity to the proposed colliery. The closest weather stations are located in Witbank and Springs. Temperature data from the Springs weather station (Station number 0476762 A 3) was analysed and a summary of the data is presented in Table 5. The temperature data spanned 2001 to 2010.

Table 5: Mean monthly temperature data for 0476762 (Springs)

Month	Average daily minimum temperature (°C)	Average daily maximum temperature (°C)
January	15.2	26.5
February	14.5	26.3
March	12.3	25.0

April	8.8	23.2
May	3.7	20.8
June	1.1	18.4
July	-0.1	18.7
August	3.5	21.6
September	7.8	25.5
October	11.3	26.4
November	13.6	25.3
December	14.8	26.9

3.2.4 Wind Direction and Speed at the Project area

No data on the wind patterns is available for the proposed mining area. Owing to the location of the site, the gentle undulating topography and the non-existence of mountain ranges and ridges, no localised wind systems (topographically-induced) will be generated. Hence the wind patterns at the mine will conform to the regional wind patterns. The average wind speed and directions as recorded at the closest weather station are presented in Table 6.

Table 6: Average wind speeds and directions

Month	N		NE		E		SE		S		SW		W		NW	
	n	v	n	v	n	v	n	v	n	v	n	v	n	v	n	v
Jan	67	4.3	124	4.0	119	4.5	92	5.1	40	4.6	47	4.3	45	3.8	149	3.8
Feb	48	4.1	108	3.8	139	4.1	135	4.9	61	4.5	48	3.9	41	3.5	91	3.7
Mar	53	3.9	99	3.7	126	3.7	99	4.5	50	4.1	56	4.1	43	3.5	111	3.9
Apr	50	4.0	88	3.5	94	4.0	55	4.2	45	4.3	71	4.4	71	4.5	129	4.0
May	54	4.4	66	3.7	61	3.9	62	4.5	47	4.2	79	4.5	67	4.7	116	4.1
Jun	48	4.1	47	3.7	59	4.1	42	4.8	46	4.7	99	4.5	76	4.3	115	4.3
Jul	43	4.1	66	3.7	64	4.1	62	4.9	54	4.6	84	4.5	57	4.2	121	4.1
Aug	80	4.9	96	4.4	97	4.3	33	5.6	35	4.9	75	4.9	65	4.9	192	4.7
Sept	115	4.8	134	4.8	101	5.0	48	5.7	32	4.1	53	5.1	59	5.0	203	4.8
Oct	115	4.5	139	4.7	116	5.4	58	5.6	41	4.9	54	4.7	47	4.8	223	4.8
Nov	105	4.4	135	4.4	110	5.0	56	5.3	37	4.9	45	4.6	55	4.3	229	4.7
Dec	91	4.2	138	4.1	102	4.8	55	4.9	35	4.5	47	4.9	55	4.2	194	4.2
Avg	72	4.4	103	4.1	98	4.4	66	4.9	44	4.5	64	4.5	57	4.4	156	4.4

3.2.5 Extreme weather conditions

Thunderstorms occur frequently during summer (rainy season) and are usually accompanied by lightning, heavy rain, strong winds and occasional hail. Storms are localised and rainfall can vary markedly over short distances. An average of six hail incidents per annum can be expected at a particular site. Frost occurs in the winter months, peaking with an average occurrence of nine days in June.

3.3 TOPOGRAPHY

3.3.1 Local topography

The topography can normally be used as a good first approximation of the hydraulic gradient in an unconfined aquifer. This discussion will focus on the slope and direction of fall of the area under investigation and features that are important from a groundwater point of view. The area is characterised by a gentle undulating topography and in the area of the proposed mining area the slope is more or less in the order of 1:150 (0.01). Locally, drainage is towards the Kromdraaispruit that flows from east to west of the proposed mining area into the Kromdraai dam and J.C. Dam. The Dieplaagte dam is also located towards the northwest of the proposed mining activities as well as smaller unnamed farm dams being fed by smaller tributaries of the Kromdraaispruit. On a larger scale, drainage occurs from the northeast to the southwest.

3.3.2 Soils

Pedoplan International consultants were commissioned by Geovicon Environmental (Pty) Limited to conduct a soil-landform assessment (**see Appendix 1 for the soil-landform assessment report**). The purpose of the study was to supply soil-landform data (See Figure 11 for the soil landform types) and interpretations to inform an impact assessment process. The survey was conducted in accordance with standard procedures for detailed investigations. The objectives of the survey were as follows:

- To conduct a detailed assessment of the soils-landform resources, comprising identification, description, classification and mapping of the soil-terrain types and assessing their attributes relating to agricultural potential, the potential for other land uses, susceptibility to erosion and topsoil quality.
- To identify pre-mining land uses.
- To assess the land capability of soil, terrain and climate combinations.
- To identify and demarcate wetland zones from a soil-landform perspective.
- To assess the impact of opencast and underground coal mining on the soil-landform resources and propose mitigation measures.

3.3.2.1 Pre – mining Land Use

Currently, the land use includes cultivated fields, mostly under a maize-soya bean rotation, two centre pivot irrigated fields and large areas of grazing land (a few old lands included), that are utilised by cattle and sheep. Other categories include two sizeable farm dams, public roads and several quarries. The different land use categories are described in Table 7 and spatially shown in Figure 10.

Table 7: Description and extent of pre-mining land use categories

LAND USE CODE	PRE-MINING LAND USE	AREA (ha)	AREA (%)
CP-S	Centre pivot irrigation: soya beans	41.33	4.71
CP-M	Centre pivot irrigation: maize	30.17	3.44
CL	Cultivated land: maize and soya beans	311.09	35.43
A	Abandoned lands	38.07	4.34
G	Grazing: mainly cattle, some sheep; grass harvesting in places	381.96	43.49
FS	Farmstead with associated outbuildings	1.55	0.18
D	Farm dams	47.35	5.39
RR	Public roads	12.55	1.43
Q1, Q2	Quarry: construction materials	14.18	1.61
Total		878.25	100.0

3.3.2.2 Dominant soil forms

The project area forms part of the Highveld Plateau. In the survey area, the latter constitutes a remnant of an old, high altitude (1550 m above sea level), moderately undulating land surface, with pans in places. It is mainly underlain by coal bearing shale, sandstone and gritstone of the Vryheid formation. Outcrops of dolerite occur in certain places.

On a meso scale, the landforms comprise a higher-lying crestal area in the northern part of Portion 5 with midslopes on both sides of the main valley bottom and limited occurrences of footslopes adjoining the valley bottom. Local relief between valley bottom and crest (northern part) is about 40 m, whereas the southern parts are predominantly lower lying with more gently sloping midslopes and relief less than 20 m. Surface drainage is towards the Wilge River, a tributary of the Olifants River. (See Figure 11 and Table 10 for the distribution and description of terrain units.)

Individual profile descriptions are summarised in Table 8 while other selected properties and derived characteristics are shown in Table 9. A generalised description is also given in the soil-landform legend (Table 10).

The overall soil pattern is one of a plinthic catena – it represents the soil pattern of a large part of the Highveld Plateau. In this pattern, soil differentiation is in accordance with the concept of a drainage toposequence. The soils are:

- Several sites (crest and midslope) consist of deep to very deep, well-drained, mesotrophic, dark red apedal, sandy clay loam or clay loam of the **Hutton form** (map unit Hu1, extent 168 ha) underlain by either weathered (saprolite) or hard rock. A strongly sloping phase (unit hHu1, 33.3 ha) had also been differentiated. Cultivated lands belonging to this unit are appropriately contoured in accordance with soil conservation practices.

- In the extreme south-eastern section, one site composed of similar **Hutton form** soil, but with less clay throughout the profile than unit Hu1, was tentatively demarcated. It is anticipated that this deep, well-drained, Hutton 2100 sandy loam to sandy clay loam (unit Hu2, 4.0 ha) will probably extend towards the south.
- Two sites of limited extent in the northern section are covered by moderately deep, well-drained, mesotrophic, yellow-brown apedal, sandy clay loam overlying hard plinthite of the **Glencoe form** (unit Gc, 12.0 ha). In places the cementation of the hard plinthite appears to be weakened and degraded through natural weathering. In another instance (unit Q1), the hard plinthite was quarried probably for road construction materials.
- Moderately well-drained, mesotrophic, yellow-brown apedal, sandy clay loam solums on soft plinthic lower subsoils of the **Avalon form** (unit Av, 177.8 ha) mainly occupy the midslopes. In places the soft plinthic B2 horizon exhibits the features of degraded hard plinthite.
- On footslope sites, dark coloured, sandy clay loam topsoils on greyish, sandy clay loam to clay loam plinthic subsoils, with shallow effective depth, of the **Westleigh form** were mapped as unit We1(102.5 ha); similar soils in pan-like topography were mapped as unit We2 (1.8 ha).
- A depression on a gently to moderately sloping footslope is covered by poorly to very poorly drained, black, weakly structured, sandy clay loam topsoil with rusty root channels in places, over dark grey, gleyed, in places mottled, structured, clay loam subsoil of the **Katspruit form** (unit Ka, 7.4 ha). Certain parts displayed high water tables.
- The valley bottoms (unit Rg, 191.8 ha) and some lower footslopes are largely occupied by moderately deep to very deep, black, rusty streaked in places, strongly structured, clay-textured, vertic topsoils overlying gleyed, calcareous, clayey subsoils of the **Rensburg form**. Slight sheet and gully erosion as well as bank erosion of the well-defined channel were noted in places. In places the adjacent lower footslopes are occupied by a transitional belt of para-duplex soils of the **Sepane form** (34.5 ha) or **Arcadia form** (2.2 ha).
- Areas with rock outcrops and their slope phases were mapped as follows: (i) strongly sloping areas with <10% rock outcrops (mainly gritstone) in complex association with mainly shallow, red, brown or yellow, sandy loam to sandy clay loam of the Hutton, Mispah and Clovelly forms (unit R1; 36.9 ha); (ii) gently sloping areas with >10% rock outcrops (mainly gritstone) in complex association with lithosols (very shallow and stony soils) (unit R2; 11.7 ha), and (iii) strongly sloping area with >30% rock outcrops (mainly dolerite and gritstone) in complex association with lithosols (unit R3; 31.1 ha).

The leaching status of the loamy soils of the Hutton, Glencoe, and Avalon forms has been taken as mesotrophic. Furthermore, all the soils exhibit very acid soil reactions, while the fertility status is low (refer to Table 9 below).

Table 8: Characteristics and classification of dominant soils.

MAP SYMBOL	SOIL FORM AND FAMILY	GENERALISED PROFILE DESCRIPTION
Hu1	Hutton 2100 sandy clay loam	<i>Orthic A horizon</i> : 20-30 cm thick, reddish brown, massive, friable to firm, sandy clay loam or clay loam (clay content 25-30%); gradual transition to <i>Red apedal B horizon</i> : >100 cm thick, dark red, massive, friable to firm, apedal, sandy clay loam or clay loam (clay content 25-40%), merging into <i>C/R horizon</i> : weathered, mottled sandstone or hard sandstone
Hu2	Hutton 2100 sandy loam to sandy clay loam	<i>Orthic A horizon</i> : 20-30 cm thick, reddish brown, massive, friable, sandy loam to sandy clay loam (clay content 18-25%); gradual transition to <i>Red apedal B horizon</i> : >100 cm thick, red, massive, friable to firm, apedal, sandy clay loam (clay content 25-35%), merging into <i>C/R horizon</i> : weathered, mottled sandstone or hard sandstone
Gc	Glencoe 2100 sandy clay loam	<i>Orthic A horizon</i> : 20-30 cm thick, dark brown, massive, friable, sandy clay loam (clay content 20-25%); gradual transition to <i>Yellow-brown apedal B1 horizon</i> : 20-60 cm thick, yellow-brown, massive, friable to firm, sandy clay loam (20-28% clay); abruptly underlain by <i>Hard plinthic B horizon</i> (in places degraded ferricrete)
Av	Avalon 2100 sandy clay loam	<i>Orthic A horizon</i> : 20-30 cm thick, dark brown to dark grey brown, massive, friable to firm, sandy clay loam (clay content 20-27%); gradual transition to <i>Yellow-brown apedal B1 horizon</i> : 80-100 cm thick, yellow-brown, massive, friable to firm, sandy clay loam (clay content 25-30%); gradual to clear transition to <i>Soft plinthic B2 horizon</i> : >40 cm thick, variegated, mottled (many, medium/coarse, distinct, mainly yellowish), massive, firm, sandy clay loam (clay content 25-35%); in places forms part of degraded hard plinthite; merging into <i>C horizon</i> : highly weathered, mottled sandstone or shale
We1, We2	Westleigh 1000 sandy clay loam	<i>Orthic A horizon</i> : 30-40 cm thick, very dark greyish brown, massive to weakly structured, friable to firm, sandy clay loam (clay content 25-35%); clear transition to <i>Soft plinthic B horizon</i> : >50 cm thick, dark greyish brown, many distinct yellow mottles, weakly to moderately structured, firm, sandy clay loam to clay (clay content 30-45%)
Sw	Swartland 1211, 1121 sandy clay loam	<i>Orthic A horizon</i> : 20-30 cm thick, reddish or greyish brown, weak to moderate structured, firm, sandy clay loam (clay content 25-35%); clear transition to <i>Pedocutanic B horizon</i> : 20-50 cm thick, reddish or greyish brown, mottled in places, strongly structured, firm, sandy clay loam, clay loam or sandy clay (clay content 30-40%); tonguing transition to <i>C/R horizon</i> : weathered or hard dolerite
Se	Sepane 1212 sandy clay loam	<i>Orthic A horizon</i> : 20-30 cm thick, greyish or dark greyish brown with rusty streaking in places, moderately structured, firm, sandy clay loam (clay content 25-35%); clear transition to <i>Pedocutanic B1 horizon</i> : 30-60 cm thick, greyish brown or brown, mottled in places, strongly structured, firm, clay loam, sandy clay or clay (clay content 35-45%); gradual transition to <i>Pedocutanic B2 horizon</i> : greyish brown or grey, mottled, strongly structured, firm, clay loam, sandy clay or clay (clay content 35-44%) of unknown depth
Ar	Arcadia 1100 clay	<i>Vertic A horizon</i> : 60-100 cm thick, black or very dark grey, strong blocky, very firm, clay (clay content 45-60%); gradually grading into <i>C horizon</i> : weathered dolerite or shale
Ka	Katspruit 1000 clay loam to sandy clay loam	<i>Orthic A horizon</i> : 30-50 cm thick, very dark greyish to black, weakly to moderately structured, firm, clay loam to sandy clay loam (clay content 25-40%); gradual transition to <i>G horizon</i> : >50 cm thick, dark greyish to dark olive, prominently yellow mottled, weakly to moderately structured, firm, clay (clay content >40%); with high watertables in places
Rg	Rensburg 2000 clay	<i>Vertic A horizon</i> : 50-140 cm thick, black or very dark grey, rusty streaking in places, strong blocky, very firm, clay (clay content 45-60%), calcareous at depth, gradually grading into <i>G horizon</i> : >50 cm thick, grey or dark olive, strong blocky, very firm, calcareous clay (clay content >45%)

Table 9: Derived soil properties and interpretive information

SOIL PROPERTIES	Hutton1, 2	hHutton1	Glencoe	Avalon	Westleigh 1	Swartland	Arcadia	Sepane	Katspruit	Rensburg
Water seepage capacity of subsoil or underlying material	Rapid-Moderate	Rapid-Moderate	Rapid-Moderate	Moderate	Slow	Slow	Slow to rapid	Slow	Very slow	Very slow
Water table (position, condition and duration)	None	None	Hard plinthite, temporary, short periods after rain events	Deep subsoil, temporary, intermediate periods after rain events	Subsoil, temporary, intermediate periods after rain events	None	Generally none	Subsoil, temporary, intermediate periods after rain events	From surface, short to long periods during year	From surface, short to long periods during year
General fertility status	Low	Low	Low	Low	Low	Low-moderate	High	Moderate	Moderate	High
pH class (topsoil)	5.0-6.0	5.0-6.0	5.0-6.0	5.0-6.0	5.5-6.5	5.5-6.5	6.0-7.0	6.0-7.0	6.0-7.0	6.5-7.5
Natural erosion hazard - water	Low	Moderate	Low	Low	Low-moderate	Low	Low	Moderate	Moderate	Moderate
Swell-shrink potential of soil	Low	Low	Low	Low	Moderate in deep subsoil	Low to moderate	High	Moderate	Moderate-High	Very high
Compaction potential	Moderate-high	Moderate-high	Moderate	Moderate	Low	Moderate-low	Low	Moderate-low	Low	Low
Stability of soil	High	High	High	High	Moderate	Moderate	Moderate	Moderate-low	Moderate	Moderate-low
Adsorption capacity of pollutants	High	High	Moderate	High-Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Dust potential	Moderate-High	Moderate-High	Moderate-High	Moderate	Moderate	Moderate	Low	Moderate	Low	Low

Table 10: Soil-landform map units

MAP UNIT	LANDFORM COMPONENT	SOIL COMPONENT	AREA (ha)	AREA (%)
TERRESTRIAL SOILS				
Hu1	Gently to moderately sloping crest and midslopes (2-8% slope)	Deep to very deep (100->150 cm), well-drained, dark red or red, apedal, sandy clay loam to clay loam of the Hutton form underlain by weathered or hard rock or degraded ferricrete; common small hard Fe/Mn nodules present in places in deep subsoil; associated with Bainsvlei and Avalon forms	167.95	19.12
hHu1	Strongly sloping midslopes (8-15% slope)	As for Hu1, but sloping phase	33.34	3.80

Hu2	Gently sloping midslopes (2-5% slope)	Mainly deep (100-150 cm), well-drained, sandy loam to sandy clay loam topsoil on red, apedal, sandy clay loam subsoil of the Hutton form underlain by weathered or hard rock or degraded ferricrete; common small hard Fe/Mn nodules present in places in deep subsoil	3.95	0.45
Gc	Gently sloping midslopes (2-5% slope)	Moderately deep (50-80 cm), well-drained, yellow-brown, apedal, sandy clay loam on hard plinthite of the Glencoe form; common small hard Fe/Mn nodules present in subsoil; closely associated with moderately deep Avalon form	11.95	1.36
Av	Gently sloping midslopes (2-5% slope)	Mainly deep (depth to soft plinthite 100-130 cm), moderately well-drained, yellow-brown, apedal, sandy clay loam upper subsoil on soft plinthic lower subsoil of the Avalon form; in places with degraded hard plinthite lower subsoil over prominently mottled saprolite; associated with Bainsvlei form	177.77	20.27
Sw	Moderately sloping midslopes (5-8% slope)	Moderately deep (50-80 cm), para-duplex soil: red-brown weak or moderate blocky sandy clay loam topsoil, sharply underlain by well-drained, red-brown, moderate to strong blocky, sandy clay loam, clay loam or sandy clay subsoil of the Swartland form, tonguing into weathered or hard dolerite	1.92	0.22
Ar	Gently to moderately sloping midslopes or upper footslopes (4-8% slope)	Moderately deep or deep (70-120 cm), well or moderately well drained, black or very dark grey, strong blocky, vertic, clay of the Arcadia form, on weathered dolerite or shale	2.18	0.25
SOILS WITH WETLAND CHARACTERISTICS				
We1	Level to moderately sloping footslopes (1-8% slope)	Shallow (effective depth 30-40 cm), somewhat poorly drained, dark coloured, sandy clay loam topsoil on plinthic, sandy clay loam to clay loam subsoil of the Westleigh form; associated with Longlands, Kroonstad and Rensburg forms	102.49	11.67
We2	Level pan-like depressions (0-1% slope)	Shallow (effective depth 30-40 cm), somewhat poorly to poorly drained, dark coloured, sandy clay loam topsoil on plinthic, sandy clay loam to clay loam subsoil of the Westleigh form; associated with Rensburg form	1.84	0.21
Se	Gently sloping upper footslopes (2-5% slope)	Deep (effective depth 40-50 cm), somewhat poorly to poorly drained para-duplex soil: grey brown or grey, rust streaked, weak or moderate blocky sandy clay loam topsoil, sharply underlain by grey brown or grey, mottled at depth, moderate to strong blocky, sandy clay loam, clay loam or clay subsoil of unknown depth, of the Sepane form	34.52	3.94

Ka	Depression on gently to moderately sloping footslope (2-8% slope)	Moderately deep soil materials: poorly to very poorly drained, black, weakly structured, sandy clay loam topsoil with rusty root channels in places overlying dark grey, mottled/gleyed, clay loam subsoil of the Katspruit form; associated with Westleigh form	7.38	0.84
Rg	Level valley bottoms (0-2% slope) with distinct, narrow river channel and in places, some gently sloping (2-4% slope) lower footslopes	Deep soil materials: poorly to very poorly drained, black, structured, vertic, clay topsoil with rusty root channels in places overlying dark grey, gleyed, calcareous clay subsoil of the Rensburg form; associated with Longlands, Kroonstad and Westleigh forms; sheet and river bank erosion evident	191.80	21.85
LAND CLASSES				
R1	Strongly sloping areas with <10% rock outcrops (mainly gritstone) in complex association with mainly shallow, red, brown or yellow, sandy loam to sandy clay loam of the Hutton, Mispah and Clovelly forms; land surface slightly uneven to uneven		36.86	4.20
R2	Gently sloping areas with >10% rock outcrops (mainly gritstone) in complex association with lithosols; land surface slightly uneven to rough		11.69	1.34
R3	Strongly sloping area with >30% rock outcrops (mainly dolerite and gritstone) in complex association with lithosols; land surface uneven to very rough		31.08	3.54
Q1	Gently sloping areas with drastically disturbed sites probably quarried for construction materials		5.22	0.59
Q2	Strongly sloping areas with drastically disturbed sites probably quarried for construction materials		8.96	1.02
D	Farm dam		47.35	5.39
Total			878.25	100.0

3.3.2.3 Land Capability

Land capability refers to the general “basket” of agricultural or forestry land uses that a tract of land is capable of sustaining in a reasonably profitable manner without undergoing undue degradation. According to the guidelines for the classification of land, land capability subdivisions reflect four classes, viz. class I (wetland), class II (arable land) class III (grazing land), and class IV (wilderness land). For the proposed project area, these classes are shown in Figure 12 and explained in Table 11 below.

Table 11: Land Capability

LAND CAPABILITY MAP UNITS	LAND CAPABILITY	SOIL-LANDFORM MAP UNIT	AREA (ha)	AREA (%)
I-p	Class 1 – Wetland: permanent	Ka, Rg, D	246.53	28.08
I-t/s	Class I – Wetland: temporary/seasonal	We1, We2, Se	104.33	11.88
I-t	Class I – Wetland: temporary	Se	34.52	3.94
II-mh	Class II – Arable land: moderately high potential	Hu1, Hu2, Av	349.67	39.84
II-m	Class II – Arable land: moderate potential	hHu1, Gc	47.47	5.41
III	Class III – Grazing land	Sw, R1, R2, R3	81.55	9.30
IV	Class IV – Wilderness land	Q1, Q2	14.18	1.61
Total			878.25	100.0

3.3.2.4 Wetland Delineation based on soil-landform assessments

Based on the Soil-landform assessment report (Appendix 1), wetland zones were derived from soil types associated with wetlands and grouped according to wetland categories similar to the land capability classes. The wetland zones are described in Table 12 below.

Map units We1, We2 and Se display temporary or seasonal wetland conditions. Unit Ka displays properties in the form of mottles in the subsoil that may be taken as indicating a possible change in wetness regime. It is, however, still classified as a permanent wetland on the basis of the soil form. Likewise, the Rg map unit displays permanent wetland conditions. Most of the Rensburg soils represent a special case, however, in that the black topsoils, displaying no signs of wetness in the form of grey colours, are mostly very thick (100-140 cm). Map unit D (two man-made reservoirs) is classified as a permanent man-made wetland.

Table 12: Wetland zones and indicators

MAP UNIT	WETLAND ZONE	INDICATORS				
		TERRAIN UNIT AND SLOPE	SOIL			PRESENCE OF SURFACE WATER (at time of survey)
			Grey matrix colours within 50 cm	Mottles within 50 cm	Soil form	
We1	Temporary/Seasonal	Footslope: gently to moderately sloping	Moderately expressed from 30-40 cm	Many; rusty rootholes	Indicator of temporary or seasonal wetland	Not observed
We2	Temporary/Seasonal	Valley bottom (pan-like): level	Moderately expressed from 30-40 cm	Many; rusty rootholes	Indicator of temporary or seasonal wetland	Not observed
Se	Temporary	Footslope: gently to moderately sloping	Absent or weakly expressed	Present; rusty rootholes	Indicator of temporary wetland	Not observed
Ka	Permanent	Depression on footslope: gently to moderately sloping	Moderately expressed from 40 cm	Common; rusty rootholes	Indicator of permanent wetland	In isolated sites
Rg	Permanent	Level valley bottom plus gently sloping lower footslope edges	Present in G horizon with upper boundary at 40 cm or, more commonly, as deep as 100-140 cm	None; rusty rootholes in places	Indicator of permanent wetland	Only in river channel
D	Permanent: Man-made farm dam	-	-	-	No soil	Storage water

3.3.2.5 Present ecological status

Although wetland habitat integrity goes very much beyond that which can be observed during soil surveys, certain indicators are given in Table 13 below. The different categories used to assess the Present Ecological Status of the identified wetlands is described in Table 14.

Table 13: Present ecological status of wetlands

MAP UNIT	PRESENT ECOLOGICAL STATUS
D	Category A: no discernible degradation
Ka	Category B: in places due to slight gully erosion
Rg	Category C: due to incision of river channel; slight gully, surface and river bank erosion; constructed dams; public roads and bridges
We1	Category C: due to cultivation in places, weeds
We2	Category C: due to cultivation in places, weeds
Se	Category C: due to past cultivation in places, weeds

Table 14: Present Ecological Status categories

Category	Description
A	Unmodified or approximates natural conditions
B	Largely natural with a few modifications
C	Moderately modified, with some loss of natural habitats
D	Largely modified, a large loss of natural habitats and basic ecosystem functions
E	Seriously modified, extensive loss of habitats and ecosystem functions
F	Critically modified, the modifications have resulted in almost complete loss of habitat

3.4 NATURAL VEGETATION / PLANT LIFE

The proposed Kromdraai North Colliery area is situated in the Grassland Biome (Rutherford, 1988). Mucina and Rutherford (2006) classify Kromdraai North Colliery within the Eastern Highveld Grassland vegetation unit (Gm 12) of the grassland biome.

The vegetation in the opencast/underground and infrastructure areas consists mainly of maize (mono-crop cultivation). This is also indicated on the 1:50 000 topo - cadastral maps. Some natural vegetation exists north-east of the opencast infrastructure area. The grassland area south-east of the underground mining area (where a pivot irrigation system is situated), is a cultivated pasture area where some natural vegetation is established. These two grasslands areas are dominated by *Eragrostis curvula* (Weeping love grass). Eight additional grass species were found in these areas. Only a few herbaceous forb (plant) species were observed in the grassland areas.

Approximately twenty two plant species were observed in these grassland areas. Biodiversity is thus not very high due to maize cultivation on a large scale. Sedge and rush species that may occur in grasslands and wetland areas were observed. A few exotic plant species do occur in the area as well.

According to the amended regulations in the Conservation of Agricultural Resources Act (no 43 of 1983), two (2) declared invader species are established in the grassland areas viz. Scottish thistle and Pampas grass.

According to the National red list of South African Plants: February 2009, no threatened plant species were encountered in the grassland areas. One medicinal plant species was observed in the grassland areas viz. Milkweed. Milkweed is widespread in the Highveld region.

Vegetation north-east of both mining areas indicates moist conditions since the Kromdraaispruit is situated in this direction. Some grass species observed in these areas may prefer damp conditions. The sedges encountered here can also occur in drier grassland areas. **See Appendix 2, Fauna and Flora Report for the proposed Colliery.**

3.5 SURFACE WATER

Geovicon Environmental (Pty) Limited commissioned iLanda Water Services cc to conduct a Surface Water Study for the proposed Kromdraai North Colliery. This report details the results of the study, as well as recommendations coming from the work conducted. **See Appendix 3, the Hydrological Report.**

3.5.1 Catchment Delineation

The Kromdraaispruit runs through the mine lease area. It enters the mine lease area from east, turns south before turning northwards and exiting the site near the north-western corner of the mine lease area. The catchment of the Kromdraaispruit was delineated using the Surveyor General's 5 m contour data. These catchment boundaries are shown in Figure 13. The Kromdraaispruit catchment area where it leaves the mine lease area measures 87.4 km².

3.5.2 Mean Annual Runoff

The mean annual runoff for the Kromdraaispruit is 2.7 Mm³ where it exits the mine lease area. The mean annual runoff for the quaternary catchment B20E is 19.28 Mm³ (Middleton and Bailey, 2009). The catchment characteristics of the Kromdraaispruit catchment are similar to those of the quaternary catchment, thus the mean annual runoff was scaled from the quaternary catchment runoff, based on the relative catchment size.

3.5.3 River Diversions

No river diversions are planned for the activities covered by this EIA/EMP Report.

3.5.4 Water Authority

In terms of the Department of Water and Sanitation demarcations, the proposed Kromdraai North Colliery mining project area falls in the Olifants Water Management area. The authority in charge is the Department of Water and Sanitation (Mpumalanga Regional Office).

3.5.5 Stream Health

Stream bio-monitoring is the monitoring of organisms that can be seen with the naked eye (macro-invertebrates) that live in different water habitats. These organisms are seen as water users. Macro-invertebrate taxa have specific ranges of tolerance to water quality variables and/or water pollutants, thus the presence or absence of a specific taxon or group of taxa is indicative of the health state of the stream and its ability to support aquatic life. Macro-invertebrates are further good indicators of synergistic effects, and have the added advantage of being relatively tolerant to chemical spikes.

A macro-invertebrate survey was thus conducted during September 2012 in the Kromdraaispruit, south-east of the proposed underground mining area and north-west of the proposed opencast and infrastructure areas.

The primary objective of this survey is to assess the health of the receiving water body system in the vicinity of the Kromdraai Colliery proposed underground as well as opencast mining and infrastructure areas.

Two bio-monitoring sampling sites were selected within this water body system viz. SASS KDS 1 (Upstream) and SASS KDS 5 (Downstream) of the proposed mining and infrastructure areas.

SASS KDS 1 (Upstream) contained taxa that have a very low tolerance to pollution as well as taxa that are moderately and highly tolerant to pollution. SASS KDS 5 (Downstream) contained taxa that are moderately and highly tolerant to pollution. This indicates that the water body system is not pristine but still in a good condition. The area is utilised for livestock watering, thus animal dung in the water may be a limiting factor. Maize fields also occur extensively in the area, thus chemicals from fertilisers may be a limiting factor as well.

The SASS scores and ASPT values of the sampling sites indicate that the receiving water body system is somewhat impacted on. The upstream point is in a slightly better health state than the downstream point, probably due to the large dam (Kromdraai dam) as well as a small village (Lionelton) situated upstream of this point. According to the SASS 5 evaluation, the health of the Kromdraaispruit in the vicinity of the proposed Kromdraai Colliery is still in a good condition. Most streams on the highveld indicate some deterioration in water quality. The closure objective for macro-invertebrates as water users is that the deterioration that already exist must not be worsened by mining activities, resulting in the disappearance of taxa sensitive to pollution. **See Appendix 4, for the Stream Health Report.**

3.6 GROUNDWATER

Geo Pollution Technologies – Gauteng (Pty) Ltd (GPT) was appointed by Geovicon Environmental (Pty) Ltd to conduct a hydrogeological impact study for the proposed Kromdraai North Colliery. This Geohydrological study aims to establish the prevailing groundwater conditions at the site and thus provide background conditions against which impacts of mining activities will be monitored:

- Identify impacts of mining activities on groundwater resources (existing & future).
- Develop mitigation plans for the identified impacts.
- Develop a monitoring network of boreholes to monitor the mine's potential impacts.

The outcome of the study is attached as Appendix 5 (Geohydrological Report).

3.6.1 Hydrocensus

A hydrocensus was conducted for the Kromdraai Coal Colliery mining site and in the surrounding area, during July 2012. The position of all the boreholes relative to the mining area can be seen in Figure 14. A total of 18 boreholes and 4 surface water bodies and streams were identified during this hydrocensus study. The main characteristics of this data are summarized in Table 15 and Table 16 below. The area is primarily utilized for grazing of large livestock and horses.

The potential groundwater receptors in the area are the surface water points and it is important that these are included in the monitoring network.

Table 15: Groundwater Hydrocensus and Borehole Information

Sample ID	Latitude	Longitude	Owner	Property	Static water level (mbgl)	Use	Comments
BH1	-26.21308	28.9021	H.N. Hoffman	Dieplaagte 262 IR	22.9	Not in use	
BH2	-26.21308	28.9021	H.N. Hoffman	Dieplaagte 262 IR	No access	Domestic, garden	Supplies water to closeby community, 1 x 2000 l tank is filled.
BH3	-26.21596	28.89993	H.N. Hoffman	Dieplaagte 262 IR	10.2	Not in use	
BH4	-26.2159	28.8997	H.N. Hoffman	Dieplaagte 262 IR	No access	Not in use	
BH5	-26.24312	28.91777	J.C.C. Kruger	Kromdraai 263 IR	No access	Domestic, garden	1 x 2000 l tank is filled.
BH6	-26.25182	28.94587	D. Bezanword	Kromdraai 263 IR	No access	Irrigation, livestock, domestic	Water to Kromdraai community, 5 x 2000 l tanks are filled.
BH7	-26.20752	28.92141	H.N. Hoffman	Strehla 261 IR	12.6	Irrigation, domestic	Supplies water to the community of Strehla.
BH8	-26.22173	28.93672	Unknown	Strehla 261 IR	No access	Unknown	Water is pumped to reservoir.
BH9	-26.22036	28.93672	Unknown	Strehla 261 IR	4.1	Not in use	
BH10	-26.23054	28.90663	A.Bezuidenhout	Kromdraai 263 IR	No access	Irrigation, livestock, domestic	BH 10 and BH 11 pumps water to the same tank. These boreholes also supplies water to the surrounding land users.
BH11	-26.23079	28.9065	A.Bezuidenhout	Kromdraai 263 IR	No access	Irrigation, livestock, domestic	
BH12	-26.23823	28.87638	J.L.C. van Dyk	Haverklip 265 IR	7.42	Irrigation, livestock, domestic	
BH13	-26.23168	28.87272	Unknown	Brakfontein 264 IR	Dry	Not in use	
BH14	-26.23061	28.87307	Unknown	Brakfontein 264 IR	50.52	Not in use	
BH15	-26.2226	28.87326	Unknown	Brakfontein 264 IR	4.07	Not in use	
BH16	-26.22218	28.87379	Unknown	Brakfontein 264 IR	Bees	Not in use	
BH17	-26.27217	28.92256	W. Hosterhuis	Springboklaagte 306 IR	No access	Livestock and Domestic	2 x 5000L tanks are filled.
BH18	-26.21505	28.86205	J.H. Senide	Brakfontein 264 IR	41.61	Domestic, garden	2 x 5000L tanks are filled.
WS1	-26.22163	28.87508	Unknown	Brakfontein 264 IR	N/A	Unknown	
Dam 1	-26.21611	28.89387	Unknown	Dieplaagte 262 IR	N/A	Unknown	
Dam 2	-26.20871	28.92152	Unknown	Strehla 261 IR	N/A	Livestock, poultry	
J.C. Dam 3	-26.23153	28.91146	Unknown	Kromdraai 263 IR	N/A	Unknown	Water is pumped from the dam.

Table 16: Results of Major Cation and Anion Analyses

Sample Nr.	BH1	BH2	BH3	BH5	BH6	BH7	BH8	BH9	BH10/11	BH12	BH14	BH15	WS1	DAM1	DAM2	DAM3	Class 0 (ideal)	Class I (acceptable)	Class II (maximum)
Ca	28.40	29.80	20.50	66.10	56.40	36.20	17.20	42.50	37.50	26.50	3.92	50.20	58.00	31.10	30.60	27.40	< 80	80 - 150	150 - 300
Mg	13.20	14.60	11.30	36.10	22.50	16.60	9.71	22.30	22.60	14.20	2.86	22.20	45.10	24.30	36.20	19.80	< 30	30 - 70	70 - 100
Na	30.00	17.60	13.40	44.20	34.30	92.90	88.90	42.90	16.00	13.50	24.50	20.60	59.30	36.30	80.90	33.20	< 100	100 - 200	200 - 400
K	4.41	5.06	4.38	1.99	4.88	3.14	3.50	4.18	5.18	1.39	1.80	1.66	4.26	7.91	13.30	6.93	< 25	25 - 50	50 - 100
Mn	0.02	0.09	0.02	0.05	0.00	0.06	0.00	0.14	0.06	0.02	0.48	0.06	0.00	0.02	0.55	0.01	< 0.1	0.1 - 1.0	1.0 - 2.0
Fe	0.02	0.02	0.00	0.01	0.00	0.19	0.12	1.08	0.00	0.04	0.65	0.05	0.02	0.16	0.41	0.28	< 0.1	0.1 - 0.2	0.2 - 2
F	0.37	0.00	0.00	0.31	0.00	0.78	1.43	0.00	0.00	0.00	0.35	0.00	0.44	0.51	1.05	0.51	< 1.0	1.0 - 1.5	1.5 - 3.5
NO ₃	0.13	0.99	9.74	0.66	2.84	0.00	0.00	0.00	21.50	14.00	0.00	3.14	0.00	0.00	0.00	0.00	< 25	25 - 44	44 - 88
Al	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.04	0.19	0.34	0.39	< 0.15	0.15 - 0.5	-
HCO ₃	164.50	129.21	85.31	354.62	255.69	357.35	288.50	185.28	147.27	69.47	69.38	198.48	330.92	227.84	297.45	207.07	-	-	-
Cl	11.00	9.40	11.00	56.00	26.00	31.00	15.00	96.00	9.00	24.00	6.70	14.00	27.00	20.00	65.00	16.00	< 100	100 - 200	200 - 600
SO ₄	36.30	52.00	11.00	27.10	57.10	30.30	8.31	11.50	16.60	7.27	21.70	56.30	125.00	41.80	46.50	32.20	< 200	200 - 400	400 - 600
TDS by sum	224.00	212.00	172.00	426.00	358.00	448.00	312.00	326.00	292.00	210.00	116.00	306.00	506.00	302.00	486.00	254.00	< 450	450 - 1000	1000 - 2400
M-Alk(CaCO ₃)	135.00	106.00	70.00	292.00	210.00	294.00	244.00	152.00	121.00	57.00	57.00	163.00	273.00	188.00	246.00	172.00	-	-	-
pH	7.09	6.93	7.02	7.68	7.32	7.59	8.52	6.96	7.38	6.98	7.35	7.30	7.83	7.84	7.97	8.14	6.0 - 9.0	5.0 - 9.5	4.0 - 10.0
EC	34.30	32.60	26.30	70.80	54.90	64.40	47.70	56.70	42.90	30.70	14.00	46.00	77.40	46.10	72.60	39.10	70	70 - 150	150 - 370
Ca/Alk Bal. %	1.67	0.70	0.26	1.22	-0.33	-0.81	0.63	0.04	0.07	2.43	-4.16	2.17	2.50	1.35	4.12	0.96	-	-	-

Notes:

Class 0: Ideal quality

Class I: Target quality

Class II: Moderate effects

Exceeding maximum allowable concentration - adverse effects

na- not analysed

All concentrations are presented in mg/l, EC is presented in mS/m

0 = below detection limit of analytical technique

3.6.2 Groundwater levels

Groundwater levels, varying between 4 m and 51 m below ground level, were measured in the surrounding area during the survey. These values were determined from borehole data where the owner was available on site and where it was possible to gain access to the boreholes for precise measuring of water levels.

Usually a good relationship should hold between topography and static groundwater level. This relationship can be used to distinguish between boreholes with water levels at rest, and boreholes with anomalous groundwater levels due to disturbances such as pumping or local geohydrological heterogeneities. The relationship using the boreholes with realistic static water levels from the hydrocensus is shown in Figure 15. This figure shows the relationship between water level and topography and a good correlation can be observed. This general relationship is useful to make a quick calculation of expected groundwater levels at selected elevations, or to calculate the depth to the groundwater level (unsaturated zone):

$$\text{Groundwater level} = \text{Elevation} \times 0.09186$$

$$\text{Depth to the groundwater level} = \text{Elevation} \times (1 - 0.9186)$$

$$= \text{Elevation} \times 0.0814$$

However, due to the heterogeneity of the subsurface, these relationships should not be expected to hold everywhere under all circumstances, and deviations could thus be expected. The calibrated static water levels as modelled have been contoured and are displayed in Figure 16. Groundwater flow direction should be perpendicular to these contours and inversely proportional to the distance between contours. Using this relationship, the inferred groundwater flow directions are depicted as Figure 17. As can be expected, the groundwater flow is mainly from topographical high to low areas, eventually draining to local streams.

3.6.3 Water Quality

Sixteen (16) water samples were collected from hydrocensus boreholes, streams and open pits around the site during the investigation. The samples were submitted for major cation and anion analyses to determine water quality in the area, see Table 16 above for the results of analysis. The groundwater results are compared with the maximum recommended concentrations for domestic use. The DWS guidelines are classified as:

- Class 0 which is ideal concentrations
- Class I which is considered as acceptable
- Class II which stipulates the maximum allowable concentration of the water constituent, which can be tolerated only for a limited period.

The results from these analyses were plotted as Pie diagrams (Figure 18), Stiff diagrams (Figure 19) and a piper diagram (Figure 20).

The pie diagrams show both the individual ions present in a water sample and the total ion concentrations in meq/L or mg/L. The scale for the radius of the circle represents the total ion concentrations, while the

subdivisions represent the individual ions. It is very useful in making quick comparisons between waters from different sources and presents the data in a convenient manner for visual inspection.

A Stiff pattern is basically a polygon created from four horizontal axes using the equivalent charge concentrations (meq/L) of cations and anions. The cations are plotted on the left of the vertical zero axis and the anions are plotted on the right. Stiff diagrams are very useful in making quick comparisons between waters from different sources.

On the piper diagram the cation and anion compositions of many samples can be represented on a single graph. Certain trends in the data can be discerned more visually, because the nature of a given sample is not only shown graphically, but also show the relationship to other samples. The relative concentrations of the major ions in mg/L are plotted on cation and anion triangles, and then the locations are projected to a point on a quadrilateral representing both cation and anions.

From the chemical analyses results the following can be confirmed regarding the water quality in the vicinity of the proposed mining area under investigation:

In general the current water quality is good. It was found that the sulphate concentrations are within the ideal quality water range for all the samples, even though it makes up a major proportion of the major cations and anions (Figure 18). The pH measured was neutral between 6.0 and 9.0 for all the samples.

From Figure 19 it can be seen that water in the area has a very similar signature namely Ca-Mg/HCO₃. Where cation exchange reactions have taken place Na is more prominent as it replaces Ca and Mg. In the vicinity of mining activity the water type varies to include SO₄ namely Ca-Mg/HCO₃- SO₄.

Most samples plot in the left quadrant of the piper diagram as an indication of fresh groundwater and surface water that has not been impacted on by human activity. Boreholes BH7, BH8 and BH14 plot in the bottom quadrant as an indication of ion exchange.

Surface water was sampled at four locations during July 2011. Water samples were taken at Kromdraai Dam (DAM1), a dam on the farm Strehla 261 IR (DAM2), JC Dam (DAM3) and the Wilge River (WS1).

The water quality of all surface water samples analysed is good. Sulphate is probably the most reliable indicator of pollution emanating from coal mining, because sulphates could be discharged from acid mine wastes. It was found that none of the water samples analysed contained sulphate concentrations exceeding the maximum allowable standard for domestic use.

According to the DWS Guidelines for Drinking Water, high concentrations of sulphate exert predominantly acute health effects. Sulphate also imparts a salty or bitter taste to water. The taste threshold for sulphate falls in the range of 200 – 400mg/L. Above 400mg/L diarrhoea can occur in most individuals and user-adaptation does not occur. It is also important to note that adverse chronic effects may occur in livestock if sulphate levels exceed 1000mg/L, such as diarrhoea and poor productivity.

From the above chemical analysis it can be deduced that both the groundwater and surface water have not been negatively affected by mining related contaminants at the time of the investigation.

3.6.4 Potential Contaminants

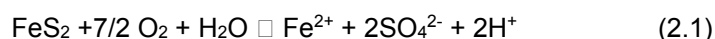
The potential contaminants associated with the mining activities may emanate from the Colliery's mining area, crushing and screening plant area, product stockpile, and pollution control dam (PCD) and R.O.M. coal area.

Workshops and fuel and oil handling facilities are likely sources of hydrocarbon related contaminants. Oils, grease and other hydrocarbon products (such as petrol and diesel) handled in these areas may contaminate the environment by spillages and leakages. Oils and greases are removed and collected in oil traps. Run-off (contained with hydrocarbons) which is not collected may enter the storm water system from where it may contaminate surface water bodies and groundwater. Septic tanks and sewage treatment plants potentially contaminate groundwater. Contaminants associated with these plants include coliforms (e.g. E.coli), bacteria viruses, ammonia, phosphate, sulphate and nitrate. Effluent from these systems usually contains elevated concentrations of organic matter which may lead to elevated COD and BOD. Waste disposal areas may source a wide range of contaminants, ranging from metals, organic matter, hydrocarbons, phosphates, etc.

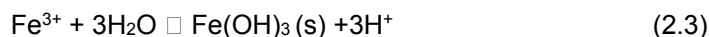
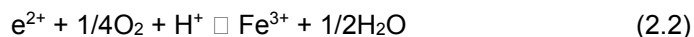
Sulphate is probably the most reliable indicator of pollution emanating from coal mining. Sulphate concentrations can however increase due to mobilisation during the mining process. The chemistry analyses supplied within this report should henceforth serve as baseline water quality throughout the life of the proposed mining operations. The following few paragraphs contains a brief overview of acid mine drainage (AMD) formation.

The reactions of acid and sulphate generation from sulphide minerals are discussed according to the three stage stoichiometric example of pyrite oxidation after James, (1997) and (Ferguson & Erickson, 1988) in which one mole of pyrite oxidized forms two moles of sulphate:

Reaction (2.1) represents the oxidation of pyrite to form dissolved ferrous iron, sulphate and hydrogen. This reaction can occur abiotically or can be bacterially catalysed by *Thiobacillus ferrooxidans*.



The ferrous iron, (Fe^{2+}) may be oxidised to ferric iron, (Fe^{3+}) if the conditions are sufficiently oxidising, as illustrated by reaction (2.2). Hydrolysis and precipitation of Fe^{3+} may also occur, shown by reaction (2.3). Reactions (2.1), (2.2) and (2.3) predominate at $\text{pH} > 4.5$.



Reactions (2.1) to (2.3) are relatively slow and represent the initial stage in the three-stage AMD formation process. Stage 1 will persist as long as the pH surrounding the waste particles is only moderately acidic ($\text{pH} > 4.5$). A transitional stage 2 occurs as the pH decreases and the rate of Fe hydrolyses (reaction 2.3) slows, providing ferric iron oxidant. Stage 3 consists of rapid acid production by the ferric iron oxidant pathway and becomes dominant at low pH, where the Fe^{2+} (ferric iron) are more soluble (reaction 4):



Without the catalytic influence of the bacteria, the rate of ferrous iron oxidation in an acid medium would be too slow to provide significant AMD generation. As such the final stage in the AMD generation process occurs when the catalytic bacteria *Thiobacillus ferrooxidans* have become established. Reactions (2.2) and (2.4) then combine to form the cyclic, rapid oxidation pathway mainly responsible for the high contamination loads observed in mining environments.

According to the SANS Guidelines for Drinking Water, high concentrations of sulphate exert predominantly acute health effects. Sulphate also imparts a salty or bitter taste to water. The taste threshold for sulphate falls in the range of 200 – 400mg/L. Above 400mg/L diarrhoea occurs in most individuals and user-adaptation does not occur. It is also important to note that adverse chronic effects may occur in livestock if sulphate levels exceed 1000mg/L, such as diarrhoea and poor productivity. This contaminated water will eventually seep into the new colliery areas. This potential situation should be managed during mining in order to minimise the impact on water resources.

3.7 AIR QUALITY

Opencast mining and related activities have a potential to impact on the air quality of its surrounding area. Potentially air pollution may arise as a result of particulates entering the atmosphere. These particulates arise as dust from earth movement, blasting, and material movement on haul roads and other gravel roads and overburden stockpiles. The proposed Kromdraai North Colliery is situated within the Kendal area. This area is dominated by mining (opencast/underground mines), agricultural practices, industries and residential areas. These activities have potential to generate particulates that may cause air pollution.

The presence of Power Stations in the region is the main source of airborne pollutants, releasing ash, CO, CO₂, SO₂ and NO_x gases as a result of burning of carbonaceous materials. Household fuel burning will contribute to emissions, although this impact will occur mainly during winter periods.

Visual observation of the Kromdraai North Colliery area and surrounds indicated that the impacts of settleable dust within a 3 km radius of the Colliery could be described as minimal and minor, since dust will gravimetrically settle within 500 m of the dust source. Generally, dust fallout will be well within the SLIGHT to MODERATE ranges (Table 17) outside of this 300 m area, with dust fallout in close proximity to these sources well within the HIGH to VERY HIGH ranges.

Table 17: Dust Fallout Guidelines

Description	RANGE
SLIGHT	<250 mg/m ² /day
MODERATE	251 – 500 mg/m ² /day
HIGH	>501 – 1200 mg/m ² /day
VERY HIGH	>1200 mg/m ² /day

3.8 NOISE AND VIBRATION

Blast Management & Consulting (BM&C) was commissioned by Geovicon Environmental to perform an initial review of possible impacts with regards to blasting operations at the proposed opencast section of Kromdraai North Colliery. **The Ground Vibration and Air Blast study report is attached as Appendix 6.** Ground vibration, air blast, fly rock and fumes are some of the aspects as a result from blasting operations. The site was

reviewed to identify surface structures which are present in a 3 500 m radius from the proposed mine boundary that will require consideration during modelling of blasting operations. This could consist of houses, general structures, power lines, pipe lines, reservoirs, mining activities, roads, shops, schools, gathering places, possible historical sites etc. The range of structures expected is typical farming and mining community with structures that range from well build to informal building style. These include rural type buildings to brick and mortar structures, cement brick structures, and industrial structures. A list was prepared to cover structures and points of interest (POI) in the 3500 m boundary. Figure 21 indicates the locations of the identified POI in relation to the proposed mining area. A list of structure locations was required for determining the allowable ground vibration limits and air blast limits possible. The list compiled is provided in Table 18 below.

3.8.1 Effects of Blasting Operations

Blasting operations have effect to its surroundings. These effects can manifest in the form of ground vibration, air blast, fumes, fly rock etc. The application of explosives breaking rock will always have a positive and negative manifestation of different energies. It is the effects that have negative outcome that needs to be managed.

3.8.1.1 Ground vibration

Explosives are used to break rock through the shock waves and gasses yielded from the explosion. Ground vibration is a natural result from blasting activities. Ground vibration and air blast was calculated from the edge of the pit outline and modelled accordingly. Blasting further away from the pit edge will have lesser influence on the surroundings. A worst case is then applicable with calculation from pit edge.

Expected ground vibration levels were calculated for each of the structure locations or POI's considered surrounding the mining area. Evaluation is given for each POI with regards to human perception and structure concern. Evaluation is done in form of the criteria what humans experience and where by structures could be damaged. This is according to accepted criteria for prevention of damage to structures and when levels are low enough to have no significant influence.

The opencast operation was evaluated for expected levels of ground vibration from future blasting operations. Review of the site and the surrounding installations/houses/buildings showed that structures varied in distances from the opencast pit area. The nearest house type structure is 905 m from the pit boundary. There are structures such as roads that are in close proximity of the pit. Each of these structures within the area of influence evaluated has influence on the operations in the proposed pit. The specific limits that will be applicable due to the structures integrity is further limiting.

The three charges evaluated showed that the minimum charge mass per delay showed relative low probability of influence. Expected levels of ground vibration are well within accepted norms and limits allowed. The highest levels are expected on the secondary road on the northern side of the pit.

The medium charge showed higher expected levels of ground vibration but remained well within accepted standards for the nearest house at POI 41. Levels are however such that it could be experienced on a human as "unpleasant". The R50 road and secondary roads next to the pit area is expected to observe greater levels of ground vibration. Levels at the R50 specifically are expected to exceed the maximum allowable levels for tarred roads. The levels are such that mitigation will be required when blasting close to the R50 road.

The maximum charge showed increased levels of ground for the roads and the R50. The nearest structures at POI's 40, 41, 7 and 8 are expected to observed levels of ground vibration that could be classified as unpleasant. The levels range between 5.7mm/s and 8.1mm/s for these points. In view of the type of structures and the limits applied the levels are still within accepted norms and negative influence on the structures are not expected. The ground vibration will be such that it could be perceived by people as unpleasant and cause reason for complaints. It will be safe to accept that all structures further than 1230 m from the pit will be well far away but levels of ground vibration may be perceptible and well below damage possibility.

3.8.1.1.1 Ground vibration on roads

There are various roads close to the project area. The R50 is a national road and other secondary roads are in the project area. The R50 is of greatest concern and with medium and maximum charge the ground vibration levels are expected to exceed the maximum allowed limits. The R50 is located approximately 80m from the pit boundary. The levels will vary according to where blasting is done in the pit. Closer to the road higher levels are expected. Possible fly rock due to distance from the pit is also considered problematic. Apart from damage to the road surface the use of the road during blasting will have to be managed to minimise the possibility of personal injury.

3.8.1.1.2 Ground vibration on adjacent communities

Ground vibration and air blast generally upset communities or people living in the vicinity of mining operations. There are farm steads, houses and informal settlements that are within the evaluated area of influence. Levels at the closest structures excluding the roads are not expected to be high and contribute to damage to these structures. The levels may be such that it could upset people as it will be greater than perceptible levels.

3.8.1.1.3 Ground vibration on houses and structures

The structures in the areas of concern vary from poor to proper quality type structures. Structures quality varies and consideration should be given to this. The quality of building material varies between brick and mortar and typical rural building style – mud houses. Building style and materials will certainly contribute to additional cracking apart from influences such as 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, standards of building applied. Thus damage in the form of cracks will 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 i.e. 6mm/s, 12.5mm/s and 25mm/s is 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 maintain within these limits the possibility of inducing damage is limited.

3.8.1.2 Air blast

The effects of air blast, if not controlled properly, is a factor that could be problematic. Maybe not in the sense of damage being induced but rather having an impact – even at low levels of roofs and windows that could result in complaints from people. As with ground vibration evaluation is given for each structure with regards to the calculated levels of air blast and concerns if applicable. Evaluation is done in form of the criteria what humans experience and where by structures could be damaged. This is according to accepted criteria for prevention of damage to structures and when levels are low enough to have no significant influence.

Air blast was calculated and modelled from the boundary for minimum, medium and maximum charge mass at specific distances from each of the pit areas. This means that air blast is taken from the edge – the most outer point of the pit area on plan as if it would be the closest place where drilling and blasting will be done to the area of influence. The calculated levels are then plotted and overlaid with current mining plans to observe possible influences at POI's identified. Air blast predictions were done considering distances ranging from 50 to 3500m around the opencast mining area.

Review of the air blast levels shows the basic same trend as ground vibration. On review from maximum charge source there is concern of possible complaints for private installations at the nearest POI at 41. Complaints from air blast are normally based on the actual effects that are experienced due to rattling of roof, windows, doors etc. These effects could startle people and raise concern of possible damage.

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. This pit is located such that “free blasting” – meaning no controls on blast preparation – will not be possible.

3.8.1.3 Fly rock

Reviewing of the factors that contribute to fly rock suggests that if no stemming control is exerted there will be fly rock. Possible reduction of stemming length to 3.5m for the blast configuration applied could see fly rock up to 190 m possible travel for hard rock material. This distance will include important installation/structures such as the roads surrounding the pit. Figure 22 shows the relationship burden or stemming length towards expected throw distance. Throw distance considered on the same level as the free face. Landing level of elements lower than free face could see longer distances. Optimal throw distance is also observed at 45 degree angles of departure. The maximum distance travel of indicated at 190 m is indicative of no stemming/fly rock control. Careful attention will need to be given to stemming control to ensure that fly rock minimised as much as possible. Consideration will also be required for evacuation of people when blasting operations is done at distances closer than 500m from the private installations.

Table 18: List of points of interest used (WG29)

Owner	Tag	Description	Y	X
Private	1	R50 Road	10467.9	2902884
Private	2	R50 Road	11446.5	2902858
Private	3	R50 Road Crossing	10163.3	2902976
Private	4	Road	10143	2902563
Private	5	Road	10941.2	2901749
Private	6	Kromdraai Dam Wall	10751.4	2901150
Private	7	Building/Structure	10324.6	2901023
Private	8	Building/Structure	10272.6	2900890
Private	9	Building/Structure	10391.9	2900628
Private	10	Building/Structure	10321.5	2900452
Private	11	Ruins	10399.7	2900519
Private	12	Ruins	10152.7	2900314
Private	13	Buildings/Structures	10554.5	2900344
Private	14	Swimming Pool	10345	2900148
Private	15	Buildings/Structures	10400.4	2900269
Private	16	Cement Dam	10623.7	2900214
Private	17	Shed	10582.4	2900087
Private	18	Informal Housing	10718.3	2900027
Private	19	Dieplaagte Dam Wall	10481	2899905
Private	20	Ruins	10155.4	2899945
Private	21	Cement Dam	10744.5	2900265
Private	22	Ruins	10882	2900309

Private	23	Buildings/Structures	10847.8	2900128
Private	24	Structure	11007.3	2899610
Private	25	Ruins	10815.5	2899481
Private	26	Buildings/Structures	11757.2	2900183
Private	27	Ruins	11667.8	2900757
Private	28	Dam	12056	2902062
Private	29	Dam RWD	12127.6	2902502
Private	30	Mining Activity	12571.3	2901988
Private	31	Buildings/Structures	13675.3	2899557
Private	32	Farm House	13686.1	2900789
Private	33	Farm House/Buildings	13554.5	2902817
Private	34	Pan	14240.1	2903432
Private	35	Buildings/Structures	12364.1	2903261
Private	36	Buildings/Structures	12441.2	2903337
Private	37	Structures	12690.2	2903328
Private	38	Farm House	13995.8	2904852
Private	39	Buildings/Structures	12681.9	2904681
Private	40	Buildings/Structures	9540.87	2903436
Private	41	Buildings/Structures	9324.53	2902515
Private	42	J.C. Dam Wall	8984.15	2902664
Private	43	Informal Housing	9791.05	2900195
Private	44	Informal Housing	9650.46	2900155
Private	45	Informal Housing	9815.11	2900067
Private	46	Cement Dam	9466.27	2900391

Private	47	Buildings/Structures	9314.8	2900559
Private	48	Building/Structure	8924.56	2900702
Private	49	Cement Dam	8999.16	2900935
Private	50	Silo's	8708.63	2900770
Private	51	Building/Structure	8640.37	2900609
Private	52	Building/Structure	8855.36	2900429
Private	53	Dam Wall	8619	2900013
Private	54	Pump House	8536.58	2899835
Private	55	Cement Dam	8415.2	2899639
Private	56	Ruins	8408.54	2899498
Private	57	Pivot Irrigation	8934.72	2901680
Private	58	Pivot Irrigation	8024.47	2903282
Private	59	Farm House/Buildings	8210.41	2903750
Private	60	Dam Wall	11291.7	2906005
Private	61	Pump House	11587.8	2906133
Private	62	Informal Housing	9504.23	2903953
Private	63	Cement Dam	9384.52	2904173
Private	64	Cement Dam	10789.6	2903309
Private	65	Cement Dam	10488.3	2903411

3.9 TRAFFIC

WSP SA Civil and Structural Engineers (Pty) Ltd was appointed by Geovicon Environmental to undertake a Traffic Impact Assessment for the proposed Kromdraai North Colliery. **The Traffic Impact Assessment Report is attached as Appendix 7.**

Figure 23 depicts the different roads existing around the proposed mining area. The proposed mining development site is situated on the northern side of the R50 (and R580), approximately 25 km east of Delmas and on both sides of district roads D686 and D2543.

3.9.1 Existing road network

R50: This road is a class 2 rural major arterial road joining towns such as Delmas to the west and Leandra to the south. Further to the west and northwest the R50 goes all the way to Pretoria and crosses over the N4 a few kilometres northwest of Delmas. The R50 in the area near the proposed development site has one through lane in each direction, with gravel shoulders in most areas and with additional short turning lanes or tapers at key or major intersections. Undertaken traffic counts indicate that the R50 past D686 and the R580 currently carries peak hour traffic volumes of between 120 and 230vph during the weekday AM (Morning) and PM (afternoon) peak periods, depending on the direction and peak hour.

R580: This is a single carriageway rural arterial road, running in an east/west direction consisting of a surfaced road that is approx. 7,0m wide. The road joins the R50 to the west near the site with the R547 in the east and also towards the south towards Secunda. The undertaken traffic counts indicate that the R580 at the R50 currently carries traffic volumes of between 75 and 130vph per direction during the weekday AM (Morning) and PM (afternoon) peak periods near the proposed site, depending of the direction.

D686: This district road runs north/south and is surfaced for about the first kilometre (from the R50 intersection) and then turns into a gravel road northwards for a few kilometres, before turning back to a surfaced (premix) road, passing the Kendal Power Station and joining the R555 to the north (west of the town of Ogies) and then the N12 and goes even further north to the N4. This road makes a number of priority controlled intersections with other district and smaller farm roads. Manually undertaken traffic counts show that this road carries low traffic volumes of only between 10 and 50vph, in each direction (in the vicinity of the site), during the peak weekday AM (Morning) and PM (Afternoon) hours.

D2543: This is also a district road running in a northwest/southeast direction between the R555 in the northwest and district road D686 at the site. The road is approx. 7m wide and is surfaced (premix) with one lane in each direction. Manually undertaken traffic counts show that this road carries between 40 and 60vph in each direction, during the peak weekday AM (Morning) and PM (Afternoon) hours.

3.9.2 Projected future traffic flows

The proposed mining development is estimated to have coal reserves of 7 million tons with an estimated output of 50,000 tons of coal product a month, this in turn calculates to an estimated 2000 loads of coal a month that will travel northwards on D686 towards the R555/N12. The proposed site access is located on a fairly straight portion of district road D686 where it is still gravel, approximately 1 km north of the existing T-junction with district road D2543.

Trip distribution for the heavy vehicles of the mine is expected to be northwards on D686 towards the R555, Ogies and then to the east to the Mooifontein Colliery. The Light Vehicles which includes employees, visitors, contractors and subcontractors are divided into five main directions with the majority estimated to come from the west on the R50 (35%) from Delmas, and smaller percentages R50 south (15%), R580 east (15%), D2543 northwest (20%) and the balance northwards on D686 (15%) towards the R555/N12 and Ogies.

It is estimated that the proposed mining activities will generate a maximum total of 130vph ('In' & 'Out') during the critical weekday morning (AM) and afternoon (PM) peak periods. From site observations conducted during the Traffic Impact Assessment and the SIDRA capacity analyses results during the peak hours, the expected peak hour development traffic will not have a major impact on the existing roads R50 and D686, at the three key intersections.

3.10 SITES OF ARCHAEOLOGICAL AND CULTURAL INTEREST

Archaeon cc was appointed by Geovicon to conduct a Heritage Impact Assessment for the proposed Kromdraai North Colliery. A report compiled after the survey of the proposed project area is attached as **Appendix 8** of this report.

The fieldwork undertaken revealed three sites of cultural heritage significance, the location of these sites are depicted in Figure 24. These are all grave sites and therefore mitigation measures are needed. However, all three fall outside of the area of direct impact and therefore exhumation and relocation is not necessary. It is also possible that subterranean archaeological sites may be found later on. Should such sites be identified, it needs to be dealt with by an archaeologist.

Graves are always regarded as having a **high** cultural significance. Those older than 60 years are considered to be heritage graves and those without a date of death are to be handled as heritage graves. There are two options when dealing with graves. The first would be to fence it in and write a management plan for the preservation thereof. This option will come into play if there is no direct impact on the graves. It should be kept in mind that there always is a secondary impact on graves since families may not have access thereto once a mine comes into operation. The second option is to have the graves exhumed and the bodies reburied. This option is preferred when graves cannot be avoided by the development. Before exhumation can be done a process of social consultation is needed in order to find the associated families and obtain permission from them. For graves younger than 60 years only an undertaker is involved in the process, but for those older than 60 years or with an unknown date of death, an undertaker and archaeologist should be involved. The identified sites are described below.

Site 1 - This is a grave yard with at least 42 graves, however, during the survey the grass cover was very long and there may be more graves in the area. The oldest date of death identified is 1947 and the youngest 1998, while some dates are unknown. Option 1 given in the previous paragraph for dealing with graves is recommended as the graves fall outside of the area of direct impact. There will however be a secondary impact as the site is close to the road. This will create a dust problem. Access to the site may also be limited due to mining activities.

Site 2 – This is another grave yard with at least 14 graves. The oldest date of death identified is 1877 and the youngest 1978. All of the graves were dated. Option 1 given in the previous paragraph for dealing

with graves is recommended as the site falls outside of the area of direct impact. The reason is that access to visitors may however be limited and mine waste (e.g. dust) may impact on the site.

Site 3 – This is a grave yard with at least 18 graves. Most of the graves have stone dressings and stone headstones without any information thereon, therefore, no legible information regarding dates of the graves was available. This site also lies outside of the area of direct impact. It is reasonably close to the underground mining area and one may therefore expect a secondary impact e.g. dust problems. Access to the site may also be limited for visitors because of the mining activities. Therefore option 2 given in the previous paragraph for dealing with graves is recommended.

3.11 SENSITIVE LANDSCAPES

Sazi Environmental Consulting cc (SAZI) was appointed by Geovicon Environmental (Pty) Ltd to undertake an assessment of wetland units within the proposed mining area. **See appendix 9 for the wetland delineation and assessment report.**

3.11.1.1 Classification of wetlands

A total of three wetland units were observed within 500m of the wetland boundaries and these included two channelled valley bottom wetlands and a seasonal pan. The wetlands identified in relation to the proposed mining area are depicted in Figure 25. The wetlands within the assessment area are located with the Olifants Catchment (Primary Catchment B), quaternary catchment B20E. The total extent of wetlands that were assessed was equal to 363ha.

3.11.1.2 Wetland Ecological Importance and Sensitivity

Due to the extent of open water within the valley bottom system on site, this system provides habitat that differs from the surrounding terrestrial habitats and thus contributes to biodiversity support.

The retention of water is high due to multiple impoundments present within the wetland system and thus the system provides flow attenuation during high flow and also due to its large lateral footprint. The ecological importance and sensitivity (EIS) of wetlands on site are summarized in Table 19 below.

However, no red data species were observed on site. The area also does not fall within a protected site. In terms of terrestrial habitat, the area is of least concern, as highlighted in the Mpumalanga Biodiversity Conservation Plan (MBCP).

Table 19: The ecological importance and sensitivity of wetlands on site

HGM Unit	EIS
Channelled Valley Bottom	High
Channelled Valley bottom 2	High
Pan	Medium

3.12 VISUAL ASPECTS

Regionally the area is characterised by a gentle undulating topography, covered by gum trees. Kromdraai North Colliery is situated adjacent to the R50 and D686 provincial roads, which is the main easterly artery through the Mpumalanga Province. As such the surface related mining activities will be highly visible from the above-mentioned roads, to the community residing within the small holdings around the said Colliery.

3.13 REGIONAL SOCIO-ECONOMIC STRUCTURE

3.13.1 Population Growth and Location

The Victor Khanye Local Municipality (VKLM) is situated on the western Highveld of Mpumalanga Province, covering a geographic area of approximately 1 567 square kilometres. The prominent towns and settlements in the Municipality include Abor, Argent, Delmas and Brakfontein. The municipality is strategically located close to the metropolitan areas of Tshwane and Ekurhuleni to the west. The headquarters of the municipality are in Delmas. VKLM is currently characterised by an increase in mining and related activities in the Leandra area. In addition to mining (concentrating on coal and silica), other important sectors in this area are agriculture (a major provider of food and an energy source, i.e. maize); finance and manufacturing (capitalising on the area's proximity to Gauteng).

Natural resources make a significant and direct contribution to the Nkangala District economy, which is "resource based" (i.e. coal, water, land capacity, geographical features, climate, and conservation areas, ecosystems and natural features). The population of Victor Khanye Local Municipality (VKLM) has grown significantly since 2001 increasing from 56,335 to 75,452, which represent a growth of 33, 9% (Census, 2011).

The highest population density occurs in the core urban area of Delmas and Botleng, with the rural wards recording the lowest in terms of spatial distribution. Wards 3, 7 and 9 have the highest population numbers accounting for 50% of the total population of 75,452. These wards are the largest, rural wards characterised by mining and agricultural activities. Ward 3 includes a section of Botleng.

The highest percentage of the population, approximately 67%, is in the economically active age group of 15-64 year old category, the majority of which are under the age of 35 years of age. This trend demonstrates that labour migration may be the contributing factor to the increase, resulting from the economic growth potential of the area.

3.13.2 Major Economic Activities and Sources of Employment

The VKLM Gross Domestic Product (GDP) is forecast to grow by 3.4% per annum up to and including 2016, although this is lower than the District and Province projections. The forecast is very optimistic if we consider that the historic growth rate in the period 1996-2011 remained relatively low at 2.0% per annum.

Agriculture, transport, community services, finance and mining will be the main contributors to the VKLM economic growth in the period up to 2016. The local municipality is a major maize producing area. Annual maize production is calculated at between 230 000 and 250 000 metric tons. Mining activities are

concentrated on coal and silica. About 3 million metric tons of coal and 2 million metric tons of silica are mined annually in the municipal area.

3.13.3 Unemployment Estimate for the Area

The latest statistics reflect that the employment level in the VKLM is currently at 28, 9%. Based on the 2011 definition of Economically Active Population (EAP) of 30,415 the unemployment rate is reflected at 28, 2%, this represents an overall gain in employment compared to 2001. This figure is high when we consider the economic activity in the area, but obviously impacted by the migration influx of job seekers. Leading industries in employment comprise of Trade (18, 7%), Agriculture (18, 2%) and Community Services contributing (14, 3%). However, the former two sectors are experiencing a decline in employment in the last few years whilst Community Services has increased and mining as an employer has grown and now contribute 12, 7%.

3.13.4 Water Supply

Significant strides have been made to-date to eradicate service backlogs and a joint project funded by a variety of provincial stakeholders is currently constructing a new 4 Ml reservoir at Eloff to address the problem of inadequate water supplies at an estimated cost of R 11,000,000.00. The construction of the new reservoir will be completed by the end of the 2014/15 financial year which will significantly increase the water holding reserve capacity of VKLM and contribute to the realisation of sustainable water provision and cater for future anticipated demand. In the current year the Botleng reservoir is scheduled to be refurbished to improve operational efficiency in water supply.

The commissioning of the newly installed Rand Water bulk water pipeline from Bloemendal; which now supports the water distribution requirements of all Delmas residents, will be connected to the Botleng reservoirs as the last stage of this project during 2014/15 at a cost of R 2 500 000.00 funded by VKLM.

A challenge to the municipality relates to access to the rural areas that are still reliant on receiving their water supply from boreholes and the dolomite nature of the topography of the area which inhibits infrastructure development. For this reason the VKLM still intends to invest approximately R 4 000 000.00 over the next five (5) years in the exploration and installation of additional borehole facilities to maintain a sustainable water supply to these rural areas.

3.13.5 Power Supply

The electricity network within VKLM is ageing and has become inefficient. The main electricity substation needs to be upgraded since the electricity demand is increasing due to developments both in the residential, commercial and industrial sectors. The infrastructure within the area supplied by Eskom; Eloff, Sundra, Botleng and Extension 3, is also in need of upgrade to ensure the sustainable provision of uninterrupted services to the community and businesses. The first phase of this upgrade has been completed with the installation of the network to the new 20 MVA sub-station. To cater for the increased demand being experienced from residents in Botleng Ext 4 and Vukuzenzele it is proposed to replace the 100 Kva transformers with 200 Kva units.

SECTION FOUR

Details of Public Participation Process

4. DETAILS OF THE PUBLIC PARTICIPATION PROCESS

4.1 THE CONSULTATION PROCESS

In terms of Chapter 6 of the NEMA regulations (GN543), all potential interested and affected parties should be informed of the project and be given a chance to register as an interested and affected party in order to raise any comments and concerns with related to the proposed project.

4.1.1 Registration phase

Immediate and adjacent landowners, relevant ward councillors, municipality in whose jurisdiction the proposed project falls, State departments and the greater public have been notified either via email, site notices and local newspaper advertisements (English and Afrikaans) of the intention to undertake the proposed activities at the proposed Kromdraai North Colliery project area.

4.1.1.1 Registered Interested and Affected Parties (I&AP's)

The registered I&AP's identified are as follows:

Department of Water and Sanitation (Mpumalanga Regional Office)

Department of Mineral Resources (Mpumalanga Regional Office)

Department of Agriculture, Rural Development, Land and Environmental Affairs (Mpumalanga Provincial Office)

Department of Agriculture, Forestry and Fisheries

Mpumalanga Parks and Tourism Agency

Immediate/adjacent landowners and legal occupiers

Victor Khanye Local Municipality

Ward Councillors

4.1.2 Scoping Phase

The Draft Scoping report was submitted to DARDLEA, relevant State Departments, the Victor Khanye Local Municipality and I&AP's for comment. The Draft Scoping report was also placed in the Delmas and Witbank Libraries for evaluation and comment. An advertisement was placed in the local newspaper in accordance with Regulation 54 of Government Notice No. R534 under section 24 of the National Environmental Management Act, 107 (Act no. 107 of 1998) informing the public about the availability of the Draft scoping report in the said Libraries for evaluation and comment. Once the commenting period

lapsed, the Final Scoping report was submitted to DARDLEA including the comments received from registered I&AP's.

4.1.2.1 Comments received from registered I&AP's (Scoping Phase)

Registered Interested and Affected Party: Brakfontein farm community
<p>The Brakfontein farm community, (representative is Mr. Owen Simon Mabaso, Ward Committee Member) raised concerns with regards to the following:</p> <ol style="list-style-type: none"> 1. The community prefers that the project employs people from local residence 2. Skills development 3. Business opportunities, and for those opportunities be given in preference to local residence 4. The project personnel must comply with the mining charter 5. Speak to the community when compiling a Social Labour Plan (SLP) so they can understand or acknowledge the needs of the community 6. Adopt the current Integrated Development Plan (IDP) document 7. The company to do Corporate Social Investment (CSI) projects 8. The mine to fund sustainable proposed projects.
Response
<p>Below is the response to the questions raised by Mr. Owen Simon Mabaso on behalf of the Brakfontein farm community. The SLP was compiled and submitted to DMR for the proposed mining project and the following commitments were outlined in the SLP.</p> <ol style="list-style-type: none"> 1. The SLP has been compiled during the Environmental Impact Assessment phase and has been submitted to the DMR for approval. 2. The SLP outlines that Eyethu Coal (Pty) Ltd will implement a Local Economic Development Programme which will see most of the labour-force sourced from the local community. 3. Eyethu Coal (Pty) Limited will develop a skills development plan for Kromdraai North Colliery, which covers a development programme from literacy through to artisan level. 4. The SLP for the proposed Kromdraai North Colliery states that the project will be possibly run by a local contractor hence will help in the development of small entrepreneurs within the local community and thereby promoting local economic development. 5. All mine personnel will comply to all applicable mining charter commitments stated in the mine's approved Environmental Management Programme Report (EMPr).

6. The local municipality's IDP was adopted during the compilation of the SLP.
7. Eyethu Coal (Pty) Limited, through the SLP, will promote small businesses and assist them to remain commercially viable.
8. Eyethu Coal (Pty) Ltd's SLP outlines that the proposed mine will initiate and implement infrastructure and local economic development projects that will benefit the local community.

The commitments made by Eyethu Coal (Pty) Ltd in the SLP cannot be implemented, subject to approval by the DMR.

Registered Interested and Affected Party: Eskom

Eskom (representative D. L .C Motsisi) raised the following conditions, concerns & requests:

1. A specific document of permission/application in respect of the mining activity as issued by the Inspector of Mines must be submitted to Eskom Tx in due course.
2. Blasting in close proximity to Eskom's overhead power lines or substation is prohibited unless the following precautions are met [refer to the Mine Health and Safety Act 29 of 1996 (Sect 4.6 states that blasting must be done within safe distances of infrastructure Regulation R109 of January 2003).
 - A blasting plan must be submitted with the application,
 - A Peak Particle Velocity (PPV) to be kept below 75 mm/s, for lines and 50 mm/s for buildings,
 - A seismic control device is set up to record the readings
 - Ensure fly rock and air blast control by means of adequate matting
 - In the interest of air blast control, only single shot blasting shall be allowed
3. The applicant will be held liable for damage to Eskom's towers or substation equipment, as a result of blasting activities.
4. Costs incurred by Eskom to comply with statutory requirements in terms of an applicant's (or his contractor's) works, equipment or plant in the servitude area, shall be paid to Eskom on demand.
5. Eskom may charge the applicant appropriately for time on site during blasting operations.
6. Eskom reserves the right to withdraw any consent if the blasting process becomes hazardous and likely to result in power interruptions.
7. If permission for the blasting process is granted the applicant must give at least fourteen work day's prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision of and/or precautionary instructions to be issued in terms of the blasting

operation.

8. Eskom Tx's rights and services must be acknowledged and respected at all times.

Further to the above the following generic conditions will be applicable.

9. Eskom Tx shall at all times retain unobstructed access to and egress from its servitudes.
10. Eskom Tx's consent does not relieve the applicant from obtaining the necessary statutory land owners or municipal approvals.
11. The applicant will adhere to all relevant environmental legislation. Any cost incurred by Eskom Tx as a result of non-compliance will be charged to the applicant.
12. All work within Eskom's servitude areas shall comply with the relevant Eskom earthing standards in force at the time.
13. No construction or excavation work shall be executed within 27.5 metres from any Eskom power line structure.
14. If Eskom Tx has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the applicant's activities or because of presence of his equipment or installation within the servitude restriction area, the applicant shall pay such costs to Eskom Tx on demand.
15. The use of explosives of any type within 500 metres of Eskom Tx's services, shall only occur with Eskom Tx's previous written permission. If such permission is granted the applicant must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.
16. Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measure taken shall be to Eskom Tx's requirements.
17. Eskom Tx shall not liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the applicant, his/her agent, contractors, employees, successors in title and assignee. The applicant indemnifies Eskom Tx against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom Tx's services or apparatus or otherwise. Eskom Tx will not be held responsible for damage to the applicant's equipment
18. No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom Tx's apparatus and/or services, without prior written permission having been granted by Eskom Tx. If such permission is granted the applicant must give at least seven working days notice prior to the commencement of work. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued by the Lines and

Servitudes Manager.

19. No work shall commence unless Eskom Tx has received the applicant's written acceptance of the conditions specified in this letter of consent within 30 days of the date of this letter and or before commencement of any work.
20. Eskom Tx's rights and duties the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with. Note: where an electrical outage is required, at least fourteen work days are required to arrange it.
21. Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The applicant shall maintain the area concerned to Eskom Tx's satisfaction. The applicant shall be liable to Eskom Tx for the cost of any remedial action which has to be carried out by Eskom Tx.
22. The clearances between Eskom Tx's live electrical equipment and the proposed construction work shall be observed as stipulated by the Regulation 19 of Electrical Machinery Regulations 2011 (with reference to SANS 10280-1) of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).
23. Equipment shall be regarded electrically live and therefore dangerous at all times.
24. In spite of the restrictions stipulated by the Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution, Eskom Tx will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area.
25. Eskom Tx may stipulate any additional requirements to eliminate any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom Tx plant.
26. It is required of the applicant to familiarise himself with all safety hazards related to Electrical Plant.

Response

Below is the response to the concerns raised by D. L .C Motsisi on behalf of Eskom.

1. The mining right application for the proposed mining operation has been submitted to the DMR and Eyethu Coal (Pty) Ltd awaits the decision by the DMR. Upon issuing of the mining right by DMR to the applicant, Eskom will receive proof of the mining right held by the applicant for the proposed mining operation.

Eyethu Coal (Pty) Ltd's Kromdraai North Colliery commits to adhere to all conditions stipulated by Eskom.

Registered Interested and Affected Party: South African Heritage Resources Agency (SAHRA)

SAHRA, (representative Ms. Nokukhanya Khumalo) raised the following concerns/responses with regards the following:

The heritage resources found in the Heritage Impact Assessment conducted during the EIR phase are cemeteries which are of high significance and that they must be conserved *in situ*. The following mitigation measures must be implemented in order to ensure the safe conservation of these cemeteries.

1. A fence must be erected around the cemeteries and a buffer zone on 10 meters of no construction must be implemented.
2. A field based Palaeontological Impact Assessment needs to be conducted for the proposed development. This report should be conducted by a suitably qualified professional palaeontologist.

Response

Below is a response to the concerns raised by Ms. Nokukhanya Khumalo on behalf of SAHRA. The Heritage Impact Assessment was conducted for the proposed mining project and the following measures were recommended for heritage resources management which will address the heritage resources related concerns from SAHRA. The Heritage Impact Assessment conducted EIR identified cemeteries which are of high cultural significance. The following mitigation measures must be implemented in order to ensure the safe conservation of these cemeteries.

1. The first option would be to fence it in and write a management plan for the preservation thereof. This option will come into play if there is no direct impact on the graves.
2. The second option is to have the graves exhumed and the bodies reburied. This option is preferred when graves cannot be avoided by the development. Before exhumation can be done a process of social consultation is needed in order to find the associated families and obtain permission from them. For graves younger than 60 years only an undertaker is involved in the process, but for those older than 60 years or with an unknown date of death, an undertaker and archaeologist should be involved.

Option 1 is recommended as the graves fall outside of the area of direct impact.

If any paleontological sites are identified during mining, a suitably qualified professional palaeontologist will be consulted with for a Palaeontological Impact Assessment for the project area.

Registered Interested and Affected Party: C. H. Boshoff Familie Trust and Retha Boshoff Boerdery cc

C. H. Boshoff Familie Trust and Retha Boshoff Boerdery, (representative Mr. Jan Boshoff) raised the following comments & concerns:

1. Requested to be registered as the representative of an adjacent farm portion, portion 8 of the farm Kromdraai 263 IR, surface owner Retha Boshoff Boerdery.
2. On the map, you indicated the proposed opencast workings at Kromdraai and these workings appear on Mr. Piet Schutte's property which was not mentioned in the application to DMR. Thus, you will need to amend your application.
3. I cannot get clarity on the activities taking place on portions 4, 5, 6 and 18. Can you please be

more specific? I am referring to the activities that will take place on Piet Schutte's property.

4. The transport of coal will probably commence via the national road. Consequently, a traffic study needs to be carried out. At this moment in time there are a lot of trucks on the road, and its increasing daily.
5. I would like to know what the impact of the proposed mining will have on the JC dam, with regards to the usage and quality of water. As a registered I&AP, I have a personal interest in this matter.
6. There are currently four Eskom power lines running through the farm portions. Eskom was granted the right for two additional power lines to run through these properties.

Response

Below is a response to the questions raised by Mr. Jan Boshoff on behalf of C. H Boshoff Familie Trust and Retha Boshoff Boerdery.

1. Mr. Jan Boshoff has been registered as the representative of Retha Boshoff Boerdery's portion 8 of the farm Kromdraai 263 IR.
2. With reference to the portions plan for the proposed Colliery (see Figure 7) and the mining layout plans attached as Figures 3, 4 and 5; the proposed opencast workings are situated on portion 4 of the farm Kromdraai 263 IR. This portion belongs to Mr. Piet Schutte and does form part of the mining right application. The mining right application for the proposed Colliery was submitted for portions 4, 5, 6 and 18 of the farm Kromdraai 263 IR. Therefore, an amendment for the mining right application is not necessary as portion 4 was included in the mining right application submitted to the DMR.
3. With regards to Mr. Piet Schutte's property, the following proposed mine surface infrastructure will be located on portion 4 of the farm Kromdraai 263 IR:
 - Office and workshop complex
 - Fuel storage facilities
 - Access and haul roads
 - Opencast workings
 - Topsoil and overburden stockpiles
 - R.O.M and product coal
 - A crushing and screening plant
 - A weighbridge
 - A pollution control dam and associated water management structures.

4. A Traffic Impact study has been conducted and the results thereof are included in Section 3.9 of the EIR/EMP (this report). The Traffic Impact Study conducted is also attached as **Appendix 7**.
5. No water will be abstracted from the JC dam for the proposed mining operation. A Geohydrological study was conducted and is attached as **Appendix 5**. The Geohydrological study states that the possible potential impacts from the proposed mining project on the JC dam are dewatering and seepage from the underground mining area and potential impact on base flow of the JC dam. Additional studies are currently being conducted by the geo-hydrologist to verify the extent of the potential impact on the J.C dam.
6. Eskom was consulted with for the proposed mining operation and their response with regards to Eskom's servitudes on the proposed mining area is included in Appendix 10.

Registered Interested and Affected Party: Jm Property and Mineral Rights Consultants, Mr. Johann Minnaar, representative of C. H Boshoff Familie Trust (Mr. Jan Boshoff)

C. H. Boshoff Familie Trust (representative Mr. Johann Minnaar) raised the following comments & concerns:

1. The FSR fails to include a legible detailed plan which depicts the localities of the various listed activities for which application for environmental authorization is made, and the AIP is therefore not in a position to assess the potential impact which the proposed listed activities may have on the affected properties and his farming business without knowing the locations of these listed activities. Such legible detailed maps should be included in the FSR, and copies must be provided to the AIP.
2. It is noted that there are listed activities applied for which, if environmental authorization is granted, will trigger water usages for which Water Use Licences and Permissions are required in terms of the provisions of the National Water Act, No. 36 of 1998 ('the NWA'). The Applicant was informed in our letter addressed to you dated 16 March 2015 that any application for water use licences will be opposed, and reasons for such refusal were detailed in this letter. In the event that the Applicant, despite this objection, still lodge applications for water use licences with the authorities, then, and in that event, copies of the detailed applications for water use licences that may be submitted to the Department of Water Affairs should be made available to the AIP, in order for the AIP to assess the impact that these water usages will have on his farming business and the affected properties; failure which will adversely affect its rights to be heard in terms of the legal principle of the *audi altrem partem* rule;
3. Paragraph 6.1.3.8 on page 43 and onwards – the AIP strongly objects against the intention of the Applicant to mine the seasonal wetland and to restrict its mining within 100 metres from other wetland areas. The Applicant is alluded to the buffer restriction of 500 metres away from a watercourse in terms of the provisions of Government Notice No. 1199 dated 18 December 2009 "Replacement of General Authorization in terms of Section 39 of the National Water Act, 1998 (Act No. 36 1998)." Such buffer zone restriction applies to both horizontal and vertical distances, and that any underground mining operations will have to be limited to the buffer restriction too. In the light of the aforesaid it is imperative for the AIP to receive detail documentation with regard to any application which the Applicant intends to make in terms of the NWA for water use licences;

4. It is noted that underground coal mining will take place between 45,9 and 73,00 metres below surface. The FSR fails to address any environmental studies which the Applicant intends to undertake in order to assess any environmental damage that the underground mine may cause to the J C Dam in particular, and the other surface dams and the Kromdraai Spruit in general;
5. Section 23(2)(b) of Chapter 5 of NEMA states one of the general objective of integrated environmental management namely, to identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions. The FSR fails to address the socio-economic conditions of, in particular the AIP, and the socio-economic impact which the proposed mine will have on its farming business at large, taking into account that the AIP will suffer loss and damage due to crop loss, and grazing loss. The Applicant is requested to adhere to the above provisions of NEMA, and to appoint an agricultural economist who will be able to compile an environmental report with regard to the socio-economic impact which the proposed mine will have on the farming business of the AIP, especially in the light of the fact that the proposed mine and its listed activities will have on the quality and quantity of water, which is the main component of the irrigation farming of the AIP;
6. It is common cause that Springboklaagte Mining intends to mine coal by opencast methods on the properties situated to the south of the Kromdraai North mining area of the Applicant. The FSR fails to mention the cumulative effects which the proposed mine of the Applicant will have on the environment together with the proposed opencast and underground mining areas of Springboklaagte Mining.

Response

Below is a response to the questions raised by Mr. Johann Minnaar on behalf of C. H Boshoff Familie Trust.

1. See attached Figure 8 for the plan indicating the listed notices applied for in terms of NEMA (Act No.107 of 1998) for the proposed Kromdraai North Colliery.
2. A Water Use Licence Application was compiled and will be made available for public comment with the Draft EIA/EMP. An electronic copy will also be submitted to Mr. Johann Minnaar on behalf of C. H Boshoff Familie Trust.
3. As indicated on the mining layout plan for Kromdraai North Colliery (Figure 3), a 100 m buffer zone was implemented for the proposed mining project and its associated infrastructure with relation to the identified wetlands indicated in Figure 3. In terms of the 500 m buffer restriction implemented for mining in relation to a watercourse, Eyethu Coal (Pty) Ltd has applied for a 21 c (Impending or diverting the flow of water in a watercourse) and 21 i (Altering the bed, bank, course or characteristics of a watercourse) water use licence. In addition, Eyethu Coal (Pty) Ltd has applied for a GN 704 exemption to comply with the requirements of the GN 704 regulations. The above mentioned applications are included in the Water Use Licence Application which will be submitted to Mr. Johann Minnaar on behalf of C. H Boshoff Familie Trust.
4. The Geohydrological study (Appendix 5) states that the possible potential impacts from the proposed mining project on the JC dam are dewatering and seepage from the underground mining area and potential impact on base flow of the JC dam. Additional studies are currently

being conducted by the geo-hydrologist to verify the extent of the potential impact on the J.C dam.

5. A Baseline Agricultural Economic Assessment was undertaken in order to quantify the potential agricultural economic impacts on the proposed Kromdraai North Colliery mining area. See Appendix 12 for the study.
6. The EIA phase addresses cumulative impacts associated with the proposed project, these impacts are included in Section 8.3 of the EIA/EMP report (this document).

Registered Interested and Affected Party: Jm Property and Mineral Rights Consultants, Mr. Johann Minnaar, representative of Daniel Jacobus Opperman Bezuidenhout

Jacobus Opperman Bezuidenhout (representative Mr. Johann Minnaar) raised the following comments & concerns:

1. The FSR fails to include a legible detailed plan which depicts the localities of the various listed activities for which application for environmental authorization is made, and the AIP is therefore not in a position to access the potential impact which the proposed listed activities may have on the affected properties and his farming business without knowing the locations of these listed activities. Such legible detailed maps should be included in the FSR, and copies must be provided to the AIP.
2. It is noted that there are listed activities applied for which, if environmental authorization is granted, will trigger water usages for which Water Use Licences and Permissions are required in terms of the provisions of the National Water Act, No. 36 of 1998 ("the NWA"). The Applicant was informed in our letter addressed to you dated 16 March 2015 that any application for water use licences will be opposed, and reasons for such refusal were detailed in this letter. In the event that the Applicant, despite this objection, still lodge applications for water use licences with the authorities, then, and in that event, copies of the detailed applications for water use licences that may be submitted to the Department of Water Affairs should be made available to the AIP, in order for the AIP to access the impact that these water usages will have on his farming business and the affected properties; failure which will adversely affect its rights to be heard in terms of the legal principle of the *audi altrem partem* rule;
3. Paragraph 6.1.3.8 on page 43 and onwards – the AIP strongly objects against the intention of the Applicant to mine the seasonal wetland and to restrict its mining within 100 metres from other wetland areas. The Applicant is alluded to the buffer restriction of 500 metres away from a watercourse in terms of the provisions of Government Notice No. 1199 dated 18 December 2009 "Replacement of General Authorization in terms of Section 39 of the National Water Act, 1998 (Act No. 36 1998)." Such buffer zone restriction applies to both horizontal and vertical distances, and that any underground mining operations will have to be limited to the buffer restriction too. In the light of the aforesaid it is imperative for the AIP to receive detail documentation with regard to any application which the Applicant intends to make in terms of the NWA for water use licences;
4. It is noted that underground coal mining will take place between 45,9 and 73,00 metres below surface. The FSR fails to address any environmental studies which the Applicant intends to undertake in order to access any environmental damage that the underground mine may cause to the J C Dam in particular, and the other surface dams and the Kromdraai Spruit in general;

5. Section 23(2)(b) of Chapter 5 of NEMA states one of the general objective of integrated environmental management namely, to identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions..." The FSR fails to address the socio-economic conditions of, in particular the AIP, and the socio-economic impact which the proposed mine will have on its farming business at large, taking into account that the AIP will suffer loss and damage due to crop loss, and grazing loss. The Applicant is requested to adhere to the above provisions of NEMA, and to appoint an agricultural economist who will be able to compile an environmental report with regard to the socio-economic impact which the proposed mine will have on the farming business of the AIP, especially in the light of the fact that the proposed mine and its listed activities will have on the quality and quantity of water, which is the main component of the irrigation farming of the AIP;
6. It is common cause that Springboklaagte Mining intends to mine coal by opencast methods on the properties situated to the south of the Kromdraai North mining area of the Applicant. The FSR fails to mention the cumulative effects which the proposed mine of the Applicant will have on the environment together with the proposed opencast and underground mining areas of Springboklaagte Mining.

Response

Below is a response to the questions raised by Mr. Johann Minnaar on behalf of Jacobus Opperman Bezuidenhout.

1. See attached Figure 8 for the plan indicating the listed notices applied for in terms of NEMA (Act No.107 of 1998) for the proposed Kromdraai North Colliery.
2. A Water Use Licence Application was compiled and will be made available for public comment with the Draft EIA/EMP. An electronic copy will also be submitted to Mr. Johann Minnaar on behalf of Mr. Jacobus Opperman Bezuidenhout.
3. As indicated on the mining layout plan for Kromdraai North Colliery (Figure 3), a 100 m buffer zone was implemented for the proposed mining project and its associated infrastructure with relation to the identified wetlands indicated in Figure 3. In terms of the 500 m buffer restriction implemented for mining in relation to a watercourse, Eyethu Coal (Pty) Ltd has applied for a 21 c (Impending or diverting the flow of water in a watercourse) and 21 i (Altering the bed, bank, course or characteristics of a watercourse) water use licence. In addition, Eyethu Coal (Pty) Ltd has applied for a GN 704 exemption to comply with the requirements of the GN 704 regulations. The above mentioned applications are included in the Water Use Licence Application which will be submitted to Mr. Johann Minnaar on behalf of Jacobus Opperman Bezuidenhout.
4. The Geohydrological study (Appendix 5) states that the possible potential impacts from the proposed mining project on the JC dam are dewatering and seepage from the underground mining area and potential impact on base flow of the JC dam. Additional studies are currently being conducted by the geo-hydrologist to verify the extent of the potential impact on the J.C dam.
5. A Baseline Agricultural Economic Assessment was undertaken in order to quantify the potential agricultural economic impacts on the proposed Kromdraai North Colliery mining area. See

Appendix 12 for the study.

6. The EIA phase addresses cumulative impacts associated with the proposed project, these impacts are included in Section 8.3 of the EIA/EMP report (this document).

4.1.3 EIA/EMP Phase

The Final Scoping Report has been accepted, the draft EIA/EMP report was submitted to DARDLEA, relevant State Departments, the Victor Khanye Local Municipality, responsible ward councillors and registered I&AP's for comment. The draft EIA/EMP was also be placed in the Delmas and Witbank Libraries for comment. A local newspaper advertisement (English and Afrikaans) in accordance with Regulation 54 of Government Notice No. R534 under section 24 of the National Environmental Management Act (Act 107 of 1998) was also placed to inform the public of the availability of the draft EIA/EMP report in the Delmas and Witbank Libraries for comment. Once the commenting period lapsed, the final EIA/EMP (this document) including comments from I&AP's, will be made available to registered I&AP's for comment for 21 days, thereafter the final EIA/EMP will be submitted to DARDLEA. **See Appendix 10 for proof of consultation.**

4.1.2.2 Comments received from registered I&AP's (EIA/EMP Phase)

Registered Interested and Affected Party: Jm Property and Mineral Rights Consultants, Mr. Johann Minnaar, representative of C. H Boshoff Familie Trust (Mr. Jan Boshoff)

C. H. Boshoff Familie Trust (representative Mr. Johann Minnaar) raised the following comments & concerns:

1. The Wetland Assessment Study Report made the following statements:
 - Based on the current mining layout boundary, the channelled valley bottom wetland associated with the Kromdraaispruit is located within the footprint of the proposed mining boundary.
 - No mitigation measures can be implemented to counter the effects of mining on this wetland.
 - The channelled valley bottom wetland associated with the non-perennial stream will also be negatively impacted by the proposed mining activities.
 - It is expected that the wetland habitat of the channelled valley bottom wetland will be permanently destroyed and there are no mitigation measures that can be implemented

It is therefore clear from this Study that environmental authorization cannot be considered for listed activities within 500 metres from the footprint of these wetlands, unless authorization has been obtained from the Department of Water Affairs in terms of the provisions of Government Notice No.1199 dated 18 December 2009 "Replacement of General Authorization in terms of Section 39 of the National Water Act, 1998 (Act No. 36 1998)."

In any case, it will be indicated below that no mining should take place within the wetland areas

irrespective of the 500 metre boundary as referred to above,

2. The following statements are made in the Geohydrological Report:

- The major concern as a result of underground mining is the close proximity of the J.C. dam to the boundary of the underground mining area (less than 100m). This poses a risk not only to the water resource in terms of dewatering, but also in terms of flooding of the underground mine, if preferential pathways (sills, dykes, faults) linking the J.C. dam with the underground mining area exist. This would allow a rapid influx of water into the underground mining area;
- The base flow feeding the Kromdraaispruit could be affected, as well the water quantity of the J.C dam and Kromdraai dam, if preferential pathways exist as discussed in the previous paragraph. This is of concern as a direct link between the J.C dam and the underground mining area could lead to rapid flooding of the underground mining area;
- The rise in groundwater level is predicted to be relatively slow and the water levels are expected to recover only in about 10---20 years;
- Groundwater within the mined areas is expected to deteriorate due to chemical interactions between the geological and the groundwater. The resulting groundwater pollution plume will commence with downstream movement;
- As some coal and discards will remain in the mine, this out flow will be contaminated as a result of acid or neutral mine drainage;
- The sulphate pollution plume emanating from the opencast is predicted to reach the Kromdraaispruit as well as Kromdraai dam between 25 to 50 years;
- It is recommended that the small opencast closest to the Kromdraaispruit not be mined to mitigate any polluted groundwater that might arise from potential decanting;
- Base flow of the Kromdraaispruit and Kromdraai dam could be potentially affected due to the cumulative effect of drawdown resulting from the dewatering of the opencast area;
- Groundwater within the mined areas is expected to deteriorate due to chemical interactions between the geological and the groundwater. The resulting groundwater pollution plume will commence with downstream movement;

The above statements are clear indications that mining in the Kromdraai North areas will have a detrimental and destroying effect on the water quality and water quantity of the KromdraaiSpruit, the JC Dam, the Kromdraai Dam and the wetland areas, and that farming in the area will in future not be possible due to water pollution and the destroying of water sources.

It is the contention of the writer that the mitigation measures as proposed by the environmental specialists of the above two Reports are inadequate to prevent environmental degradation of the water resources as indicated in these Reports.

It is of specific concern to note in the Geohydrological Report the recommendation made by the environmental specialist on page 48 of the Report, namely, "Should any unusual seepage be

encountered during underground mining, a full hydrogeological study must be done on the impact that the underground mine dewatering will have on the J.C dam.”

The above recommendation is inadequate and superfluous to prevent any damage to the J C Dam, for the simple reason that once mining has taken place the damage is done and further studies would not remedy such damage and loss to the water source. The authorities should therefore, and in the light of the aforementioned statements not grant any environmental authorizations associated with the underground mining area.

It is noted in both the above two Reports that the environment associated with the position of the shaft system which will gain access to the underground mine has not been study or been reported on. In any case, due to the fact that the authorities should not grant any environmental authorizations associated with the underground mine as indicated above, no environmental authorizations should be granted in respect of the shaft area and its associated infrastructure development.

It is recommended in the Geohydrological Report that the opencast area not be mined, and therefore the authorities should not grant any environmental authorizations in respect of the opencast area and infrastructure development associated with this opencast mining operation.

3. The following statements are made in the Soils Wetland Petoplan Report:

- Sensitive areas include (a) wetland zones (385 ha or 44% of project area), within which mining activities ought to be excluded and (b) prime agricultural land (397 ha or 45%). These two land categories therefore cover 89% of the total area;
- In view of the need of protecting the limited high to moderate potential agricultural land/topsoil resources in the country, the significance of the prime farmland is assessed to be high both with and without mitigation;
- It is certain that any mining development within a wetland would ultimately lead to degradation. The wetland sites corresponding to map units We1, We2, Se, Ka and Rg represent sensitive areas of high significance and should ideally be excluded (and isolated by means of embankments, where necessary) from any mining activity to minimize impacts;
- Land comprising moderately high or moderate agricultural potential is perceived as a sensitive area. The construction of mining infrastructure will have a long term (and in most cases permanent) impact on agricultural productivity;
- As shown in TABLE 8, map units Hu1, Hu2 and Av plus hHu1 and Gc are occupied by moderately high and moderate potential agricultural land respectively and may be described as prime agricultural land. These map units cover about 397 ha or 45% of the total area. In view of the need of protecting the limited high to moderate potential agricultural land/topsoil resources in the country, the significance is assessed to be medium to high with and high without mitigation;
- Loss of prime agricultural land/topsoil (definite impact; medium---high significance with and high without mitigation);

It is clear from the above statements that mining operations in the project area will have a

detrimental and devastating effect on future crop production and that commercial farming business of the AIP will be destroyed with considerable loss and damage to my client. Permanent loss of high potential agricultural land will make commercial farming business economically unprofitable with the consequences that the AIP will be without income.

The authorities should not grant any environmental authorizations to authorize the establishment of the proposed mining operations within the project area in the light of the above negative socio--economical impact which the proposed mine will have on the commercial farming business of the AIP in general and the farming community at large.

4. Flora and Fauna Study Report

- The above Report on page 26 stated that about 15 Red Data Book bird species may occur in the project area, among others the Blue Crane, the Marabou Stork and the Grass Owl.
- The Report does not indicate any mitigation measures to protect these birds during mining operations, and thus the Report is incomplete, and does not comply with the provisions of the National Environmental Management Act, No. 107 of 1996 ("NEMA"), namely the investigation of mitigation measures to keep adverse consequences or impacts to a minimum [Section 24(2)(b)(ii)].

5. Traffic Impact Study Report

- This Report does not take into account the cumulative effect on future road traffic when both the proposed Kromdraai North (this project) and the Springboklaagte South Colliery will both be in operation. The draft Environmental Impact Assessment Report and draft Environmental Report for the Springboklaagte South project are in the public domain but no reference is made to the findings of such Reports in the draft EMP of the Applicant.

6. The Draft Environmental Impact Assessment Report and the draft Environmental Management Report ("EMP") makes the following statement contrary to the findings of the environmental specialists, namely:

- "A seasonal wetland occurs within the underground mining section, this wetland will be undermined. A 100 m buffer zone from the edge of the seasonal wetland will be demarcated at the opencast mining section, where mining activities will not be conducted within the buffer zone."
- The Wetland Study Report, the Geohydrological Report and the Soils Wetland Pedoplan Report clearly advise against any mining operations and establishment of mining infrastructure in the wetland areas (see the detailed statements in these Reports as summarized above). This proposed action of the Applicant is total disregard and insensitivity to the prevention of environmental degradation of the environment, and the leading authority has no other choice but to reject the application of the Applicant for environmental authority as applied for.

7. In the Chapter titled Need and Desirability of the Project "in the draft EMP on page 59 the following

Statements are made

- Eyethu Coal (Pty) Limited will employ approximately 38 employees, thus the commencement of the mining operation at the proposed Kromdraai North Colliery will contribute to the job creation within the Victor Khanye Local Municipality and beyond;
- It would be desirable for the project to commence. Not proceeding with the project will contribute to the already high levels of poverty and high unemployment rate;
- Eyethu Coal (Pty) Ltd expects that considerable benefits from the proposed mining project will accrue to the immediate project area, the sub-region and the province of Mpumalanga. These benefits must be offset against the costs of the project, including the impacts to land owners.
- Potential reduction in crime because of short-term job creation during construction (providing farm safety and security measures are implemented).
- Local growth in the economy of the town of Delmas and surrounding areas, and for local businesses including those that supply transport etc.
- Again, if the mining operation is not proceeded with, it will be denying the company the opportunity of contributing, as the holders of the mining right, towards the socio-economic development of the area in which they are operating.

The above statements have not been scientifically proven by way of a Socio---Economic Assessment Report, and the leading authority should be obliged to disregard the above statement as scientific unfounded. It is the contention of the writer that it can hardly be argued by the Applicant that the employment of 38 employees could have such a significant impact on the socio---economic impact on the relevant region as stated above.

No Socio---Economic Assessment Report has been done on the effect that mining operations will have on job losses of the farm workers community when farming operations will have to be abandoned due to mining in the area.

No Socio---Economic Assessment Report has been done on the effect that mining operations will have on the depletion and total destruction of the commercial farming business of the AIP in particular and the farming community in the project area at large if mining should commence. The total loss and damages to the AIP in particular and the farming community at large have not been assessed.

No census has been undertaken in order to determine the amount of farm workers who are employed by commercial farmers in the project area in general and by the AIP in particular and loss of income by them.

The above statements are made without sound statistics records and without taking into account the negative effect which mining will have on the commercial farming business of the owners of the land situated within the project area and job losses which will occur in the farm workers community.

The writer has pointed out in its comments on the Draft Scoping Report, and has reiterated in its comments in the Final Scoping Report the following, which is again emphasized and recorded:

Section 23(2)(b) of Chapter of NEMA states one of the general objective of integrated environmental management namely, to identify, predict and evaluate the actual and potential impact on the environment, socio---economic conditions..." The FSR fails to address the socio---economic conditions of, in particular the AIP, and the socio---economic impact which the proposed mine will have on its farming business at large, taking into account that the AIP will suffer loss and damage due to crop loss, and grazing loss. The Applicant is requested to adhere to the above provisions of NEMA, and to appoint an agricultural economist who will be able to compile an environmental report with regard to the socio---economic impact which the proposed mine will have on the farming business of the AIP, especially in the light of the fact that the proposed mine and its listed activities will have on the quality and quantity of water, which is the main component of the irrigation farming of the AIP"

It is clear that that Applicant has not complied with Section 23 (2)(b) of Chapter 5 of NEMA and therefore its application for the required listed activities cannot be considered by the Applicant, and must be rejected and not be approved by the authorities as such.

8. Cumulative Effect

The draft EMP does not address the cumulative effect which the Applicant's mining operations will have on the environment once the mining operations of the Applicant and that of the 'Springboklaagte South Colliery will both be established and in operations. Factors such as in increase in traffic, noise, dust, degradation of the environment, loss of high potential arable lands and commercial farming business, loss of jobs of farm workers and water pollution and water availability have not been considered or addressed.

Response

Below is a response to the questions raised by Mr. Johann Minnaar on behalf of C. H Boshoff Familie Trust.

1. Response: Based on the results of Wetland Assessment, the mining layout plan has been revised to remove all mine infrastructure that occurred within 100 m from the identified wetland areas. As indicated in Figure 3, a 100 m buffer zone has been added on the mining layout plan. A water Use licence Application was compiled and all mining activities within 500 m from any watercourse were applied for. The application was submitted to the Department of Water and Sanitation and is currently under review by the department.
2. Response: Based on the results of Geohydrological study, the mining layout plan has been revised to remove all mine infrastructure within 100 m from the identified wetland areas, thereby reducing the opencast mining area and in turn reducing the likelihood of decanting occurring in those areas. As indicated in Figure 3, a 100 m buffer zone has been added on the mining layout plan. Additional studies are currently being conducted by the geo-hydrologist to verify the extent of the potential impact on the Kromdraaispruit, Kromdraai dam and J.C dam.
3. Response: As indicated in Figure 3, a 100 m buffer zone has been added on the mining layout plan to restrict mining activity in those areas in order to avoid the identified wetlands soil areas. An Agricultural Economic specialist was appointed to conduct a baseline Agricultural Economic study in order to quantify the impact of the proposed Kromdraai North Colliery on the agricultural

land falling within the proposed mining and infrastructure areas. See Appendix 12 for the results of the study. Negotiations between the surface owner and Eyethu Coal (Pty) Limited will be conducted prior to mining commences.

4. Response: The mine will ensure that all mining and associated infrastructure covers as much as possible (a small footprint) in order to preserve as much of the grasslands present, in order for any red data bird species present to forage. The mine personnel will be further informed not to shoot any red data bird species or put out snares to capture any red data bird species in the mining area. The mine will ensure that no dirty storm water enters the surrounding water resources, hence a 100 m buffer zone has been indicated on the mining layout plan as well as proper storm water management control will be put in place to reduce the risk of the mine on the surrounding watercourses and in turn on the red data bird species that may be present in those watercourses.
5. Response: The proposed Coal mine will be known as Kromdraai North Colliery, which is approximately 693 ha in extent, and planned to be mined by means of open cast and underground methods. The proposed coal mine is located on the northern side of road R 50, approximately 25 km east of Delmas and approx. 15 km north of Leandra. It is estimated that the proposed mining activities will generate a maximum total of 130 vph ('In' & 'Out') during the critical weekday morning (AM) and afternoon (PM) peak periods, as is discussed in Chapter 3.3 of this study. From our site observations and the SIDRA capacity analyses results during the peak hours, the expected peak hour development traffic will not have a major impact on the existing roads R 50 and D 686, at the three key intersections. Due to safety considerations we propose regular and suitable gravel maintenance on road D 686.
6. Response: Based on the results of Wetland Assessment, the mining layout plan has been revised to remove all mine surface infrastructure that occurred within 100 m from the identified wetland areas, hence no mining or surface infrastructure will occur within the identified wetland areas. As indicated in Figure 3, a 100 m buffer zone has been added on the mining layout plan. In terms of the underground mining section on Kromdraai North Colliery, a portion of a temporary seasonal wetland will be undermined with mining occurring at an average depth of 45 m hence there will be no physical impact on the wetland as there is no surface infrastructure within that wetland.
7. Response: An Agricultural Economic specialist was appointed to conduct a baseline Agricultural Economic study in order to quantify the impact of the proposed Kromdraai North Colliery on the agricultural land falling within the proposed mining and infrastructure areas. See Appendix 12 for the results of the Agricultural Economic study. Negotiations between the surface owner and Eyethu Coal (Pty) Limited will be conducted prior to mining commences. Furthermore, during the compilation of the mining right application, a social and labour plan was compiled which incorporated socio economic background information based on census data and the Delmas Local Municipality IDP document. See Appendix 13 for the Social and Labour Plan.
8. At this stage Eyethu Coal does not have any information regarding the other mine (proposed Springboklaagte South Colliery). Hence it will be difficult to quantify the cumulative impacts in terms of traffic, noise, dust, degradation of the environment, loss of high potential arable lands and commercial farming business, loss of jobs of farm workers, water pollution and water availability. However during the operational phase of the two mines, negotiations will be initiated in order to share valuable information to reduce and combat any potential impacts that may

emanate from the two mines.

Registered Interested and Affected Party: Jm Property and Mineral Rights Consultants, Mr. Johann Minnaar, representative of Daniel Jacobus Opperman Bezuidenhout

1. The Wetland Assessment Study Report made the following statements:

- Based on the current mining layout boundary, the channelled valley bottom wetland associated with the Kromdraaispruit is located within the footprint of the proposed mining boundary.
- No mitigation measures can be implemented to counter the effects of mining on this wetland.
- The channelled valley bottom wetland associated with the non-perennial stream will also be negatively impacted by the proposed mining activities.
- It is expected that the wetland habitat of the channelled valley bottom wetland will be permanently destroyed and there are no mitigation measures that can be implemented

It is therefore clear from this Study that environmental authorization cannot be considered for listed activities within 500 metres from the footprint of these wetlands, unless authorization has been obtained from the Department of Water Affairs in terms of the provisions of Government Notice No.1199 dated 18 December 2009 “Replacement of General Authorization in terms of Section 39 of the National Water Act, 1998 (Act No. 36 1998).”

In any case, it will be indicated below that no mining should take place within the wetland areas irrespective of the 500 metre boundary as referred to above,

2. The following statements are made in the Geohydrological Report:

- The major concern as a result of underground mining is the close proximity of the J.C. dam to the boundary of the underground mining area (less than 100m). This poses a risk not only to the water resource in terms of dewatering, but also in terms of flooding of the underground mine, if preferential pathways (sills, dykes, faults) linking the J.C. dam with the underground mining area exist. This would allow a rapid influx of water into the underground mining area;
- The base flow feeding the Kromdraaispruit could be affected, as well the water quantity of the J.C dam and Kromdraai dam, if preferential pathways exist as discussed in the previous paragraph. This is of concern as a direct link between the J.C dam and the underground mining area could lead to rapid flooding of the underground mining area;
- The rise in groundwater level is predicted to be relatively slow and the water levels are expected to recover only in about 10---20 years;
- Groundwater within the mined areas is expected to deteriorate due to chemical interactions between the geological and the groundwater. The resulting groundwater pollution plume will commence with downstream movement;
- As some coal and discards will remain in the mine, this out flow will be contaminated as a result of acid or neutral mine drainage;

- The sulphate pollution plume emanating from the opencast is predicted to reach the Kromdraaispruit as well as Kromdraai dam between 25 to 50 years;
- It is recommended that the small opencast closest to the Kromdraaispruit not be mined to mitigate any polluted groundwater that might arise from potential decanting;
- Base flow of the Kromdraaispruit and Kromdraai dam could be potentially affected due to the cumulative effect of drawdown resulting from the dewatering of the opencast area;
- Groundwater within the mined areas is expected to deteriorate due to chemical interactions between the geological and the groundwater. The resulting groundwater pollution plume will commence with downstream movement;

The above statements are clear indications that mining in the Kromdraai North areas will have a detrimental and destroying effect on the water quality and water quantity of the KromdraaiSpruit, the JC Dam, the Kromdraai Dam and the wetland areas, and that farming in the area will in future not be possible due to water pollution and the destroying of water sources.

It is the contention of the writer that the mitigation measures as proposed by the environmental specialists of the above two Reports are inadequate to prevent environmental degradation of the water resources as indicated in these Reports.

It is of specific concern to note in the Geohydrological Report the recommendation made by the environmental specialist on page 48 of the Report, namely, "Should any unusual seepage be encountered during underground mining, a full hydrogeological study must be done on the impact that the underground mine dewatering will have on the J.C dam."

The above recommendation is inadequate and superfluous to prevent any damage to the J C Dam, for the simple reason that once mining has taken place the damage is done and further studies would not remedy such damage and loss to the water source. The authorities should therefore, and in the light of the aforementioned statements not grant any environmental authorizations associated with the underground mining area.

It is noted in both the above two Reports that the environment associated with the position of the shaft system which will gain access to the underground mine has not been study or been reported on. In any case, due to the fact that the authorities should not grant any environmental authorizations associated with the underground mine as indicated above, no environmental authorizations should be granted in respect of the shaft area and its associated infrastructure development.

It is recommended in the Geohydrological Report that the opencast area not be mined, and therefore the authorities should not grant any environmental authorizations in respect of the opencast area and infrastructure development associated with this opencast mining operation.

3. The following statements are made in the Soils Wetland Pedoplan Report:

- Sensitive areas include (a) wetland zones (385 ha or 44% of project area), within which mining activities ought to be excluded and (b) prime agricultural land (397 ha or 45%). These two land

categories therefore cover 89% of the total area;

- In view of the need of protecting the limited high to moderate potential agricultural land/topsoil resources in the country, the significance of the prime farmland is assessed to be high both with and without mitigation;
- It is certain that any mining development within a wetland would ultimately lead to degradation. The wetland sites corresponding to map units We1, We2, Se, Ka and Rg represent sensitive areas of high significance and should ideally be excluded (and isolated by means of embankments, where necessary) from any mining activity to minimize impacts;
- Land comprising moderately high or moderate agricultural potential is perceived as a sensitive area. The construction of mining infrastructure will have a long term (and in most cases permanent) impact on agricultural productivity;
- As shown in TABLE 8, map units Hu1, Hu2 and Av plus hHu1 and Gc are occupied by moderately high and moderate potential agricultural land respectively and may be described as prime agricultural land. These map units cover about 397 ha or 45% of the total area. In view of the need of protecting the limited high to moderate potential agricultural land/topsoil resources in the country, the significance is assessed to be medium to high with and high without mitigation;
- Loss of prime agricultural land/topsoil (definite impact; medium---high significance with and high without mitigation);

It is clear from the above statements that mining operations in the project area will have a detrimental and devastating effect on future crop production and that commercial farming business of the AIP will be destroyed with considerable loss and damage to my client. Permanent loss of high potential agricultural land will make commercial farming business economically unprofitable with the consequences that the AIP will be without income.

The authorities should not grant any environmental authorizations to authorize the establishment of the proposed mining operations within the project area in the light of the above negative socio economical impact which the proposed mine will have on the commercial farming business of the AIP in general and the farming community at large.

4. Flora and Fauna Study Report

- The above Report on page 26 stated that about 15 Red Data Book bird species may occur in the project area, among others the Blue Crane, the Marabou Stork and the Grass Owl.
- The Report does not indicate any mitigation measures to protect these birds during mining operations, and thus the Report is incomplete, and does not comply with the provisions of the National Environmental Management Act, No. 107 of 1996 ("NEMA"), namely the investigation of mitigation measures to keep adverse consequences or impacts to a minimum [Section 24(2)(b)(ii)].

5. Traffic Impact Study Report

- This Report does not take into account the cumulative effect on future road traffic when both the

proposed Kromdraai North (this project) and the Springboklaagte South Colliery will both be in operation. The draft Environmental Impact Assessment Report and draft Environmental Report for the Springboklaagte South project are in the public domain but no reference is made to the findings of such Reports in the draft EMP of the Applicant.

6. The Draft Environmental Impact Assessment Report and the draft Environmental Management Report (“EMP”) makes the following statement contrary to the findings of the environmental specialists, namely:

- “A seasonal wetland occurs within the underground mining section, this wetland will be undermined. A 100 m buffer zone from the edge of the seasonal wetland will be demarcated at the opencast mining section, where mining activities will not be conducted within the buffer zone.”
- The Wetland Study Report, the Geohydrological Report and the Soils Wetland Pedoplan Report clearly advise against any mining operations and establishment of mining infrastructure in the wetland areas (see the detailed statements in these Reports as summarized above). This proposed action of the Applicant is total disregard and insensitivity to the prevention of environmental degradation of the environment, and the leading authority has no other choice but to reject the application of the Applicant for environmental authority as applied for.

7. In the Chapter titled Need and Desirability of the Project “in the draft EMP on page 59 the following Statements are made:

- Eyethu Coal (Pty) Limited will employ approximately 38 employees, thus the commencement of the mining operation at the proposed Kromdraai North Colliery will contribute to the job creation within the Victor Khanye Local Municipality and beyond;
- It would be desirable for the project to commence. Not proceeding with the project will contribute to the already high levels of poverty and high unemployment rate;
- Eyethu Coal (Pty) Ltd expects that considerable benefits from the proposed mining project will accrue to the immediate project area, the sub-region and the province of Mpumalanga. These benefits must be offset against the costs of the project, including the impacts to land owners.
- Potential reduction in crime because of short-term job creation during construction (providing farm safety and security measures are implemented).
- Local growth in the economy of the town of Delmas and surrounding areas, and for local businesses including those that supply transport etc.
- Again, if the mining operation is not proceeded with, it will be denying the company the opportunity of contributing, as the holders of the mining right, towards the socio-economic development of the area in which they are operating.

The above statements have not been scientifically proven by way of a Socio---Economic Assessment Report, and the leading authority should be obliged to disregard the above statement as scientific unfounded. It is the contention of the writer that it can hardly be argued by the Applicant that the employment of 38 employees could have such a significant impact on the socio---economic impact on the relevant region as stated above.

No Socio---Economic Assessment Report has been done on the effect that mining operations will have on job losses of the farm workers community when farming operations will have to be abandoned due to mining in the area.

No Socio---Economic Assessment Report has been done on the effect that mining operations will have on the depletion and total destruction of the commercial farming business of the AIP in particular and the farming community in the project area at large if mining should commence. The total loss and damages to the AIP in particular and the farming community at large have not been assessed.

No census has been undertaken in order to determine the amount of farm workers who are employed by commercial farmers in the project area in general and by the AIP in particular and loss of income by them.

The above statements are made without sound statistics records and without taking into account the negative effect which mining will have on the commercial farming business of the owners of the land situated within the project area and job losses which will occur in the farm workers community.

The writer has pointed out in its comments on the Draft Scoping Report, and has reiterated in its comments in the Final Scoping Report the following, which is again emphasized and recorded:

Section 23(2)(b) of Chapter of NEMA states one of the general objective of integrated environmental management namely, to identify, predict and evaluate the actual and potential impact on the environment, socio---economic conditions..." The FSR fails to address the socio---economic conditions of, in particular the AIP, and the socio---economic impact which the proposed mine will have on its farming business at large, taking into account that the AIP will suffer loss and damage due to crop loss, and grazing loss. The Applicant is requested to adhere to the above provisions of NEMA, and to appoint an agricultural economist who will be able to compile an environmental report with regard to the socio---economic impact which the proposed mine will have on the farming business of the AIP, especially in the light of the fact that the proposed mine and its listed activities will have on the quality and quantity of water, which is the main component of the irrigation farming of the AIP"

It is clear that that Applicant has not complied with Section 23 (2)(b) of Chapter 5 of NEMA and therefore its application for the required listed activities cannot be considered by the Applicant, and must be rejected and not be approved by the authorities as such.

8. Cumulative Effect

The draft EMP does not address the cumulative effect which the Applicant's mining operations will have on the environment once the mining operations of the Applicant and that of the 'Springboklaagte South Colliery will both be established and in operations. Factors such as increase in traffic, noise, dust, degradation of the environment, loss of high potential arable lands and commercial farming business, loss of jobs of farm workers and water pollution and water availability have not been considered or addressed.

Response

Below is a response to the questions raised by Mr. Johann Minnaar on behalf of Jacobus Opperman Bezuidenhout.

1. Response: Based on the results of Wetland Assessment, the mining layout plan has been revised to remove all mine infrastructure that occurred within 100 m from the identified wetland areas. As indicated in Figure 3, a 100 m buffer zone has been added on the mining layout plan. A water Use licence Application was compiled and all mining activities within 500 m from any watercourse were applied for. The application was submitted to the Department of Water and Sanitation and is currently under review by the department.
2. Response: Based on the results of Geohydrological study, the mining layout plan has been revised to remove all mine infrastructure within 100 m from the identified wetland areas, thereby reducing the opencast mining area and in turn reducing the likelihood of decanting occurring in those areas. As indicated in Figure 3, a 100 m buffer zone has been added on the mining layout plan. Additional studies are currently being conducted by the geo-hydrologist to verify the extent of the potential impact on the Kromdraaispruit, Kromdraai dam and J.C dam.
3. Response: As indicated in Figure 3, a 100 m buffer zone has been added on the mining layout plan to restrict mining activity in those areas in order to avoid the identified wetlands soil areas. An Agricultural Economic specialist was appointed to conduct an Agricultural Economic study in order to quantify the impact of the proposed Kromdraai North Colliery on the agricultural land falling within the proposed mining and infrastructure areas. See Appendix 12 for the results of the study. Negotiations between the surface owner and Eyethu Coal (Pty) Limited will be conducted prior to mining commences.
4. Response: The mine will ensure that all mining and associated infrastructure covers as much as possible (a small footprint) in order to preserve as much of the grasslands present, in order for any red data bird species present to forage. The mine personnel will be further informed not to shoot any red data bird species or put out snares to capture any red data bird species in the mining area. The mine will ensure that no dirty storm water enters the surrounding water resources, hence a 100 m buffer zone has been indicated on the mining layout plan as well as proper storm water management control will be put in place to reduce the risk of the mine on the surrounding watercourses and in turn on the red data bird species that may be present in those watercourses.
5. Response: The proposed Coal mine will be known as Kromdraai North Colliery, which is approximately 693 ha in extent, and planned to be mined by means of open cast and underground methods. The proposed coal mine is located on the northern side of road R 50, approximately 25 km east of Delmas and approx. 15 km north of Leandra. It is estimated that the proposed mining activities will generate a maximum total of 130 vph ('In' & 'Out') during the critical weekday morning (AM) and afternoon (PM) peak periods, as is discussed in Chapter 3.3 of this study. From our site observations and the SIDRA capacity analyses results during the peak hours, the expected peak hour development traffic will not have a major impact on the existing roads R 50 and D 686, at the three key intersections. Due to safety considerations we propose regular and suitable gravel maintenance on road D 686.

6. Response: Based on the results of Wetland Assessment, the mining layout plan has been revised to remove all mine surface infrastructure that occurred within 100 m from the identified wetland areas, hence no mining or surface infrastructure will occur within the identified wetland areas. As indicated in Figure 3, a 100 m buffer zone has been added on the mining layout plan. In terms of the underground mining section on Kromdraai North Colliery, a portion of a temporary seasonal wetland will be undermined with mining occurring at an average depth of 45 m hence there will be no physical impact on the wetland as there is no surface infrastructure within that wetland.
7. Response: An Agricultural Economic specialist was appointed to conduct an Agricultural Economic study in order to quantify the impact of the proposed Kromdraai North Colliery on the agricultural land falling within the proposed mining and infrastructure areas. See Appendix 12 for the results of the Agricultural Economic study. Negotiations between the surface owner and Eyethu Coal (Pty) Limited will be conducted prior to mining commences. Furthermore, during the compilation of the mining right application, a social and labour plan was compiled which incorporated socio economic background information based on census data and the Delmas Local Municipality IDP document. See Appendix 13 for the Social and Labour Plan.
8. At this stage Eyethu Coal does not have any information regarding the other mine (proposed Springboklaagte South Colliery). Hence it will be difficult to quantify the cumulative impacts in terms of traffic, noise, dust, degradation of the environment, loss of high potential arable lands and commercial farming business, loss of jobs of farm workers, water pollution and water availability. However during the operational phase of the two mines, negotiations will be initiated in order to share valuable information to reduce and combat any potential impacts that may emanate from the two mines.

4.1.4 Record of Decision

I&AP's will be notified in writing and by way of advertisements in the local newspaper, of the authority's decision on the final EIA/EMP, that is whether environmental authorisation has been granted to the applicant or not, and the conditions of the authorisation. If positive, I&AP's will be advised that the decision may be appealed within 20 days from notification of the decision. Notification of the authority's decision will be provided as follows: A notice will be sent out to all registered I&AP's informing them of the authority's decision and explaining how to lodge an appeal should they wish to; and an advertisement to announce the authority's decision will be published in the local newspaper.

SECTION FIVE

Need and Desirability of the Project

5. NEED AND DESIRABILITY OF THE PROPOSED PROJECT

5.1 NEED AND DESIRABILITY FOR THE PROJECT

Eyethu Coal (Pty) Limited will employ approximately 38 employees, thus the commencement of the mining operation at the proposed Kromdraai North Colliery will contribute to the job creation within the Victor Khanye Local Municipality and beyond. In view of the unemployment rates within the local municipality and the poverty within the area, it would be desirable for the project to commence. Not proceeding with the project will contribute to the already high levels of poverty and high unemployment rate. In terms of the Kromdraai North Colliery's Social and Labour Plan, the mining operation at Kromdraai North Colliery will result in assistance with the establishment of small and medium businesses and infrastructure development, community development and poverty eradication projects.

Eyethu Coal (Pty) Ltd expects that considerable benefits from the proposed mining project will accrue to the immediate project area, the sub-region and the province of Mpumalanga. These benefits must be offset against the costs of the project, including the impacts to land owners.

The potential benefits of the proposed project are:

Long-term, national benefits of reliable power supply and the resultant socio-economic benefits.

Highly significant benefits to the province of Mpumalanga in terms of the long-term coal supply to Eskom. Local, provincial and national socio-economic benefits.

Potential reduction in crime because of short-term job creation during construction (providing farm safety and security measures are implemented).

Local growth in the economy of the town of Delmas and surrounding areas, and for local businesses including those that supply transport etc.

Economic benefits for contractors and other suppliers of goods and services.

If the mining operation on the proposed mining area is not proceeded with, the consequences will be negative in that the coal reserves will be sterilized.

Again, if the mining operation is not proceeded with, it will be denying the company the opportunity of contributing, as the holders of the mining right, towards the socio-economic development of the area in which they are operating.

SECTION SIX

Detailed Description of the Project

6. DETAILED DESCRIPTION OF THE PROJECT

6.1 DETAIL DESCRIPTION OF THE PROJECT

6.1.1 Surface Infrastructure

The mine surface infrastructure associated with the proposed opencast mining area will comprise of the following; access roads, hards overburden stockpile area, softs material stockpile area, R.O.M coal stockpile area, product stockpile area, water management facilities (trenches, berms, pollution control dam, silt trap, sump etc.), mine offices and change rooms, workshops, crushing and screening plant, diesel bay area, weighbridge, box-cuts and access ramps. Refer to Figure 4 for the opencast mining layout plan for more details. The mine surface infrastructure associated with the proposed underground mining area will comprise of the following; access roads, weighbridge, hards overburden stockpile area, topsoil stockpile area, R.O.M coal stockpile area, water management facilities (trenches, berms, pollution control dam, silt trap, sump etc.), mine offices and change rooms, equipment yard, workshop and oil separator, parking bay areas, electrical supply (Eskom substation), diesel bay area, adit with related structures and telephone lines. Refer to Figure 5 for the underground mining layout plan for more details.

6.1.1.1 Roads, railways, conveyor belts and power lines

There are various main and minor roads and power lines crossing nearby the proposed Kromdraai North Colliery mining area. District roads (R 50, D 686 and D 2543), telephone lines and heavy duty Eskom power lines transect the mining area. With regards to access to the proposed mining site, the proposed access is located on a fairly straight portion of district road D 686 where it is still gravel, approximately 1 km north of the existing T-junction with district road D 2543.

6.1.1.2 Solid Waste Management

The proposed Kromdraai North Colliery will use a contractor for the transportation of domestic waste from the mining operation to the registered Leandra waste disposal sites. The waste will be sorted before disposal, paper and cardboard will be separated and sent for recycling.

Industrial waste arising from the mine (classified as hazardous waste – old paint tins, degreaser containers, oily rags, etc) will be collected in a different waste collection system and disposed of by a contractor at a registered hazardous waste disposal site. Batteries, tyres, old conveyor belts, used oil drums and waste metal will be collected around the mine, transported to the Kromdraai North Colliery's salvage yard and sorted. The waste will then be sold to scrap and recycling companies.

6.1.1.3 Mine residue (coal discard) management

No coal processing plant will be constructed at the proposed Kromdraai North Colliery, no coal discard disposal facility will therefore be necessary. All coal from the mining areas will be transported to the Run of Mine (R.O.M) coal stockpiles, crushed and screened and sold to customers.

6.1.1.4 Water Pollution Management Facilities

Kromdraai North Colliery will operate on the strategy of maximising the utilisation of “dirty water” in the mining area and will have a policy of zero discharge of contaminated water. Most of the water used in mining will be obtained from the pit and underground workings. The water accumulated in the pit workings will be pumped into the pollution control dams. The water from the pollution control dams will be utilised to suppress dust on the haul roads.

6.1.1.5 Sewage Treatment

Septic/conservancy tanks will be used for the collection and treatment of sewage at Kromdraai North Colliery. A waste removal contractor will be appointed to empty the tanks on a regular basis. The removed waste will be deposited at a registered sewage treatment plant.

6.1.1.6 Portable water

There will be no potable water treatment plant at Kromdraai North Colliery. Drinking water will be obtained from boreholes.

6.1.1.7 Process water supply

The supply of process water that will be required at the mine will be the supply of water for dust suppression and for the treatment of sewage. The supply of water for dust suppression will include the use of water pumps which will be used to fill water carts that will sprinkle water on the access and haul roads and any area that will require dust suppression. Water supply for sewage treatment will be obtained from the water tanks to be installed on site. Water pumps will be installed for the pumping of water from the tanks to the septic/conservancy tanks.

6.1.1.8 Transport

Mine officials and senior skilled employees will use their own vehicles for all transport requirements. Where necessary, a bus services will be made available to transport other employees from their residence to their working place. Normal light delivery vehicles will be utilized to transport employees to the opencast mining areas. Underground vehicles will be specially altered to work in a coal mine as per the Department of Mineral Resources requirements.

A number of haul roads will be constructed around the mine for the transportation of coal from the opencast areas to the main R.O.M. coal stockpiling area. R.O.M. from the underground section will be transported by dump trucks using the roads, R 580, R 50, D686 and D 2543 to the main R.O.M. at the

opencast section. R.O.M. coal from the main stockpile will be crushed and screened before being transported to customers.

6.1.1.9 Workshops and buildings

The locality of workshops, change houses, main office and others are indicated on the Mining Layout Plan (Figure 3). These buildings will be equipped with the necessary septic/conservancy tanks, electricity and telecommunication facilities.

Workshops will be equipped with wash bays and oil separators will also be established adjacent to the workshops and fuel storage tanks. Power supply facilities will also be constructed on the proposed mining areas.

6.1.1.10 Housing

No houses or hostels will be established on the mining areas. All employees will be transported on a daily basis to the mine.

6.1.1.11 Disturbance of Water Courses

Wetlands associated with the Kromdraaispruit and its tributaries occur on and adjacent to the mining areas. A seasonal wetland occurs within the underground mining section, this wetland will be undermined. A 100 m buffer zone from the edge of the seasonal wetland will be demarcated at the opencast mining section, where mining activities will not be conducted within the buffer zone. Management of Eyethu Coal (Pty) Limited is committed to comply with the environmental legislation, by obtaining necessary authorisations before mining within and adjacent to these wetlands. **A detailed Wetland Assessment report is attached in Appendix 9.**

6.1.1.12 Storm water management

Storm water measures will be necessary for the proposed mining project. Kromdraai North Colliery will practice a policy of clean and dirty water separation where dirty water is contained and stored in the pollution control dams for re-use on the haul roads and material stockpiles.

A conceptual storm water management plan has been drafted for the proposed Kromdraai North Colliery. This storm water management plan is designed to separate clean and polluted water. The storm water management plan is designed such that the separated dirty water is diverted to pollution control dams (PCD (opencast area) and PCD (underground area)). **The Conceptual Design Report is attached as Appendix 11.**

SECTION SEVEN

Description of Identified potential alternatives

7. CONSIDERATION OF ALTERNATIVES

7.1 LOCATION ALTERNATIVES

In terms of the proposed Kromdraai North Colliery, there are no location alternatives that could be considered as the coal reserve occurs in the proposed mining area as shown in the Mining Layout Plan.

7.2 SITE LAYOUT ALTERNATIVES

In terms of the Kromdraai North Colliery infrastructure area, there were no site layout alternatives that could be considered, due to the location of the coal reserves on the proposed Kromdraai North Colliery.

7.3 TRANSPORT ALTERNATIVES

In terms of the Kromdraai North Colliery the most viable option chosen is using trucks to transport coal to Eskom and the other markets.

7.4 NO GO OPTION

Eyethu Coal (Pty) Limited will employ approximately 38 employees, thus the commencement of the mining operation at the proposed Kromdraai North Colliery will contribute to the job creation within the Victor Khanye Local Municipality and beyond. Not proceeding with the project will contribute to the already high levels of poverty and high unemployment rate. In terms of the Kromdraai North Colliery's Social and Labour Plan, the mining operation at Kromdraai North Colliery will result in assistance with the establishment of small and medium businesses and infrastructure development, community development and poverty eradication projects.

Accordingly, the consequences of not proceeding with the proposed project will have a detrimental impact on the current and future labour force, the surrounding previously disadvantaged communities, the owners of the mine, and the coal export market. This may ultimately have an impact on the region as a whole, due to a loss of revenue and due to a loss in taxes.

SECTION EIGHT

Impact Assessment

8. IMPACT ASSESSMENT

8.1 ASSESSMENT METHODOLOGY

The following prediction and evaluation of impacts is based on the proposed Kromdraai North mining activities to be conducted at the proposed area.

The evaluation distinguishes between significantly adverse and beneficial impacts and allocates significance against national regulations, standards and quality objectives governing:

- Health & Safety
- Protection of Environmentally Sensitive Areas
- Land use
- Pollution levels
- Irreversible impacts are also identified.

The significance of the impacts is determined through the consideration of the following criteria:

Probability	: likelihood of the impact occurring
Area (Extent)	: the extent over which the impact will be experienced.
Duration	: the period over which the impact will be experienced.
Intensity	: the degree to which the impact affects the health and welfare of humans and the environment (includes the consideration of unknown risks, reversibility of the impact, violation of laws, precedents for future actions and cumulative effects).

The above criteria are expressed for each impact in tabular form according to the following definitions:

Probability	Definition
Low	There is a slight possibility (0 – 30%) that the impact will occur.
Medium	There is a 30 – 70% possibility that the impact will occur.
High	The impact is definitely expected to occur (70% +) or is already occurring.
Area (Extent)	Definition
Small	0 – 40 ha
Medium	40 – 200 ha
Large	200 + ha
Duration	Definition
Short	0 – 5 years
Medium	5 – 50 years

Long	51 – 200 years
Permanent	200 + years

Intensity	Definition
Low	Does not contravene any laws, Is within environmental standards or objectives, Will not constitute a precedent for future actions, Is reversible Will have a slight impact on the health and welfare of humans or the environment.
Medium	Does not contravene any laws, Will not constitute a precedent for future actions, Is not within environmental standards or objectives, Is not irreversible Will have a moderate impact on the health and welfare of humans or the environment.
High	Contravene laws, May constitute a precedent for future actions, Is not within environmental standards or objectives, Is irreversible Will have a significant impact on the health and welfare of humans or the environment.

Significance	Definition
Negligible	The impact is insubstantial and does not require management
Low	The impact is of little importance, but requires management
Medium	The impact is important; management is required to reduce negative impacts to acceptable levels
High	The impact is of great importance, negative impacts could render options or the entire project unacceptable if they cannot be reduced or counteracted by significantly positive impacts, and management of these impacts is essential
Positive	The impact, although having no significant negative impacts, may in fact contribute to environmental or economical health

8.2 ASSESSMENT OF THE ENVIRONMENTAL IMPACTS FOR THE PROPOSED KROMDRAAI NORTH COLLIERY

The tables below describe the assessment of impacts from the proposed activities applied for, for the proposed Kromdraai North Colliery. Note that under the assessment the following abbreviations i.e. P, E, D, I and S were used, which stands for Probability, Extent, Duration, Intensity and Significance respectively.

8.2.1 CONSTRUCTION PHASE- KROMDRAAI NORTH COLLIERY

ENVIRONMENTAL IMPACT ASSESSMENT CONSTRUCTION PHASE- KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
Construction of haul/access roads, pollution control facilities, soil and overburden stockpiles.	The formation of topsoil, subsoil and overburden stockpiles will result in topographical highpoints, which will alter the local topographical patterns of the immediate area.	H	S	S	L	M	Ensure that as little space as possible is used for the stockpiling of topsoil, subsoil and overburden material.
	The construction of the pollution control dams will result in the formation of topographical void, which will change the local topographical patterns of the immediate area.	H	S	S	L	L	Ensure that the dams are designed by a suitably qualified person who will ensure that the dam covers as little space as possible whilst complying with the relevant legal requirements.
	All activities will result in stripping and removal of topsoil layers, which will disrupt the soil profile. This may result in the loss of prime agricultural land, changes on the land surface, soil erosion, soil compaction and chemical soil pollution.	H	S	S	L	M	Strip topsoil clean from underlying non-topsoil material such as weathered sandstone. Construct soil conservation measures at construction sites and along roads. Minimise compaction by avoiding unnecessary trafficking. Make contingency plans to manage hydrocarbon spills that may occur. Stockpile topsoil layers in the designated stockpiling area and ensure that soil fertility is tested.
	All activities will result in the removal of the topsoil layer, which will result in the loss of natural vegetation cover.	H	S	S	L	M	All topsoil material to be stockpiled separately at appropriate height. Note that the topsoil will retain its seed bank if stockpiled properly.

ENVIRONMENTAL IMPACT ASSESSMENT CONSTRUCTION PHASE- KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
	Exposure of soils may lead to increased silt loads in surface water runoff.	H	S	S	M	M	The trenches must be constructed such that any exit point for water, will have a silt trap that will settle silt from construction sites before reporting to the clean water environment.
	Movement of mine vehicles over exposed areas will result in the generation of dust. Generated dust will migrate towards the predominant wind direction and settle on surrounding properties and crops.	H	S	S	H	M	Conduct dust suppression on haul and access roads on a regular basis.
	Noise generated from construction activities may add to the current noise levels.	M	S	S	M	M	Construction of berms to reduce the noise levels. Limit mining activities during night time.
	Degradation of the wetland during construction activities. Sedimentation from rainfall induced runoff from the construction site may have negative impacts on the wetland area. This will affect the vegetation cover along the wetland boundary, which will cause loss of the remaining habitats at the wetland areas.	H	S	M	H	H	Avoid development in wetland zones and maintain 100 m buffer zone, limit and manage any activities within the buffer zone. Avoid the dumping of materials, spills into wetland zones. Design, implement and maintain effective water runoff control measures. Refrain from disturbing land in the proximities of wetland zones. Implement good construction practices, adhere to properly managed strip mining procedures.
	The construction activities may interfere with the scenic views from surrounding farm dwellings and small holdings.	H	S	S	M	H	Construct visual berms around the visible areas of the mine.
Construction of an initial box cut (opencast	The excavation of the initial box-cut will result	H	S	S	H	H	No mitigation can be undertaken for the predicted impact.

ENVIRONMENTAL IMPACT ASSESSMENT CONSTRUCTION PHASE- KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
pit)	in the disturbance of the geological profile.						
	The construction of the initial box cut will result in the formation of topographical void, which will change the local topographical patterns of the immediate area.	H	S	S	H	H	The initial box cut must be designed and constructed to cover as little space as possible. Concurrent rehabilitation to be undertaken as soon as the coal is removed from the initial box-cut.
	Construction of the initial box cut will result in the striping and removal of the topsoil layer, which will disrupt the soil profile. This will result in the reduction of the land capability of the area. Land use will change from grazing to mining.	H	S	S	M	M	Stockpile removed topsoil on a topsoil stockpile area separate from other overburden stockpiles. Ensure that the topsoil stockpile is stockpiled to have a height that will prevent the reduction in the fertility of the topsoil.
	Construction of the initial box cut will result in the removal of the topsoil layer, which will result in the loss of natural vegetation cover.	H	S	S	M	M	All topsoil material to be stockpiled separately at an appropriate height. Note that the topsoil will retain its seed bank if stockpiled properly.
	The mining activities will result in the migration of animals away from the proposed mining area.	L	S	S	L	L	Ensure that mining activities are confined to the mining right area and ensure that the employees are educated in the protection of wildlife.
	Excavation of the initial box cut will result in the formation of void that will result in reduced runoff within the Kromdraaispruit sub-catchments.	H	S	S	L	L	The initial box cut must be designed and constructed to cover as little space as possible.

ENVIRONMENTAL IMPACT ASSESSMENT CONSTRUCTION PHASE- KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
	Exposure of soils may lead to increased silt loads in surface water runoff.	H	S	S	L	M	Construct berms along the box-cuts to reduce the levels of silt that may report to the nearby stream.
	Water captured within the pit will be exposed to carbonaceous material, resulting in elevated mining related contaminants such as SO ₄ concentrations.	H	S	S	H	H	Water captured in the pit must be pumped into the pollution control dam promptly.
	Stripping of soil layers will result in the exposure of soils, which will result in the generation of dust during windy periods.	H	S	S	M	M	Conduct dust suppression daily. Enforce appropriate speed limits for the mine vehicles
	During blasting vibration may have an impact on the surrounding structures, surrounding industries and small holdings	H	S	S	M	H	A qualified blasting expert will be employed to design the blasting such that nearby properties and residents are not affected.
	Machine operators in close proximity to machinery will be exposed to noise levels in excess of 85 dB.	H	S	S	H	H	Ensure that the mine employees are issued with earplugs and that they are instructed to use them.
	During blasting noise levels may reach in excess of 130 dB.	H	S	S	L	M	Educate employees on the dangers of hearing loss due to mine machinery. A qualified blasting expert will be employed to design the blasting such that nearby residents are not affected.
Construction of crushing and screening	The construction of these infrastructures and	H	S	S	M	M	The crushing and screening plant and associated buildings will be

ENVIRONMENTAL IMPACT ASSESSMENT CONSTRUCTION PHASE- KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
plant, workshops, offices and mine related infrastructure	associated buildings will result in the creation of topographical highpoints, which may change the landscape of the area.						constructed to have heights that are within acceptable standards and that will not have detrimental impacts on the surrounding environment. Paint structures in a colour that will blend with the surrounding environment.
	Waste (general and hazardous) will be generated from the construction of the above-mentioned infrastructure and associated buildings.	H	S	S	M	M	All waste generated during the construction activities will be collected in bins and disposed of at a registered landfill site.
	Noise levels will be increased during the construction of the above-mentioned infrastructure. This may have impacts on the surrounding property owners.	H	S	S	M	M	All construction equipment will be maintained to ensure that noise generated from such machinery is within regulated standards.

8.2.2 OPERATIONAL PHASE- KROMDRAAI NORTH COLLIERY

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
Systematic removal of coal from the opencast pits	Removal and subsequent replacement of overburden material for access to the target coal seams will result in the disturbance of the	H	M	S	H	H	No mitigation can be undertaken for this impact. The mine will however replace the overburden material in the mined out opencast

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
	geological layers overlying the target coal seams.						pits during rehabilitation.
	Opening of opencast pits during mining will result in the formation of a void, which will alter the local topographical patterns within the immediate mining area.	H	M	S	H	H	Mining must be undertaken concurrently with rehabilitation. A maximum of three cuts must be operational at any time during mining.
	Rehabilitated areas may show areas of localised water ponding and impaired drainage.	H	M	S	M	M	Ensure that the rehabilitated areas maintain safe slopes and the areas are free draining.
	Stripping of top- and subsoil layers during mining will result in the disruption of the soil profile.	H	M	S	M	M	Mining must be undertaken concurrently with rehabilitation. A maximum of three cuts must be operational at any time during mining.
	During mining the soils’ physical, chemical and biological properties may be altered due to mixing soils with sub-soils during handling, stockpiling and subsequent placement.	H	M	S	M	M	Stockpile different soils separately. Improve organic status of soils during rehabilitation. Curb topsoil loss by erosion control measures.
	The impact on soils may lead to reduction in the land capability.	H	M	P	M	H	Facilitate agricultural use of rehabilitated land and effective management of rehabilitated land.
	The opencast mining will result in the removal of the topsoil layer, which will result in the loss of natural grassland vegetation cover.	H	M	S	M	M	Mining must be undertaken concurrently with rehabilitation. A maximum of three cuts must be operational at any time during mining. The rest of the mined out area will be rehabilitated and re-

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
							vegetated.
	Disturbance to and/or exclusion of animals currently occupying/utilising the site.	H	S	S	L	L	No mitigation will be undertaken. Note that fauna will naturally re-colonise un-mined and rehabilitated areas. Experience has however shown that opencast mining does not pose permanent effect on animal life as the rate of advance of the pit is slow, reciprocal habitat is available for fauna to move into, and rehabilitation follows mining hence the low significance of the impact.
	There is a risk that uncontrolled access to the workings by mine and contractor employees will result in poaching of animals.	M	S	M	H	H	Educate employees on dangers of trapping endangered species during the mines environmental awareness plan implementation.
	Loss of animal burrows/microhabitats and migration of animals may occur due to disruption of soil profile and stripping of vegetation cover over the mining areas.	M	L	M	H	H	Concurrent rehabilitation will minimise the impact
	Formation of a void during mining will result in loss of MAR within the catchments.	H	M	S	M	M	Ensure that the operational opencast pit covers as little space as possible during mining; hence rehabilitation must be conducted concurrently with mining to ensure that the mined areas are returned to free draining surfaces.
	Runoff from the upslope area may enter the opencast workings giving rise to an increased loss of potential surface water runoff within affected catchments	H	S	S	H	H	Construct diversion trenches or berms on the upslope side of the opencast pit.

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
	Surface run-off may result in soil erosion over rehabilitated areas.	H	S	M	M	H	Establish vegetation as soon as possible after completion of soil placement and profiling.
	Water captured within the pit may contain elevated ion concentrations, which may impact detrimentally on the environment if allowed to enter the natural environment.	H	M	S	H	H	All dirty water from the mine will be diverted and captured within the opencast pit and pumped into the pollution control dams. Since no mining will be undertaken within the 1:100 year floodline, no wetland is expected to be physically affected by the proposed mine.
	During the operational phase, it is expected that the main impact on the groundwater quantity will be dewatering of the surrounding aquifer and loss of groundwater contribution to catchments base flow. Water entering the mining pit will have to be pumped out to enable mining activities. This will cause a lowering of the groundwater table in and around the mine and hence loss of groundwater to catchments base flow.	H	M	M	M	M	Monitor static groundwater levels, on a quarterly basis, in all boreholes within a zone of two kilometres surrounding the opencast pit areas, to ensure that any deviation of the groundwater flow from the idealised predictions is detected in time and can be dealt with appropriately. If it can be proven that the mining operation is indeed affecting the quantity of groundwater available to certain users, the affected parties should be compensated.
	Groundwater within the mined areas is expected to deteriorate due to chemical interactions between the geological strata and the groundwater, resulting groundwater pollution plume migrating downstream.	H	M	M	H	H	Mining should remove all coal from the seams and as little as possible should be left. Remaining acid producing material should be placed as low in the pit as possible to ensure fast flooding of the material. All mined areas should be flooded as soon as possible to bar oxygen from reacting with remaining pyrite

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
							<p>The final backfilled topography of the opencast should be engineered such that runoff is directed away from the backfilled areas. The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge to the opencast.</p> <p>Quarterly groundwater sampling must be done to establish a database of plume movement trends, to aid eventual mine closure.</p>
	During mining, fine coal or coal dust may accumulate in the workings. This may have health impacts on the employees.	H	S	S	H	H	Employees must be issued with dust masks and instructed to use them. Dust suppression must be undertaken at the opencast pits.
	Spontaneous combustion of coal in exposed faces or in carbonaceous spoils may generate noxious gasses associated with burning coal.	M	S	S	M	M	<p>Overburden stockpiles will be compacted accordingly and continuously to reduce the risk of spontaneous combustion.</p> <p>Rehabilitation of mined out areas as soon as possible to limit spoils area of spontaneous combustion risk.</p>
	Blasting of the overburden and coal seams will result in the generation of dust, which may contain fine coal. The dust will migrate towards the predominant wind direction.	H	L	S	H	H	<p>A Safe blasting distance (500 m) must at all times be maintained. Evacuation of human beings and animals within 500 m must be conducted with all the required pre-blasting negotiations. Proper road closure procedures in conjunction with the necessary authorities will be required. A monitoring program and photographic inspection must be initiated. Proper stemming lengths must be maintained to control fly rock. Blasting times taking weather conditions into consideration must at all times be enforced.</p> <p>A qualified blasting expert must be employed to design blasting</p>

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
							patterns such that nearby properties and residents are least affected.
	Machine operators in close proximity to machinery will be exposed to noise levels in excess of 85 dB.	H	S	S	H	H	Issue earplugs to employees and educate on their use and on the effect of noise on their health.
	During blasting, noise levels may reach in excess of 130 dBA.	H	S	M	H	H	Monitor noise levels to ensure that the required noise levels are maintained within the surrounding areas.
	The noise and vibration of the blast may be audible/felt within a certain distance from the mining area.	H	S	S	H	H	A qualified blasting expert will be employed to design the blasting such that nearby residents are not adversely affected.
	Blasting may also generate vibrations and fly rock that may damage the vehicles or cause injury to public travelling on roads adjacent to the pits.	H	S	S	H	H	Close the provincial road during blasting in consultation with relevant authority and nearby community.
	Visual impacts will result from the proposed Kromdraai North Colliery's mining operations.	H	L	S	M	M	Ensure that the constructed visual berms along visible parts of the mine are maintained. Rehabilitate concurrently with mining.
	Potential socio-economic impacts of the mining operation include threat of increase in crime and petty theft and poaching by labourers, if they reside on site.	H	M	S	H	H	Through the environmental awareness plan, the employees will be made aware of the impact poaching and crime will have on the surrounding farmers and the environment.

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
Construction of an inclined adit and systematic removal of coal from the underground mining section.	Formation of a void during mining will result in loss of MAR within the catchments.	H	S	M	M	M	Ensure that the adit covers as little space as possible, without compromising the required production.
	Blasting may also generate vibrations and fly rock that may damage the vehicles or cause injury to public travelling on roads adjacent to the pits.	H	S	M	M	M	Close the provincial road during blasting in consultation with the relevant authority.
	The major concern as a result of underground mining is the close proximity of the J.C. dam to the boundary of underground mining area and undermining the wetland areas, ie, flooding of the underground workings, if preferential pathways (sills, dykes, faults) linking the J.C. dam and wetland areas with the underground mining area exist.	H	S	M	H	H	<p>In terms of the National Water Act, 1998 (Act No. 36 of 1998 Government Notice 704) no mining (opencast or underground) or any mining activity may be established within the 1:50 year flood-line or within a horizontal distance of 100 m from any watercourse or estuary, whichever is the greatest.</p> <p>Drill boreholes between J.C. dam and the underground boundary to monitor static groundwater levels to ensure that any deviation of the groundwater levels is detected in time and can be acted swiftly and appropriately.</p> <p>Major underground fractures encountered while mining must be sealed by grouting.</p>
	Groundwater within the mined areas is expected to deteriorate due to chemical interactions between the geological strata and the groundwater, resulting groundwater pollution plume migrating downstream.	H	S	M	H	H	<p>Mine sections should be sealed where possible during mining to reduce the contact of water and air with remaining sulphides.</p> <p>Install water collection and pumping systems within the mining areas capable of rapidly pumping water out, so minimising contact of water the geochemically reactive material. Kinetic testing of the pillar</p>

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
							material should be conducted to aid in the prediction of post mining geochemical conditions
	High extraction of coal could lead to subsidence	H	S	M	H	H	Pillars with sufficient strength will be left intact, to keep the overlying strata from collapsing.
Operation of the main R.O.M coal stockpile areas	The stockpiling of the R.O.M coal will result in the formation of a topographical highpoint, which may change the topography of the area.	H	S	M	M	M	Use of in pit R.O.M stockpile areas instead of surface R.O.M stockpiling areas must be investigated and implemented if feasible.
	Runoff from the R.O.M coal stockpile may contain elevated chemical concentrations, which will impact negatively on the environment if released.	L	S	M	H	H	Divert and pump all runoff water from the R.O.M coal stockpile to the sump, then to pollution control dams.
	During stockpiling of coal (R.O.M and product coal), machinery movement and wind blowing over exposed surfaces will generate dust and diesel fumes. This dust will during windy days form dust clouds and migrate towards the wind direction, which will eventually settle on vegetation cover. This dust cloud may impact negatively on the nearby residents and on the natural vegetation cover.	M	S	M	L	L	Conduct dust suppression on the roads within the stockpiling area and limit the vehicle activity as much as possible within these roads. Limit the size of the stockpiles to the recommended size. Maintain and repair mine vehicles on a continuous basis.
	The R.O.M coal stockpile (surface stockpiling)	H	S	S	H	H	Use in pit areas for the R.O.M coal stockpiling. This must not be

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
	may be visible from a certain distance resulting in a visual impact.						visible from the surrounding areas.
Operation of other mine infrastructure i.e. haul and access roads and mine office/workshop complex.	The transportation of R.O.M. coal and overburden material (top soils, sub soils and hards) may result in the contamination of virgin land (soil and vegetation) due to spillages along the access/haul roads.	H	S	S	M	M	Trucks to obey maximum speed limit to be set by the mine. Conduct dust suppression on access and haul roads.
	Leaking oils and fluids from trucks may also result in the contamination of soils.	M	S	S	M	M	Maintain and repair mine vehicles on a continuous basis. Maintenance of mine vehicles to be conducted at the workshops. Emergency repairs to be conducted on protected ground e.g., areas covered with tarpaulins.
	Spillage of hydrocarbon fluids outside the mine’s office/workshop area may result in the contamination of the soils.	H	S	S	M	M	No repair must be conducted outside the mine’s workshop area. Emergency repairs must be conducted on protected ground e.g., tarpaulins.
Crushing and screening of R.O.M coal	The crushing and screening plant may be visible from the surrounding roads	H	S	M	M	H	Construction of berms along the plant will reduce the impact.
	Generation of noise and dust	H	S	M	M	H	Seeding of the berm will reduce dust generation and the use proper equipment in the plant will reduce noise generation.
Stockpiling of coal products	Creation of local high points	H	M	M	L	L	Demand of the said products gives rise to a continual removal of stockpiled products, therefore the creation of local high points will be

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
							reduced.
Transport of coal products	Vehicle movement will be visible on the R50 road.	H	S	M	L	M	The impact can be reduced by constructing visual berms around the mining area.
	The transportation of the coal product may result in the contamination of soil and vegetation, due to spillages along the access/haul roads.	H	S	M	L	M	Trucks to obey maximum speed limit to be set by the mine. All trucks must cover the bins with tarpaulins before leaving the mine
Disposal of mine affected water into the pollution control dam	Failure of the said dams will lead to contamination of water resources.	H	S	M	H	H	Maintenance and monitoring will avoid failure of the said dams. Pollution control dams should be lined to prevent ingress of contaminated into groundwater.
	Runoff water from the mine's workshop and haul/access roads will contain elevated levels of hydrocarbons and coal contaminated silt loads respectively, which will impact negatively on the environment if released.	M	S	S	M	M	Hydrocarbons must be separated from the water and silt before their disposal. Haul roads must be graded regularly to remove any layer of coal material from the mine vehicles.
	Water to be stored in the pollution control dams will contain elevated chemical concentrations associated with coal mining. These may result in reduced pH levels, and thus elevated heavy metals in surface water quality within the natural water environment if	L	S	S	H	H	Design and construct the pollution control dams to be able to handle the volumes of dirty water emanating from the mine. The dams must be operated to meet the Department of Water and Sanitation's minimum requirements for operating dams.

ENVIRONMENTAL IMPACT ASSESSMENT OPERATIONAL PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
	allowed to enter the natural environment.						
	Use of haul and access roads will result in the generation of dust, which my impact negatively on neighbouring farmers.	H	M	S	M	M	Conduct dust suppression on a regular basis on the roads. Maintain the roads on a regular basis
	Employees working in close proximity to mine machinery will be exposed to high levels of noise, which may in a long term be detrimental to their health.	H	S	S	H	H	Issue employees with earplugs and instruct them to use the earplugs. The mine will through the implementation of the environmental awareness plan encourage the employees to use these earplugs.

8.2.3 DECOMMISSIONING PHASE- KROMDRAAI NORTH COLLIERY

ENVIRONMENTAL IMPACT ASSESSMENT DECOMMISSIONING PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
Dismantling of the crushing/screening plant, change house, office area and related structures	Generation of dust and noise	H	S	S	L	L	Dust suppression around this area. The use of working machinery in good condition will reduce noise impacts.
	Spillages of hydrocarbons	M	S	S	L	L	Work on protected ground (tarpaulins).
Rehabilitation of access roads, opencast area and the incline shaft	Generation of dust and noise	H	S	S	L	L	Dust suppression around this area. The use of working machinery in good condition will reduce noise impacts.

ENVIRONMENTAL IMPACT ASSESSMENT DECOMMISSIONING PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
	Contamination of surface water with silt generated from the rehabilitation areas	H	S	S	L	M	Construct contours on rehabilitated areas to ensure that storm water from the construction sites is directed to structures such as silt traps where the silt will be collected before the water is allowed to leave the site.
Rehabilitation of overburden and spoils	Contamination of surface water with silt generated from the rehabilitation areas	M	M	S	M	M	Construct contours on rehabilitated areas to ensure that storm water from the construction sites is directed to structures such as silt traps where the silt will be collected before the water is allowed to leave the site.
General surface rehabilitation	Contamination of surface water with silt generated from the rehabilitation areas	H	M	S	M	M	Construct contours on rehabilitated areas to ensure that storm water from the construction sites is directed to structures such as silt traps where the silt will be collected before the water is allowed to leave the site.
	Areas of ponding may result from rehabilitated areas	M	M	S	M	M	Any signs of ponding must be addressed by levelling as soon as possible.
	Rehabilitation areas may show areas of soil erosion, which may remove the replaced topsoil	M	M	S	M	M	Monitor rehabilitated areas. Any signs of erosion must be remedied by compaction and re-vegetation.
	Invader species and noxious weeds may colonise the areas prior to the establishment of natural vegetation	M	M	S	H	H	Progress of re-vegetation must be monitored regularly. Identified invader species or exotic plant species must be removed.

8.2.4 CLOSURE PHASE- KROMDRAAI NORTH COLLIERY

ENVIRONMENTAL IMPACT ASSESSMENT CLOSURE PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
Water management	As predicted in the Geohydrological report (Appendix 5), groundwater may decant after mining has been completed.	H	M	S	M	M	<p>Contain or use decant water. Treatment of decant may be viable, however all passive methods should be investigated first during the operational phase of the mine.</p> <p>To minimise decanting in the Colliery, all direct connection (if applicable) between the underground areas and opencast should be thoroughly sealed to prevent direct groundwater seepage to the backfilled opencast. Mining should remove all coal from the opencasts and as little as possible should be left. Remaining acid producing material should be placed as low in the pit as possible to ensure fast flooding of the material. All mined areas should be flooded as soon as possible to bar oxygen from reacting with remaining pyrite.</p> <p>The final backfilled Colliery topography should be engineered such that runoff is directed away from the Colliery areas. The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge to the Colliery.</p> <p>Quarterly groundwater sampling must be done to establish a database of plume movement trends, to aid eventual mine closure.</p>
	The sulphate pollution plume emanating from the opencast is predicted to reach the Kromdraaispruit as well as Kromdraai dam	H	M	S	H	H	Groundwater quality must be monitored on a quarterly basis. The monitoring results must be interpreted annually by a qualified hydrogeologist and the monitoring network should be audited

ENVIRONMENTAL IMPACT ASSESSMENT CLOSURE PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
	<p>between 25 to 50 years.</p> <p>Following this period, seepage of AMD will increase in concentration and could reach very high levels at the Kromdraaispruit.</p>						<p>annually to ensure compliance with regulations. Numerical groundwater model must be updated by calibrating the model with monitoring data. A pollution control dam could be used to intercept polluted seepage water.</p> <p>Mined sections should be sealed where possible during mining to reduce the contact of water and air with remaining sulphides.</p> <p>Install water collection and pumping systems within the mining areas capable of rapidly pumping water out, so minimising contact of water the geochemically reactive material.</p> <p>Assess the impact of the neighbouring mines on this Colliery and vice versa. This is best done by pooling measured groundwater data to update and expand the current numerical model.</p> <p>Kinetic testing of the pillar material should be conducted to aid in the prediction of post mining geochemical conditions.</p> <p>Process water must be stored in a lined pollution control dam and the processing areas should be designed to prevent standing water.</p> <p>Clean and dirty water systems should be separated.</p>
Maintenance and after care	Invader species may colonise the rehabilitated areas	M	L	L	M	M	Progress of re-vegetation must be monitored regularly. Identified invader species or exotic plant species must be removed.
	Rehabilitated areas may show areas of soil	L	L	S	L	L	Monitor rehabilitated areas. Any signs of erosion must be remedied

ENVIRONMENTAL IMPACT ASSESSMENT CLOSURE PHASE – KROMDRAAI NORTH COLLIERY							
ACTIVITY	IMPACT	IMPACT ASSESSMENT					MITIGATION MEASURES
		P	E	D	I	S	
	erosion, which may remove replaced topsoil.						by compaction and re-vegetation.

8.3 CUMULATIVE IMPACTS

This section of the Environmental Impact Assessment will attempt to determine if the proposed Kromdraai North Colliery's mining activities will contribute towards any cumulative impacts. For the purpose of this document cumulative impacts will be described as the impacts (including those that has been assessed as being insignificant) that would be significant when combined with the same impact arising from another activity within and around the area of the proposed mining project.

It must however be mentioned that the assessment of the cumulative impacts is a difficult exercise that requires a combined effort from the different role stakeholders (farmers, mines, industries, individuals etc.,) that would contribute to the cumulative impacts identified. Accurate data from the contributing parties will be a key for a thorough and accurate cumulative impact assessment.

8.3.1 Geology

The area under discussion is situated on a small outlier of the Karoo succession surrounded by Rocks of the Transvaal sequence. The Karoo outlier is classified as part of the Witbank coalfield due to the similarities in the Middle Ecca succession. Coal deposits in this area occur in patches and not in a uniform bed formation that would extend over an extended area.

The geological profile (target coal seam and overlying strata) on the proposed Kromdraai North Colliery will have been permanently disturbed by mining. Other mining companies in the vicinity of the proposed Colliery will contribute to the disturbance of the geological layers.

8.3.2 Topography

Several mining operations are being undertaken in the vicinity of the proposed project. The presence of these mining operations will have an added impact on the regional topography of the area such that the sense of place will be affected. Drainage of the area might also be affected by the presence of other mining operations within and around the proposed project area.

Cumulative impacts on topography over the proposed area are reduced by the undulating nature of the local topography.

8.3.3 Soil, Land Use and Capability

The area within which the proposed Kromdraai North Colliery mining activities will be undertaken is classified as having good arable land. The presence of the other mining operations will have an effect on the soils of the area such that the area that could be used for crop production would be lost to mining. It must however be noted that mining operations will take place over a long period at different areas hence not all areas will be impacted upon simultaneously.

The proposed mining area will be rehabilitated once the mine operation ceases, this therefore reduces the significance of the cumulative impacts.

8.3.4 Natural Vegetation

Due to the high arable potential of the area within the Kromdraai North Colliery mining area, extensive agricultural practices (grazing and crop production) has resulted in the removal of vast areas of natural vegetation. In view of the above, the natural vegetation of the area has been severely affected by the previous farming activities. The presence of mining activities would add to the already impacted environment. Rehabilitation of the mining area and associated infrastructure would in a sense mitigate against these impacts. However the mitigation cannot be guaranteed since the land will most probably be used for agriculture practices (grazing or crop production), provided that good rehabilitation is undertaken, which will add to the identified impacts.

8.3.5 Surface water

Mining and its associated activities has over the past decades had detrimental effects on the surface water environment. This could be attributed to previous environmentally unfriendly mining practices. The presence of several mining activities within one catchment may have severe effects on the surface water environment. However, due to new technologies and environmental awareness that has been promoted over the last decade, mining and its associated activities can be undertaken such that the impacts on the surface water environment are significantly minimised and controlled.

Agriculture, which currently dominates the area, has also been detrimental to the surface water environment. Several wetlands have been lost due to overgrazing and attempted cultivation. Exposure of ground has also resulted in increased silt entering the water environment resulting in serious consequences to the livelihood of the surface water environment. Based on the above, cumulative impacts on surface water could be serious if no mitigation measures are undertaken.

Eyethu Coal (Pty) Limited will, in view of the seriousness of the potential impacts, continue to undertake the necessary measures to ensure that the proposed activities does not contribute to the identified impacts on surface water environment.

8.3.6 Ground water

The proposed Kromdraai North Colliery is surrounded by opencast and underground mined areas, cumulative effects are predicted. Pollution plumes of similar extent should develop in parallel if no mitigation is applied.

8.3.7 Air Quality

The proposed Kromdraai North Colliery falls within the Highveld Priority Area (HPA). The Highveld area in South Africa is associated with poor air quality and elevated concentrations of criteria pollutants due to the concentration of industrial and non-industrial sources. The Minister of Environmental Affairs therefore declared the Highveld Priority Area (HPA) on 23 November 2007.

During the impact assessment it was identified that air quality will be impacted on by the dust and fumes from the proposed Kromdraai North Colliery.

Several activities that may have impacts on the air quality within and around the proposed mining area are currently being conducted i.e. agriculture and mining.

Agricultural related activities require soil to be prepared especially during the planting season. During the preparation of the soils, a substantial amount of dust is produced.

With the above in mind and the fact that the above-mentioned parties will require services e.g. transporting of products to sites and haulage of material in and out of sites, which will result in secondary air pollution, the impacts on air quality might be significant. It must however be mentioned that the magnitude of the impact on air quality from the different parties will not be the same. Some activities will have more significant impact on the air quality than others. It is however not expected that the cumulative impact on air quality would be significant if all parties take reasonable measures to minimise the generation of dust within their operations.

SECTION NINE

Environmental Management Programme

9. ENVIRONMENTAL MANAGEMENT PROGRAMME

9.1 CONSTRUCTION PHASE

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
Geology	No impacts were predicted.	No mitigation measures will be undertaken during the construction phase.	No impacts were predicted.	No impacts were predicted.
Topography	To minimise the impacts of stockpiles and voids on the topography. Ensure that stockpile construction have minimum impact on topography.	Topsoil stockpiled to a height of three meters. Subsoil and hard overburden stockpiled to appropriate heights.	A qualified surveyor will ensure that all stockpiles are constructed to the maximum allowable heights.	During construction of structures.
	Ensure that the construction of the pollution control dams has minimum impact on topography.	Pollution control dams constructed to design specifications and located at designated areas within the mining area.	A qualified surveyor will ensure that water management facilities are surveyed prior to construction. The Environmental Co-ordinator will ensure that these structures are constructed as specified and located in accordance with the Mining Layout Plan.	During construction phase before generation of mine affected water.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
	Ensure that storm water diversion trenches are constructed to have minimum impact on topography.	Storm water diversion trenches to be constructed to specified size, depth and positioned correctly.	A qualified surveyor will ensure that water management facilities are surveyed prior to construction. The Environmental Co-ordinator will ensure that these structures are constructed as specified and located in accordance with the Mining Layout Plan.	During construction phase before generation of mine affected water.
	Ensure that excavation of the initial box-cut has minimum impact on topography.	Excavate the initial box-cut to design specifications within surveyed area.	A qualified surveyor will ensure that the box-cut and the adit are surveyed prior to construction. The Environmental Co-ordinator will ensure that these structures are constructed as specified and located in accordance with the Mining Layout Plan.	During construction phase of mining operation.
Soil	To minimise the impacts of mining on soils. Ensure that soil compaction is minimised.	Rip compacted areas in order to reduce runoff and improve re-vegetation. Minimise compaction by avoiding unnecessary trafficking. Limit trafficking to definite road zones. Refraining from movement over soil surface during very	The Mine manager or his appointed representative will ensure that the mining plan is followed and topsoil and subsoil is utilised as required within the mining	All mining phases

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
		wet conditions.	area.	
	Ensure that chemical soil pollution is avoided	Design and construct coal storage and handling sites in such a manner that water percolation into the soil is minimised, and that runoff water is collected and pumped into the pollution control dams.	The Mine manager or his appointed representative will ensure that the mining plan is followed and topsoil and subsoil is utilised as required within the mining area.	All mining phases
	Ensure that soil erosion is avoided	Construct soil conservation measures at construction sites and along roads. Avoid bare, disturbed surfaces or embankments for long periods (i.e. re-vegetate).	The Mine manager or his appointed representative will ensure that the mining plan is followed and topsoil and subsoil is utilised as required within the mining area.	All mining phases
Land capability/ use	To minimise impacts of the mine infrastructure and soil movement on land capability. Ensure that the loss of prime agricultural land is minimised.	Strip topsoil clean from underlying non-topsoil materials such as weathered sandstone, hard or soft plinthite. Stripping and stockpiling of A horizon (30 cm topsoil) separately from subsoil. Selection of sites of lower potential soils for development whenever possible. During rehabilitation, soil amelioration should be done by liming and fertilizer applications based on soil analysis.	The mine manager or his appointed representative will ensure that the mine infrastructure and soil placement is conducted according to the Mining Layout Plan.	All mining phases

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
Natural vegetation	To minimise the long-term impacts on the area's potential to maintain a natural vegetation cover. Ensure that the removal of topsoil is conducted such that the impacts on the area's ability to maintain natural vegetation cover is minimised.	Strip topsoil clean from underlying non-topsoil materials such as weathered sandstone	The mine manager or his appointed representative will ensure that the topsoil is removed and stockpiled at the designated areas within the mining area.	During construction phase
	Ensure that stockpiling of topsoil is conducted in a manner that will not impact on the ability of the area to maintain vegetation cover.	Stockpiling of A horizon (300 mm topsoil) must be conducted separately from subsoil. (B, E & G horizons as stipulated in the soil-land report)	The mine manager or his appointed representative will ensure that the topsoil is removed and stockpiled at the designated areas within the mining area.	During construction phase
Animal life	Due to the previous land utilization, i.e., grazing, crop production and mining, no significant animal populations occur on the property. Thus no significant impacts were predicted. As a result no mitigation measures will be undertaken during the construction phase.			
Surface water quantity	To reduce impacts on surface water runoff patterns, and thus minimise loss of MAR within all catchments (surface water quantity). Ensure that construction of pollution control dams has the	Pollution control dams designed by civil engineer.	The design will ensure the minimum space is used to construct the dam and that the dam meets regulatory requirements for construction of pollution control dams.	Prior to construction phase.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
	least possible impact on the surface water runoff patterns, and thus loss of MAR within all catchments.	Construct the pollution control dams according to design specifications.	A surveyor will ensure that the pollution control dams, are positioned and constructed according to design specifications.	During construction phase.
		Maintain and monitor structure of the pollution control dams.	The mine manager or his appointed representative would ensure that the pollution control dams are constructed properly.	During construction phase and throughout life of mine.
	Ensure that the construction of storm water diversion trenches have the least possible impact on the surface water runoff patterns, and thus loss of MAR within all catchments.	Storm water diversion trenches constructed to separate clean and dirty water on the mine.	A surveyor will ensure that the, diversion trenches are positioned and constructed according to design specifications.	During construction phase.
		Storm water trenches maintained and monitored on regular basis.	The mine manager or his appointed representative would ensure that the diversion trenches are constructed properly.	During construction phase and continued throughout life of mine.
	Ensure that the excavation of the initial box-cut has the least possible impact on the surface water runoff patterns, and thus loss of MAR within all catchments.	Development of a comprehensive mining plan, which will include the initial box-cut.	A surveyor will ensure that the initial box-cut is positioned and constructed according to design specifications.	During construction phase.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
		Construction of the initial box-cut as per mining plan.	The mine manager or his appointed representative would ensure that the initial box-cut is constructed properly according to the mining layout plan.	During construction phase.
		Storm water diverted away from the initial box-cut.	The mine manager or his appointed representative would ensure that the initial box-cut is constructed properly to ensure that storm water is diverted away from the initial box-cut.	During construction phase.
Surface water quality	<p>To minimise all potential impacts on surface water quality.</p> <p>Ensure that impacts from chemical leakages on surface water quality are minimised.</p>	<p>All mining vehicles should be well maintained and inspected for hydrocarbon leaks weekly.</p> <p>Fuel depots and refuelling areas should be bunded.</p> <p>Chemicals should be stored in a central secure area. Regular training of personnel, on the responsible handling of chemicals should be undertaken.</p> <p>A sufficient supply of absorbent fibre should be kept at the site to contain accidental spills</p>	The Mine Manager or his appointed representative and the Environmental Co-ordinator	<p>During construction phase and throughout life of mine.</p> <p>During construction phase.</p> <p>During construction phase and throughout life of mine.</p>

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
	Ensure that impacts from dirty water captured within the mine, on surface water quality are minimised.	<p>Ensure that the appropriate diversion facilities (berms, storm water channels etc.) are constructed before constructing the coal handling facilities, box-cut and the adit.</p> <p>Storm water diversion trenches constructed to separate clean and dirty water on the mine.</p> <p>Any dirty water captured within the box-cut will be pumped to the pollution control dams.</p> <p>The water quality, monitoring program must be initiated.</p>	The Mine Manager or his appointed representative will ensure that the diversion trenches and foundation slabs are constructed and that the water quality monitoring program is initiated.	<p>During construction phase</p> <p>During construction phase.</p> <p>Prior to commencement of the construction phase.</p>
Flood events	No impacts were predicted and no mitigation measures will be undertaken during the construction phase.			
Air quality	To minimise the potential impacts on local air quality.	All machinery will be fitted with the correct exhaust systems, which will be maintained at all times.	The Environmental Co-ordinator will ensure that all machinery are maintained and remain in good condition.	During construction phase and throughout life of mine.
	Ensure that impacts from diesel fumes generated by machinery on local air quality is minimised.			
	Ensure that impacts from dust generated by blowing wind on exposed area is minimised.	Dust suppression will be undertaken during the construction phase.	The Environmental Co-ordinator will ensure that dust suppression is undertaken as per the prescribed stipulations.	Twice daily throughout life of mine and if necessary frequency will increase.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
	Ensure that impacts from dust generated by blasting, on atmosphere is minimised.	Blasting holes will be stemmed to correct levels to ensure that minimal dust is produced. Use minimum explosives during blasting	A blaster will be appointed to make sure that correct blasting methods are used during blasting.	During construction phase and throughout life of mine During blasting
Sensitive Landscapes	To minimise mining related impacts on wetlands present. Ensure that degradation of wetlands is minimised	Minimise the removal of/damage to vegetation in riparian and wetland areas; The construction of roads in or adjacent to the wetland/riparian zone is to be managed and strictly controlled to minimise damage to wetlands; Operation & storage of equipment in the riparian and wetland zones to be prevented; Wetlands disturbed during construction should be re-vegetated using site-appropriate indigenous vegetation and/or seed mixes; Alien vegetation should not be allowed to colonise the disturbed wetland areas; Rehabilitation of disturbed wetland habitat should commence immediately after construction is completed; No construction camps should be allowed in or within 100 m of the wetlands; No stockpile areas should be located in or within 100 m of the wetlands;	The Environmental Co-ordinator will ensure that the mine adheres to the conditions.	During construction phase and throughout life of mine.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
		<p>Construction should preferably take place during the low flow/winter months in order to minimise the risk of sediment and debris being washed into wetlands;</p> <p>Stockpiling of soil and the construction camps must be stored clearly away (at least 100 m where possible) from the wetland to prevent soil being washed into the wetland;</p> <p>During the construction and operation phases erosion and siltation measures should be implemented (e.g. temporary silt traps downstream of construction areas should be employed);</p> <p>Slope/bank stabilization measures should be implemented where necessary, to prevent erosion during the operation.</p>		
Noise and vibrations	<p>To minimise the impacts of noise and vibrations on the health of people and the environment.</p> <p>Ensure that noise impacts on machine operators and/or residence are minimised.</p>	Machine operators will be issued with earplugs, and instructed how to use them.	The Mine Safety officer will ensure that earplugs are issued and used.	During construction phase and throughout life of mine.
	<p>Ensure impacts from noise generated during blasting are minimised.</p>	All residences and structures within a 1 km radius of the proposed mining operation will be surveyed and a photographic record of these taken to determine a pre-mining condition.	The Mine Manager or his appointed representative will conduct structural surveys, in consultation	During construction phase and throughout life of mine.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
		<p>Mine Management will repair any damage, which arises as a result of blasting or activities at the mine, at the mine's expense.</p> <p>If blasting or vibrations are perceived to be excessive, a seismic monitor with a continuous recorder will be placed about one kilometre from the mine during blasting activities. Such recordings will be kept and made available to any interested or affected party on request.</p> <p>All Interested and Affected Parties identified during the Interested and Affected Party survey will be notified within One (1) hour prior to Blasting.</p> <p>The Blaster employed, who will be certified in terms of the Mine Safety Act, will utilise the minimum possible explosives to achieve maximum affect.</p> <p>Blasting will be conducted between the hours of 06 H 00 and 18 H 00 to minimise the impact on persons dwelling within close proximity to the mine.</p>	<p>with the relevant landowners, and collect the photographic record. The Mine Manager or his appointed representative will, in conjunction with the Blaster, inform Interested and Affected Parties of blasting time, and that all blasting is conducted correctly.</p>	
Visual Aspects	<p>To reduce the impacts on the overall visual aesthetic of the Kromdraai North Colliery to residences and landowners in the vicinity of the mining activities.</p> <p>Ensure that visual impacts from dust generated during blasting is</p>	Blasting holes will be stemmed.	A blaster will be appointed to make sure that correct blasting methods are used during blasting.	Whenever there is blasting on the mine during operational phase of mine.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
	minimised.			
	Ensure that dust generated by wind and movement of machinery is minimised to have minimum visual impacts.	<p>Dust suppression will be conducted on all haul roads and stockpiling areas where movement of machinery may generate dust.</p> <p>The rehabilitated workings will be seeded with a seed mix recommended in this document.</p> <p>All trucks transporting material on the proposed mining area will be required to obey a maximum 40 km/h speed limit.</p> <p>The mine will adopt a clean-house policy. All stockpiles will be maintained at specified heights to reduce visual impact.</p>	The Mine Manager or his appointed representative will ensure that the dust suppression program is initiated and kept up to date. The Mine Manager or his appointed representative will also ensure that the backfilled workings are re-vegetated, and that the transport companies obey the speed limits, and that the clean-house policy is maintained.	<p>Twice a day.</p> <p>As soon as old open cuts are filled and rehabilitated.</p> <p>At any time during the operational phase of the mine.</p> <p>During operational phase and throughout life of mine.</p>
	Ensure that visual impacts from any mine infrastructure is minimised.	<p>Topsoil stockpile to be vegetated.</p> <p>Overburden stockpiles to have soil cover and vegetated.</p> <p>Maintenance of the constructed topsoil/subsoil berm.</p>	The Mine Manager or his appointed representative will also ensure that the visual screen is established as stated in this EMP.	<p>During construction phase.</p> <p>During construction phase.</p> <p>Throughout life of mine.</p>
Socio-economic impacts	<p>The objective is to have a significant, positive impact on the socio-economic of the area.</p> <p>Management: As far as practically possible, all supplies and mine employees will be sourced from the Greater Delmas area.</p>			

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
Interested and affected parties	<p>To minimise the mining related impacts on all Interested and Affected Parties.</p> <p>Ensure that Influx of labourers seeking employment is reduced.</p>	<p>The Mine will utilise people from the surrounding areas as far as possible, to minimise the influx of illegal immigrants.</p> <p>No squatters will be allowed on the property. Recruitment of employees must be conducted at a designated place away from the mine.</p> <p>Mine management will maintain an open-door policy, with all Interested and Affected Parties. Minutes of all meetings will be kept, and made available on request.</p> <p>An Interested and Affected Parties Forum will be established to make certain that reported issues are addressed promptly.</p>	<p>The Mine Manager or his appointed representative will ensure that all machinery is maintained in good working order. The Mine Manager or his appointed representative will ensure that no labourers are housed legally or illegally on the mining area. The Mine Manager or his appointed representative will attend all I & AP's forum Meetings.</p>	<p>During construction phase and throughout life of mine.</p> <p>Forum will convene every six months during construction phase and throughout life of mine.</p>
Historical and cultural aspects	The fieldwork undertaken revealed three sites of cultural heritage significance. These are all grave sites and therefore mitigation measures are needed. However, during construction phase, graves will not be disturbed.			

9.2 OPERATIONAL PHASE

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
Geology	<p>The removal of the No. 4 and 2 coal seams is a core function of the mine, thus the impact on the geology is considered as highly significant. However, no mitigation measure is regarded as possible. All material removed will be stockpiled in such a manner that ongoing rehabilitation can be undertaken by replacing the said material in the right chronological order.</p> <p>Approximately 65% of the coal within the Kromdraai North Colliery's underground section area will be removed. The remainder will be left as underground pillars to ensure that the overlying strata remain intact, and thus the possibility of surface subsidence is minimised. A safety factor of more than 2.5 (determined by applicable formulas) will be used to determine the pillar widths.</p>			
Topography	<p>To minimise the impacts of mining on the topography.</p> <p>Ensure that the opening of box cuts has minimum impact on topography of the area.</p>	The Mine Surveyor will survey opencast pit.	Mine Surveyor	Monthly for the entire operational phase.
		Mine surveyor will also survey cuts to be constructed.	Mine Surveyor	Prior to the construction of the cut.
		Rehabilitation of the pit will be conducted concurrently with mining. Only three cuts will be open at any given time with successive cuts used to systematically backfill the preceding cuts. This will minimise the size of the void.	Mine manager, Mine Surveyor and Environmental Co-ordinator	During the operational phase of the mine.
		The Mine Surveyor will survey backfilled cuts to ensure that these are filled and rehabilitated to surface and conform to natural runoff patterns. No ponding will occur.	Mine Surveyor	After backfilling of each cut during the operational phase of mine.
	Ensure that the formation of the ROM stockpile has a minimum impact on the topography of the	<p>The ROM stockpile will not exceed height of 9 meters.</p> <p>ROM stockpile to contain limited amount of</p>	A qualified surveyor will ensure that all stockpiles are constructed to the maximum allowable heights and that the adit is surveyed prior	During operational phase of the mine.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
	area.	product i.e. five days production or 10 000 m ³ of material.	to construction.	
	Ensure that the underground mining has minimum impact on topography of the area.	Use Safety factor of more than 2.5 to prevent subsidence occurring at the underground mining section	The Mine Engineer, Surveyor and Environmental Co-ordinator will ensure that the adit and diversion trenches are constructed as specified in the Mining Layout Plan.	During operational phase
Soil	To prevent contamination of soils. Ensure that the removal of top and subsoil layers have minimum impact on soil.	Design and construct coal storage and handling sites in such a manner that water percolation into the soil is minimised, and that runoff water is collected and pumped into pollution control dams. Make contingency plans to manage spills that may occur. Topsoil and subsoil removed from successive cuts will be used to backfill preceding cuts. Cuts will be filled with overburden material first, then subsoil and finally topsoil. This will minimise loss of soil and topsoil will be placed to a minimum depth of 300 mm. Rehabilitated workings will be seeded in accordance with identified suitable seed mixture. This will reduce loss of topsoil to wind and water erosion. Topsoil stockpiled during construction phase will be used as final cover on backfilled workings. This	The Mine manager or his appointed representative will ensure that the mining plan is followed and topsoil and subsoil is utilised as required within the mining plan and soil utilisation guide.	During operational phase As soon as a new cut is constructed during the operational phase of mining. As soon as cuts are backfilled and covered with topsoil.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
		will ensure that soils are not leached out.		As necessity arises during operational phase of the mine.
Land capability	<p>To minimise impacts of mining on land capability.</p> <p>Ensure that soil and overburden stockpiles do not result in severe reduction of land capability.</p>	<p>Loss of topsoil will be minimised by filling the cuts with overburden, then subsoil and finally topsoil.</p> <p>To ensure rehabilitated land retains its land capability, sub-soil will be placed to a minimum depth of 3 meter and arable topsoil used to backfill preceding cuts will be placed to a minimum depth of 300 mm.</p> <p>The rehabilitated workings will be seeded with an appropriate seed mixture.</p>	The Mine Manager or his appointed representative will ensure that the mining plan is followed, as a result the areas will be restored to its original status, i.e., that of grazing and crop cultivation.	<p>As coal is removed from mined workings and new cuts constructed during operational phase of mining.</p> <p>As mined areas are backfilled and rehabilitated during operational phase of mining.</p> <p>After rehabilitated workings are covered with topsoil.</p>
Land use	Note that land use has change from agriculture to mining when the construction phase is initiated. No mitigation measures will be undertaken during operational phase.			
Natural vegetation	<p>To minimise impacts of mining on natural vegetation.</p> <p>Ensure that removal of soil during mining operation has minimum impact on natural vegetation</p>	Backfilled and rehabilitated workings will be seeded with an appropriate seed mixture.	The Mine Manager or his appointed representative will ensure that an appropriate seed mix is applied	As soon as mined cuts are rehabilitated.
		Vegetation cover inspection of rehabilitated land will be conducted.	A suitably qualified person will be employed to conduct vegetation survey on rehabilitated areas. The Mine Manager will ensure that the vegetation surveys are conducted on rehabilitated areas.	Annually during operational phase of mining.
Animal life	Due to the previous land utilization, i.e., grazing, crop production and mining, no significant animal populations occur on the property, thus no significant impacts were			

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
	predicted. No mitigation measures will be undertaken during the operational phase.			
Surface water quantity	To reduce impacts of mining on surface water run-of patterns, and thus loss of MAR within all catchments (surface water quantity). Ensure that minimum rainwater is captured within the opencast pit at the mine.	The mining will be conducted according to the mining plan i.e. preceding cuts are filled and rehabilitated. This will reduce the size of the void resulting in less rainwater in the open cuts. Only three cuts will be opened at any given time.	The Mine Manager or his appointed representative would ensure that the mining plan is followed, and that rehabilitated areas conform to the proposed rehabilitation design.	As per mining plan during the operational phase of the mine.
	Ensure that runoff reporting into the opencast pit is minimised.	All clean water will be diverted around the mining area. The mine will maintain these diversion trenches to ensure that no blockage occurs.	The Mine Manager or his appointed representative will ensure that the push-up berms are constructed around the open cuts to divert clean runoff water around the workings.	On a weekly basis during operational phase.
		A one-meter push-up berm will be constructed upslope of the open cuts to divert water around the pit. This berm will migrate forward with the opencast pit.	The Mine Manager or his appointed representative will ensure that the push-up berms are constructed around the open cuts to divert clean runoff water around the workings.	Constructed with construction of new mining cut.
		All rehabilitated areas will conform to the proposed rehabilitation model and be free draining. No ponding will occur on rehabilitated areas.	The Mine Manager or his appointed representative would ensure that the mining plan is followed, and that rehabilitated areas conform to the proposed	Survey done after backfilling and rehabilitation of mined out cuts.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
			rehabilitation design.	
Surface water quality	To minimise all potential impacts on surface water quality.	Water within the pit will not be discharged into the natural environment.	Mine manager and Environmental Co-ordinator	At any time during the operational phase.
	Ensure that water captured within the pit do not impact on surface water quality.	Water within the pit will be pumped to the Pollution control dam.	Mine manager and Environmental Co-ordinator	During the operational phase
		Regular water quality monitoring will be conducted at the Pollution control dam.	Mine manager and Environmental Co-ordinator	On a monthly basis.
	Ensure that runoff from the stockpiling area does not impact on the surface water quality.	The operation of the pollution control dams will be maintained at one meter below spillway level.	The Mine Manager or his appointed representative will ensure that the pollution control dams are maintained at operating levels.	At any time during the operational phase of the mine.
		Regular checks will be conducted on the maintenance and operation of the pollution control dams.	The Mine Manager or his appointed representative will ensure that the pollution control dams are maintained at operating levels.	On a weekly basis.
		Regular water quality monitoring will be conducted at the pollution control dams.	Mine manager and Environmental Co-ordinator	On monthly basis.
	Ensure that water contained within the Pollution control dam does not impact on the surface water quality.	All runoff water from the R.O.M. stockpile will be diverted by a dirty water trench to the pollution control dams.	The Mine Manager or his appointed representative will ensure that the pollution control dam will contain all water from the dirty area of the mine i.e. the	Throughout the operational phase life of the mine.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
			R.O.M. stockpile area.	
		Opencast workings will be rehabilitated and seeded to reduce silt load from the mining area.	The Mine Manager or his appointed representative	As soon as open cuts are mined out, throughout life of mine.
		All dirty water structures will be checked on a regular basis.	The Mine Manager or his appointed representative	On a weekly basis during wet season and on a monthly basis during dry season.
		All damages, blockages and erosion will be repaired.	The Mine Manager or his appointed representative	Within 24 hours after discovery.
	Ensure that diesel spillages do not occur.	<p>No water from the diesel tank will be discharged.</p> <p>All water reporting in the bunted area will be drained to an oil separator.</p> <p>Separated diesel will be disposed of in accordance with the relevant legislation.</p> <p>Operation of the diesel tank will be checked on a regular basis.</p>	The Mine Manager or his appointed representative	<p>Throughout the operational phase of the mine.</p> <p>On a weekly basis</p>
Flood events	<p>To minimise impacts of floods on water pollution control structures.</p> <p>Ensure that all pollution control structures do not impact on surface water during flood events</p>	<p>All pollution control structures will be inspected after a flood rainfall event for signs of erosion. Water levels will be checked to ensure that the operational capacities are maintained.</p> <p>All damages and erosion will be rectified.</p>	The Mine Manager or his appointed representative will ensure that all pollution control structures maintenance checks and repairs are conducted timeously.	<p>24 hours after the flood rainfall event.</p> <p>Within 24 hours of discovery.</p>

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
Dewatering and Discharge	To minimise impacts of poor water quality on the environment. Ensure that water captured in the opencast pit does not impact on the environment	Water seeping or captured within the pit will be removed to facilitate mining. No water from the pit will be discharged, but will be pumped to the pollution control dams for re-use at the mine.	The Mine Manager will ensure that water within the pit is not discharged but pumped into the pollution control dams.	In the process of mining throughout the life of mine.
Groundwater	To minimise impacts of mining on groundwater. Ensure that impacts from the seepage from the rehabilitated workings on groundwater is minimised.	The final backfilled opencast topography should be engineered such that runoff is directed away from the rehabilitated opencast areas. The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge into the rehabilitated opencast areas	The Mine Manager or his appointed representative will ensure that water within the pit is not discharged but pumped into the pollution control dams.	As per mining plan during the operational phase of the mine.
		All clean water runoff diversion systems will be maintained and a push up berm will be constructed upslope of the pit. This berm will divert runoff water from the pit area.	The Mine Manager or his appointed representative	As per storm water diversion plan during operational phase of the mine.
		Groundwater monitoring will be conducted on the proposed mining area. The monitoring will detect any groundwater contamination from the proposed mining activity.	The Mine Manager or his appointed representative will ensure that the groundwater-monitoring programme is implemented.	On a quarterly basis.
	Ensure that impacts from seepage from the pollution control dams is minimised.	The pollution control dams will be clay lined. This will ensure that the water in the dam will not enter the groundwater regime. The pollution control dams will comply with regulation GN 704.	The Mine Manager or his appointed representative will ensure that water within the pit is not discharged but pumped into	During construction phase.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
			the pollution control dams.	
		The pollution control dams will be check for damages and seepage due to cracks or any other faults.	The Mine Manager or his appointed representative	On a weekly basis for the first six months and then every month.
		Groundwater monitoring will be conducted on the proposed mining area. The monitoring will detect any groundwater contamination from the proposed mining activity.	The Mine Manger or his appointed representative will ensure that the groundwater-monitoring programme is implemented.	On a quarterly basis.
	Ensure that the impact on water supply of groundwater users surrounding the mine is minimised.	<p>Monitor static groundwater levels on a quarterly basis, in all boreholes within a zone of one to two kilometres, surrounding the opencast areas, to ensure that any deviation of the groundwater levels from the idealised predictions is detected in time and can be dealt with appropriately.</p> <p>If it can be proven that the mining operations are indeed affecting the quantity of groundwater available to certain users, the affected parties should be compensated. This may be done through the installation of additional boreholes for water supply purposes, or any alternative water supply.</p> <p>If any seepage is encountered during mining a full hydro-geological study be done on the impact that the underground mine dewatering will have on the J.C dam.</p>	The Mine Manger or his appointed representative will ensure that the groundwater-monitoring programme is implemented.	On a quarterly basis.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
	Minimise deterioration of groundwater quality down gradient of the mining operations due to plume movement.	In terms of the National Water Act, 1998 (Act No. 36 of 1998 Government Notice 704) no mine (opencast or underground) or mine activity may be established within the 1:50 year flood-line or within a horizontal distance of 100 m from any watercourse or estuary, whichever is the greatest.		
		Mine sections should be sealed where possible during mining to reduce the contact of water and air with remaining sulphides. Install water collection and pumping systems within the mining areas capable of rapidly pumping water out, so minimising contact of water the geochemically reactive material.	The Mine Manager or his appointed representative	Throughout the operational phase of the mine.
		The numerical model should be updated during mining by using the measured water ingress, water levels, mining and geophysics information to re-calibrate and refine the impact prediction.	The Mine Manager or his appointed representative	Throughout the operational phase of the mine.
Air quality	To minimise the impacts of mining on local air quality. Ensure that impacts from dust and diesel fumes generated by machinery on local air quality is minimised.	All machinery employed on site will be in good repair, and well maintained. All machinery will be fitted with the correct exhaust systems, which will be maintained and in good repair. All trucks transporting material from the proposed mining operation will be required to obey a maximum 40 km/h speed limit. This will reduce the	The Mine Manager or his appointed representative will ensure that; all machinery is maintained and remains in good condition and vehicle speeds must not exceed 40 km/h along dust roads.	Throughout operational phase and life of mine

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
		generation of dust on the haul roads.		
	Ensure that impacts from dust generated by blowing wind on local air quality is minimised.	Dust suppression will be undertaken during the operational phase on haul roads and stockpiling areas where movement of machinery may generate dust.	The Mine Manager or his appointed representative will ensure that dust suppression measures are undertaken as per the prescribed stipulations.	Twice daily throughout life of mine and if necessary frequency will increase.
		The rehabilitated workings will be seeded with a recommended seed mix. This will reduce dust generation.	The Mine Manager or his appointed representative will ensure that exposed surfaces are re-vegetated as soon as possible.	As soon as open cuts are rehabilitated.
		Approximately 40 m ³ of water will be allocated for dust suppression by means of a water cart.	The Mine Manager or his appointed representative will ensure that dust suppression measures are undertaken as per the prescribed stipulations.	Daily
		Water for dust suppression purposes will be obtained from the pollution control dams.	The Mine Manager or his appointed representative will ensure that dust suppression measures are undertaken as per the prescribed stipulations.	During operational phase and throughout life of mine
	Ensure that impacts from dust generated by blasting on local air quality is minimised.	Blasting holes will be stemmed prior to blasting.	The Mine Manager will employ a qualified blaster	During operational phase and throughout life of mine.
Sensitive Landscapes	Note that the proposed surface water management measures (i.e.: diversion of clean runoff water and capture of dirty runoff water) will ensure that the surrounding sensitive landscapes are not adversely affected. The quality of the surface water in the farm dams will be monitored on a monthly basis to serve as an early detection measure for			

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
	possible contamination from the mining area.			
Noise and vibrations	To minimise the impacts of noise and vibrations on the environment.	Machine operators will be issued with earplugs, and will be instructed on how to use them correctly.	Mine Manager and Environmental Co-ordinator	During operational phase and throughout life of mine.
	Ensure that noise emanating from mining equipment's is minimised.	All equipment used during the operational phase must be kept in good working condition		
	Ensure impacts from noise generated during blasting are minimised.	All residences and structures within a 1 km radius of the proposed mining operation will be surveyed and a photographic record of these taken to determine a pre-mining condition.	The Mine Manager or his appointed representative will ensure that a monitoring programme will be established to keep records of all activities pertaining to noise generation.	During operational phase and throughout life of mine.
		It is highly recommended that a seismic monitoring program be initiated. This will also determine the existing ground vibration and air blast levels and assist in mitigating these aspects appropriately.	The Mine Manager or his appointed representative will ensure that a monitoring programme will be established to keep records of all activities pertaining to noise generation.	During operational phase and throughout life of mine
		All such structures will also be inspected for signs of vibration or blasting damage.	The Mine Manager or his appointed representative	On a 6-monthly basis (or at public request).
		Mine Management will repair any damage, which arises as a result of blasting or activities at the mine, at the mine's expense.	The Mine Manager or his appointed representative	During operational phase and throughout life of mine.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
		All Interested and Affected Parties identified during the Interested and Affected Party survey will be notified within One (1) hour prior to Blasting.	The Mine Manager or his appointed representative	During operational phase and throughout life of mine.
		The Blaster employed, who will be certified in terms of the Mine Safety Act, will utilise the minimum possible explosives to achieve maximum affect.	The Mine Manager or his appointed representative will ensure that noise is kept within recommended levels at all times within the mining area as far as is practically possible.	During operational phase and throughout life of mine.
		Blasting will be conducted between the hours of 06H00 and 18H00 to minimise the impact on persons dwelling within close proximity to the mine.	The Mine Manager or his appointed representative will ensure that noise is kept within recommended levels at all times within the mining area as far as is practically possible.	During operational phase and throughout life of mine.
Visual Aspects	To reduce the impacts of the overall visual aesthetic of the mining area to residences and landowners in the vicinity. Ensure that visual impacts from dust generated during blasting is minimised.	Blasting holes will be stemmed.	The Mine Manager will employ a qualified blaster	Whenever there will be blasting on the mine during operational phase of mining.
	Ensure that dust generated by wind and movement of machinery is minimised.	Dust suppression will be conducted on all haul roads and stockpiling areas where movement of machinery may generate dust.	The Mine Manager or his appointed representative will ensure that the dust suppression program is initiated and kept up to	Ongoing.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
			date.	
		The rehabilitated workings will be seeded with the recommended seed mix.	The Mine Manager or his appointed representative will ensure that the rehabilitated opencast workings, stockpiles and residue dams will be vegetated with the recommended seed mix.	As soon as mined out cuts are backfilled and rehabilitated.
		All trucks transporting material on the mining area will be required to obey a maximum 40 km/h speed limit.	The Mine Manager or his appointed representative	At any time during the operational phase of the mine.
		The mine will adopt a clean-house policy. All stockpiles will be maintained at specified heights to reduce visual impact.	The Mine Manager or his appointed representative	During operational phase and throughout life of mine.
Socio-economic impacts	<p>The objective is to have a significant, positive impact on the economy of the area.</p> <p>Management:</p> <ul style="list-style-type: none"> - As far as practically possible, all supplies will be obtained from the Greater Delmas area. - As far as practically possible, mine employees will be recruited from the Greater Delmas area. 			
Interested and affected parties	<p>To minimise the mining related impacts on all Interested and Affected Parties.</p> <p>Maintain cordial relationships with all identified Interested and</p>	The drilling of new/additional boreholes to replace/supplement existing boreholes will compensate for adjacent landowners within a 2 km radius, which show decreased borehole yields resulting from this mining venture.	The Mine Manager or his appointed representative will be responsible for maintaining good housekeeping policies, and that the mine adheres to the commitment highlighted in the	Groundwater levels will be monitored quarterly to establish the effect of mining on the surrounding.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
	Affected Parties. Address all issues raised by identified Interested and Affected Parties.		Environmental Management Program.	
		All Interested and Affected Parties identified will be notified prior to blasting.	The Mine Manager or his appointed representative will be responsible for maintaining good housekeeping policies, and that the mine adheres to the commitment highlighted in the Environmental Management Program.	Within One (1) hour of Blasting.
		No squatters will be allowed on the property.	The Mine Manager or his appointed representative will be responsible for maintaining good housekeeping policies, and that the mine adheres to the commitment highlighted in the Environmental Management Program.	During operational phase and throughout life of mine
		Mine management will maintain an open-door policy with all Interested and Affected Parties. Minutes of all meetings will be kept, and made available on request.	The Mine Manager or his appointed representative will be responsible for maintaining good housekeeping policies, and that the mine adheres to the commitment highlighted in the Environmental Management Program.	During operational phase and throughout life of mine.

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
Subsidence	Proper measures have been taken to ensure that underground pillar failure which may result in surface subsidence does not occur at the mine i.e. a safety factor of more than 2.5 will be used for underground pillars. All incidents of surface subsidence will be reported to the Principal Inspector of Mines. However, although unlikely, in the event of pillar failure and subsequent surface subsidence Kromdraai North Colliery will undertake the following action plan:			
	Ensure that pillar failure does not occur.	Remaining underground pillars will be monitored regularly, for signs of failure and for compliance with required safety factor	The Mine Manager or his appointed representative	Once every month
		Any pillar failure will be reported to Mine manager/representative immediately	The Mine Manager or his appointed representative	On occurrence of pillar failure occur
		Recommendation from Rock Engineering Services on required safety factor to avoid re-occurrence of pillar failure requested	The Mine Manager or his appointed representative	Subsequently after reporting of pillar failure
		Safety factor for the remaining portion of the mining area increased as recommended by Rock Engineering Services	The Mine Manager or his appointed representative	Throughout remaining life of mine
	Ensure that the surfaces with subsidence, if any, caused by pillar failure are rehabilitated accordingly	The Mine Surveyor will survey the surface that is undermined.	The Mine Manager or his appointed representative	Monthly for the entire operational phase
		Monitoring of the undermined surfaces will be undertaken	The Mine Manager or his appointed representative	Monthly for the entire operational phase
		In the case of subsidence, topsoil on affected area will be stripped to a minimum depth of 300 mm over the affected area.	The Mine Manager or his appointed representative	One week after noticing of subsidence

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
		The affected area will be backfilled by material from the remaining stockpiles and shaped to be free draining	The Mine Manager or his appointed representative	Two weeks after noticing of subsidence
		The removed topsoil will be replaced over the area (minimum thickness = 300 mm).	The Mine Manager or his appointed representative	Two weeks after noticing of subsidence
	Ensure that any fractures that promulgate to surface after settlement has occurred is managed properly	Fractures will be excavated to a minimum depth of 1.6 meters (stockpiling the upper 300 mm topsoil separately)	The Mine Manager or his appointed representative	One week after noticing the fractures
		Fractures will be backfilled using 150 mm compacted layers to a minimum thickness of 0,6 meters. (Compaction to be 93% MOD AASHTO)	The Mine Manager or his appointed representative	One week after noticing the fractures
		Affected areas will be backfilled to 300 mm above surface level	The Mine Manager or his appointed representative	One week after noticing the fractures
		Finally covered and shaped to conform to the surface surroundings using a minimum 300 mm layer of topsoil.	The Mine Manager or his appointed representative	Two weeks after noticing the fractures
	Ensure that the areas with surface water ponding are managed properly	Conduct visual monitoring of areas being undermined and that have already been undermined	The Mine Manager or his appointed representative	Monthly for the entire operational phase
		Areas where surface water ponding is identified will be reshaped to a free draining topography as described in the above action plan	The Mine Manager or his appointed representative	Two weeks after notice of water ponds

Environmental Component	Objectives/specific goals	Action	Technical and Management Options	Time Schedule
		Areas reshaped will be checked for cracks and fractures and if fractures or cracks noticed the above-mentioned action plan for fractures will be applied	The Mine Manager or his appointed representative	As necessity arises during operational phase of the mine
	Ensure that the areas showing soil erosion are managed properly	Visual monitoring of areas being undermined, areas that have already been undermined and areas rehabilitated as mentioned in the above action plan	The Mine Manager or his appointed representative	Monthly for the entire operational phase
		Areas showing signs of soil erosion will again be backfilled as described in the above action plan for surface subsidence and surface fractures.	The Mine Manager or his appointed representative	Two weeks after notice of erosion gullies
	Ensure that reshaping and backfilling of fractures, surface subsidence, soil erosion and water ponding does not have detrimental impact on natural vegetation	Visual monitoring of the backfilled and reshaped areas for re-establishment of natural vegetation	The Mine Manager or his appointed representative	Monthly after reshaping and backfilling of affected areas
		In consultation with the land owners the affected areas will be re-vegetated with appropriate vegetation species	The Mine Manager or his appointed representative	Annually during operational phase of mining
Historical and cultural aspects	<p>The fieldwork undertaken revealed three sites of cultural heritage significance. These are all grave sites and therefore mitigation measures are needed.</p> <ul style="list-style-type: none"> • There are two options when dealing with graves. The first would be to fence it in and write a management plan for the preservation thereof. This option will come into play if there is no direct impact on the graves. It should be kept in mind that there always is a secondary impact on graves since families may not have access thereto once a mine comes into operation. Such a management plan needs to be written by a heritage expert and needs to be signed off by SAHRA. • The second option is to have the graves exhumed and the bodies reburied. This option is preferred when graves cannot be avoided by the development. Before exhumation can be done a process of social consultation is needed in order to find the associated families and obtain permission from them. For graves younger than 60 years only an undertaker is involved in the process, but for those older than 60 years or with an unknown date of death, an undertaker and archaeologist should be involved. 			

9.3 DECOMMISSIONING PHASE

Most of the impacts identified for the operational phase will continue during the decommissioning phase, hence all mitigation and environmental management programmes planned for the operational phase will be continued throughout the decommissioning phase.

However new impacts will emanate from the areas that has been removed of the surface infrastructure. These will virtually involve the entire mining area where rehabilitation is either been done or has been done. Below is the programme to manage any new impacts that may arise from the mining area either being rehabilitated or area that has just been rehabilitated. Note that some of the mitigation measures will be applicable for the areas being rehabilitated during the operational phase.

9.3.1 Surface water

9.3.1.1 Surface water quantity

No significant impacts are predicted to occur during the decommissioning phase. No mitigation measures will be necessary.

9.3.1.2 Surface water quality

Objective: To minimise the impacts on water quality

Specific goals:

1. Ensure that runoff water from rehabilitated areas does not impact on surface water quality.

Technical/management options:

The Mine Manager or his appointed representative will ensure that seeding is conducted as specified, and that the surface water monitoring program is carried out.

Action Plan	Time schedule
Ensure that runoff water from rehabilitated areas does not impact on surface water quality.	
All exposed soils will be seeded with the seed mix recommended. This will reduce silt loads in surface water runoff. Note that seeding of the rehabilitated opencast workings will be ongoing during the operational phase, thus silt loads in surface water runoff will not be significant.	At all times during the decommissioning phase.
The surface water quality monitoring program will continue through the decommissioning phase.	Ongoing until closure certificate is obtained.

9.3.2 Groundwater

Objective: To minimise impacts on groundwater during decommissioning phase.

Specific goals:

1. To ensure that the requirements of all groundwater users downstream of the proposed mine are met.
2. Minimise deterioration of groundwater quality down gradient of the mining operations due to plume movement

Technical/management options:

The Mine Manager or his appointed representative will ensure that the groundwater monitoring program is carried out and that the monitoring reports maintained at the mine office, are up to date.

Action Plan	Time schedule
To ensure that the requirements of all groundwater users downstream of the proposed mine are met.	
Groundwater levels at all boreholes will be monitored to determine water levels. Adjacent landowners, which show decreased yields (caused by this mining venture), will be compensated by the drilling of new/additional boreholes to replace/supplement existing boreholes.	On a three-monthly (3) basis during the decommissioning phase of the mine.
The Groundwater quality monitoring program will continue through the decommissioning phase. Groundwater quality reports will be compiled and maintained at the Mine Manager's office. This report will be made available to all Interested and Affected Parties on request.	On a three-monthly (3) basis during the decommissioning phase of the mine.
Minimise deterioration of groundwater quality down gradient of the mining operations due to plume movement	
<p>Implement as many closure measures during the operational phase, while conducting appropriate monitoring programmes to demonstrate actual performance of the various management actions during the life of mine.</p> <p>All mined areas should be flooded as soon as possible to minimise oxygen from reacting with the remaining pyrite.</p> <p>Mining should remove all coal from the opencasts and separate acid forming and non-acid forming material. Deposit acid forming material at the base of the pit.</p> <p>The final backfilled opencast topography should be engineered such that runoff is directed away from the</p>	

<p>opencast areas.</p> <p>The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge to the opencasts.</p> <p>Quarterly groundwater sampling must be conducted to establish a database of groundwater quality to assess plume movement trends.</p> <p>All sulphate containing waste material should be stored underground and flooded as soon as possible to exclude oxygen.</p> <p>Major underground fractures encountered while mining must be sealed by grouting, both on inflow and outflow areas</p>	
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9.3.3 Air quality

Objective: To minimise the impacts of mining on local air quality.

Specific goals:

1. Ensure that impacts from dust and diesel fumes generated by machinery on local air quality is minimised.
2. Ensure that impacts from dust generated by blowing wind on local air quality is minimised.

Technical/management options:

The Mine Manager or his appointed representative will ensure that all machinery is in good running order, and that the re-vegetation program is up to date.

Action Plans	Time schedule
Ensure that impacts from dust and diesel fumes generated by machinery on local air quality is minimised.	
All machinery utilised on site will be in good repair, and well maintained.	Throughout decommissioning phase of mine.
All machinery will be fitted with the correct exhaust systems, which will be maintained and in good repair.	Throughout decommissioning phase of mine.
Ensure that impacts from dust generated by blowing wind on local air quality is minimised.	
Dust suppression will be undertaken during the decommissioning phase on haul roads and stockpiling	Twice daily throughout life of mine and if necessary

areas where movement of machinery may generate dust.	frequency will increase.
The rehabilitated workings will be seeded with the recommended seed mix. This will reduce dust generation.	Each onset of the rainy season.
Approximately 40 m ³ of water will be allocated for dust suppression by means of a water cart.	Daily.
Water for dust suppression purposes will be obtained from the Pollution control dam.	During decommissioning phase and throughout life of mine.

9.3.4 Noise and vibrations

Objective: To minimise the impacts of noise and vibrations on the health of people and the environment.

Specific goals:

1. Ensure that noise impacts on machine operators are minimised.

Technical/management options:

The Mine Safety officer will ensure that earplugs are issued and used.

Action Plan	Time schedule
Ensure that noise impacts on machine operators are minimised.	
All machine operators will be issued with earplugs, and instructed on how to use them.	Whenever the operators are exposed to high noise levels during decommissioning phase of mine.

9.3.5 Interested and affected parties

Objective: To minimise the impacts on all Interested and Affected Parties.

Specific goals:

1. Maintain cordial relationships with all identified Interested and Affected Parties.

Technical/management options:

The Mine Manager or his appointed representative will maintain copies of the latest reports at his office, and will make these available to all Interested and Affected Parties.

Action	Time schedule
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Maintain cordial relationships with all identified Interested and Affected Parties.	
Mine management will continue to maintain an open-door policy, with all Interested and Affected Parties. Minutes of all meetings will be kept, and made available on request.	During decommissioning phase of mine.
The Interested and Affected Parties Forum will continue through the decommissioning phase. Minutes of all meetings will be taken. These Minutes will include a record of all parties in attendance.	Forum will convene every six months during the decommissioning phase of mining.

9.4 MINE CLOSURE

9.4.1 Dismantling of mine surface infrastructure

The retention or demolition of mine infrastructure presents a significant cost and should be considered at the purchasing and planning stages. The market value will change over the life of the operation and the degree to which the infrastructure is maintained during the operational period should reflect the intended post closure use. The following will be provided in relation to decommissioning of mine infrastructure:

- Description of areas and equipment that needs decommissioning
- Description of strategy, timing and methods chosen to remove and dispose of equipment, structures and associated waste material, unless they are considered by the Director to be beneficial to a future use of the land.
- Precautions to be used to ensure safety during decommissioning
- Requirement of Interested and Affected Parties (I&AP) with regards to the retention of certain mine infrastructure.

9.4.1.1 Access/haul roads

- Removal of core infrastructure like culverts
- Removal of carbonaceous material build up

9.4.1.2 Offices, workshops, electrical and telecommunication facilities

- Removal and demolition of unwanted structures

9.4.1.3 R.O.M. coal and Overburden Stockpiles

- Removal of carbonaceous material build up on the R.O.M. stockpile area
- Removal of stockpiles and utilisation of the material to backfill the remaining voids

9.4.1.4 Water Management facilities

Removal of all redundant surface water management facilities, such as berms and trenches will dependent on the rehabilitation plan and the agreed upon post-closure end land-use.

9.4.1.5 Adit and ventilation shafts

Decline and ventilation shafts will be sealed according to the requirement of relevant sections of the Mine, Health and Safety Act, No 29 of 1996 and the plans submitted to the Principal Inspector of Mines at the Department of Mineral Resources (DMR) Regional office in Witbank for approval before said action takes place.

9.4.1.6 Topsoil, subsoil and hard overburden stockpiles.

Removal of stockpile material and utilise material for the filling of remaining void within the mining area

9.4.1.7 Crushing and screening Plant

The plant will be demolished and removed from site. Where possible assets may be re-used or sold to other mines. The remaining items will be demolished, removed and transported from site as required. All recoverable scrap steel will be sold and recycled, with the remaining non-recycled wastes either being taken to a licensed landfill or buried in the areas being backfilled if available at the time of closure.

9.4.1.8 Rehabilitation of all disturbed surface areas directly affected by mining activities, placement of mine infrastructure and buildings.

This would involve the following actions:

- All concrete floors and slabs will be broken up to at least 1.5 meters below surface. The waste concrete will be crushed to produce aggregate that can either be used on site or sold for some other beneficial use beyond mine closure.
- Rotovate all hardened surfaces.
- Backfilling of the final void within the decline with overburden materials (unless the void is required for long term water management purposes),
- Compaction of backfilled areas,
- Distribution and shaping of subsoil and topsoil, and
- Seeding of landscaped areas with recommended mixture.
- Implementation of the long-term water management strategy will continue
- Monitoring and maintenance of all environmental aspects as committed to in the approved Environmental Management Program (EMP).

9.4.1.9 Rehabilitation of all surface areas indirectly affected by mining activities, such as subsided areas.

- The subsided areas will undergo reshaping to ensure they meet the final landform criteria prior to final re-vegetation

9.4.1.10 Spontaneous Combustion

Spontaneous combustion is known to occur; particularly where coal is left exposed (not capped or covered). The following must be undertaken to reduce the potential for spontaneous combustion:

- Accumulations of coal and carbonaceous material, particularly if it is known to contain pyritic material, must be covered by inert overburden material; and
- Should any outbreaks of sponcom occur during operational phase, the details on material involved, presence of pyritic material, location and climatic conditions must be recorded on survey plans. These areas must be assessed at closure to ensure appropriate management measures are in place to minimise the likelihood of sponcom occurring post closure. The areas must be included as part of the ongoing inspection and monitoring that will be required following closure of the mine and before closure certificate is issued.

9.4.2 Progressive Rehabilitation

Kromdraai North Colliery will adopt a progressive approach to the rehabilitation of disturbed areas to ensure that where practicable, areas where mining or overburden placement are completed, areas are quickly shaped, topsoiled and vegetated to provide a stable landform. The progressive formation of the post-mining landform and the establishment of a vegetative cover will reduce the amount of disturbed land at any one time and also reduce the visibility of mine-related activities from surrounding properties and roads. Early re-profiling and vegetation of external batter slopes of the emplacement areas is particularly important and will be targeted as a priority.

It is proposed that progressive rehabilitation be undertaken on the site, with disturbed areas generally undergoing rehabilitation as soon as coal has been removed, overburden, topsoil placement has taken place and subsequently being re-profiled to the final landform. A progressive approach to the rehabilitation of disturbed areas will significantly reduce liability during any given time, when the Colliery has to shut down due to unforeseen circumstances.

9.4.3 Review strategy

This rehabilitation and decommissioning closure plan should be looked at as a dynamic document; it will be continually reviewed and updated throughout the life of mine. Three years before closure of the mine, a more detailed rehabilitation and decommissioning closure plan will be prepared.

Review strategy would also trigger a thorough risk assessment, the development of a care and maintenance plan, and a full review of the Mine Closure and Rehabilitation Plan.

SECTION TEN

Environmental Awareness Plan

10. ENVIRONMENTAL AWARENESS PLAN

10.1 ENVIRONMENTAL AWARENESS PLAN

In terms of section 33(j) of the National Environmental Management Act, 107 of 1998, Environmental Impact Assessment Regulations 2010, Eyethu Coal (Pty) Limited must compile and implement an environmental awareness plan. The above-mentioned environmental awareness plan must describe the manner in which the mine (in this case Kromdraai North Colliery) will inform their employees of any environmental risk which may result from their work and the manner in which the environmental risks will be addressed to avoid pollution or/and degradation of the environment. This section, therefore concerns the details of the environmental awareness plan for Eyethu Coal (Pty) Limited's proposed Kromdraai North Colliery as required by the National Environmental Management Act, 107 of 1998. In view of the above, Eyethu Coal (Pty) Limited has developed an environmental awareness plan for the proposed project, which is explained in more detail below.

Note that the responsible person will revise these environmental awareness procedures from time to time. The date of commencement of the revised procedure will always be indicated to prevent confusion, in this case after the issuing of environmental authorization to Eyethu Coal (Pty) Limited.

This Environmental Awareness (Standard Training Procedure) sets out the mine's training objectives regarding to environmental awareness. It is a stand-alone procedure, which serves to improve awareness, training and competency in the environmental field. It contains no detail on the actual training initiatives but rather serves to ensure that a responsible person is appointed to deal with and increase environmental awareness on the mine.

10.1.1 Environmental Awareness Plan

10.1.1.1 Scope

This Environmental Training Standard Procedure sets out the mine's training objectives regarding environmental awareness. It is a stand-alone procedure, which serves to improve awareness, training and competency in the environmental field. It contains no detail on the actual training initiatives but rather serves to ensure that a responsible person is appointed to deal with and increase environmental awareness on the mine.

10.1.1.2 Objectives

The following are the objectives set for this standard procedure:

- To explain and aid the personnel involved in training with regards Environmental Management System (EMS);

- To clarify the EMS training and ensure that all employees are correctly instructed with regards to the environment.

10.1.1.3 Safety risks associated with activity

There were no hazards identified in applying this standard procedure.

10.1.1.4 Responsibilities

In the case where there is no training department on site, a responsible person should be identified (Mine manager, Environmental Officer or Consultant) to ensure that the objective of this procedure is met.

10.1.1.5 Legal requirements

The following legislation and standards apply to this Standard Procedure:

- * Employment Equity Act 55 of 1998 – AREAS WHERE EMPLOYMENT EQUITY ARE DEFINED, INCLUDING TRAINING & DEVELOPMENT.
- * National Environmental Management Act 107 of 1998 – RECOMMENDATIONS FOR INSTITUTIONAL CO-OPERATION.
- * Minerals and Petroleum Resources Act, 2002 (Act 28 of 2002) – DEVELOPMENT OF AN ENVIRONMENTAL AWARENESS PLAN.

10.1.1.6 Induction Programme

An Induction Programme (Kromdraai North Colliery induction), which will include environmental awareness programme will be established for Kromdraai North Colliery. During the training sessions various topics will be discussed such as, but not limited to: Water Pollution Prevention, Good Environmental Housekeeping, etc. Through the Induction Programme, the mine manager, safety officer, or any other responsible appointed person shall ensure that all staff receives training in:

Administrative requirements and procedures, which will include the Environmental Emergency.

10.1.1.7 Procedures

Resource conservation and environmental reporting and general environmental awareness for mine related environmental issues.

All employees (including contractor employees) will undergo Kromdraai North Colliery induction. Kromdraai North Colliery induction includes training and awareness on environmental issues on the mine and is compulsory for all new employees. The induction programmes will as mentioned above, have an

environmental management component. On an annual basis the environmental section of the induction gets updated to ensure that it is up to date. Consideration should be given to:

- Significant environmental impacts as identified in the EMP.
- Procedures: environmental awareness and emergency procedures.
- Trends in incidents.
- Trends in audit findings.

10.1.1.8 Trainee needs

The identification of environmental training and environmental awareness needs are derived from an analysis of the type of role different categories of employees play at Kromdraai North Colliery. The following categories are considered, viz:

- Senior Management.
- Middle management (Environmental Officers).
- Supervisors.
- Operators.
- Visitors and contractors.

Each of these categories has different responsibilities and therefore has different knowledge requirements and environmental awareness training needs to obtain that knowledge.

10.1.1.9 Training Planning

Identified and agreed training needs shall be included in budgets. Course attendance (other than at the internal induction courses) shall be scheduled on the basis of the importance of task contribution to the maintenance, effectiveness and improvement of the objectives.

10.1.1.10 General environmental awareness training

General awareness training will be offered to operators, processors and the other various sections of the mine during the safety toolbox talks. This will be conducted on rotational basis. New environmental awareness topics are determined and new topics are introduced after all the shifts have received training/awareness on the current topic. The following will be undertaken to ensure that the above awareness training is conducted:

- A monthly environmental awareness topic for discussion will be distributed to all mine sections. These topics will be discussed at the safety toolbox talks, by SHE (Safety, Health and Environmental) reps /Environmental officers if available.

- The topics will also be displayed on the notice boards of all mine sections.
- Ad hoc environmental awareness sessions to various departments/sections will be conducted on request. The presentations will focus on the environmental issues relevant to individual tasks.

10.1.1.11 Job specific environmental awareness training

Job specific training will be developed to address urgent training needs as identified /required. The training material will focus on the following:

- Waste prevention and control (implementation of the waste management procedure).
- Water management (Leaking pipes and taps).
- Hydrocarbon and chemical spill reporting and clean up.
- Storing and handling of chemicals.
- Rehabilitation.
- Dust management on the mine.

Supervisory staff within specific mine sections will be equipped with the necessary knowledge and information to guide their employees on environmental aspects applicable in performing a specific task.

10.1.1.12 Competency training

Management (training official/environmental officer if available) is responsible for the environmental competency and awareness training of middle management and supervisors. This training will be conducted on both a one to one basis and through workshops. If required, external organizations may be requested to provide training to selected employees (e.g. EMP auditing).

Competence and the effectiveness of training and development initiatives will be determined through the following:

- Trend analysis and reporting
- Analysis of work areas during visits and audits
- Trend analysis of monthly incidents (or zero tolerance if available) as recorded per mine sections.

10.1.1.13 Certification

Photocopies of certificates issued after completion of a training course shall be maintained in the staff member's file and Training Department's records.

10.1.1.14 Records

Environmental awareness and training records will be kept at a safe and accessible place on site.

SECTION ELEVEN

Conclusion and Recommendations

11. CONCLUSION AND RECOMMENDATIONS

The purpose of this final chapter is to:

- Summarise the main recommendations of the impact assessment to mitigate significant negative impacts and enhance benefits,
- Briefly discuss how the objectives of the report have been met,
- Provide an indication of how complete the information in this report is for decision-making purposes.

11.1 KEY RECOMMENDATIONS

The key recommendations = relate to significant impacts and potential significant impacts of the proposed project. These recommendations are outlined below.

11.1.1 Recommendations Relating to Impacts on Soils

- Topsoil from the overburden stockpiling site, access/haul roads and pollution control dam sites should be stripped prior to use of the area and the stripped topsoil must be used for rehabilitation after the use of the sites.
- As far as possible, stripped topsoil should be stockpiled upslope of the each site.
- The topsoil stockpiles must be placed upslope or outside the dirty water areas.
- The broad soil groups suitable for rehabilitation purposes should be stockpiled separately from less suitable broad soil groups and all topsoil must be stockpiled separately from the subsoil material.
- Soil depth and volumes to be used during rehabilitation must comply with the rehabilitation budget.
- Wetland degradation should be prevented. All infrastructures should be constructed and designed by a qualified engineer. Where necessary, strip topsoil clean from underlying non-topsoil materials such as weathered sandstone, hard or soft plinthite.
- Stripping and stockpiling of the A horizon (30 cm topsoil) separately from the subsoil, should become standard practice. Stripping of wetland zones for rehabilitation is not recommended.
- Operators are to be properly informed in order to strip the above-mentioned topsoil to its correct depth and without contaminating it with undesired, underlying, weathered materials or ferricrete.
- Selection of sites of lower potential soils for development whenever possible.

- During rehabilitation, soil amelioration should be done by liming and fertilizer applications based on soil analysis.

11.1.2 Recommendations Relating to Impacts on vegetation and fauna (biodiversity)

- After rehabilitation and re-vegetation of the opencast and underground shaft areas, regular inspections must be conducted over the areas to determine if vegetation cover is successful in order to combat erosion. If bare patches become visible, seeding of the areas must follow.
- Inspections must also include the establishment of any declared invader plant species. If they exist in the areas an immediate eradication program must be implemented.

11.1.3 Recommendations Relating to Impacts on Sensitive landscapes

- Wetland degradation should be prevented. All infrastructures associated with the opencast and underground mining areas should be constructed and designed by a qualified engineer.
- Constant monitoring of mining infrastructures close to all sensitive landscape such as wetlands and streams to allow for the early detection of any impacts that could potentially occur.
- Avoid the dumping of materials, spills and the run-on of polluted water into wetland zones.
- It is a recommendation that a buffer zone of a 32m radius outside this wetland boundary be maintained.
- To this end, design, implement and maintain effective water runoff control measures.
- Refrain from unnecessarily disturbing land in the proximities of wetland zones.

11.1.4 Recommendations Relating to Impacts on surface water

- It is recommended that all dirty water emanating from the infrastructure area be contained, clean water be diverted away from the dirty water areas of the infrastructure area.
- All dirty water management structures must be designed to handle water from flood events (1:50 and 1:100 year flood event).

11.1.5 Recommendations Relating to Impacts on Groundwater

11.1.5.1 Recommendations Relating to the Lowering of Groundwater Levels during Mining

- The static level of groundwater in all boreholes within a distance of less than one kilometre must be measured regularly to establish a database against which future groundwater levels can be compared.
- Such measurements must be made preferably quarterly, but at least twice annually, following the dry and rainy seasons.
- In the event of unacceptable decrease of the yield of any affected boreholes, alternative water supply should be supplied to the affected parties until such time that the groundwater recovers following closure of the pit.
- As the wetland could be affected, monitoring of the wetland is essential. Should clean mine water be available, it is suggested that it be released in the wetland. A wetland specialist should be consulted to ensure correct volumes and timing of the added water.
- It is recommended that the closest box cut to the Kromdraai spruit and wetland keep a distance of at least 150m from edge of the wetland.
- Another very important aspect to consider is the layout and order of the Colliery cuts. The best possible scenario for minimising impacting on the Kromdraai spruit is to start the boxcut parallel to the spruit and at the farthest point from the spruit. In such a mining scenario the impact on the spruit will be delayed to the latest possible time before closure of the colliery.

11.1.5.2 Recommendations Relating to the Rise of Groundwater Levels Post-Mining

- It is recommended that the small opencast area closest to the Kromdraai spruit not be mined to mitigate any polluted groundwater that might arise from potential decanting as a result of the rise in groundwater levels post-mining.

11.1.5.3 Recommendations Relating to the Spread of Groundwater Pollution Post-mining

- All mined areas should be flooded as soon as possible to bar oxygen from reacting with remaining pyrite.
- Mining should remove all coal from the Colliery and as little as possible should be left.
- The final backfilled Colliery topography should be engineered such that runoff is directed away from the colliery areas.
- The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge to the colliery.
- Leaving a final void in the Colliery areas must be investigated. Once final mining plans are available, it will be essential to model this option.

- Quarterly groundwater sampling must be done to establish a database of plume movement trends, to aid eventual mine closure.
- Regular sampling and chemical analyses of the groundwater is imperative to establish a sound database: Groundwater in all boreholes within a distance of less than two kilometres must be sampled regularly to establish a database against which future groundwater levels can be compared. Sampling must be preferably quarterly, but at least twice annually, following the dry – and rainy seasons.
- If it is found during such a sampling event that groundwater from any extraction borehole is polluted beyond acceptable standards, alternative water will have to be supplied to the affected party.

11.1.5.4 Recommendations Relating to Impacts Indirectly Related to Mining

- It must be ensured that a credible company removes used oil after vehicle servicing.
- A sufficient supply of absorbent fibre should be kept at the site to contain accidental spills.
- Used absorbent fibre must be land-farmed, using approved methodologies.
- Domestic waste water, especially sewage, must either be treated at site according to accepted principles, or removed by credible contractors.
- Solid waste must similarly either be stored at site on an approved waste dump, or removed by credible contractors.

11.1.5.5 Recommendations Relating to Further work for groundwater impacts

- Monitoring holes be sited and constructed around each mining area by use of geophysics.
- A monitoring network should be dynamic. This means that the network should be extended over time to accommodate the migration of contaminants through the aquifer as well as the expansion of infrastructure and/or addition of possible pollution sources. An audit on the monitoring network should be conducted annually.
- The numerical model should be recalibrated as soon as more hydrogeological data such as monitoring holes are made available. This would enhance model predictions and certainty.
- The Kromdraai spruit as well as tributary of the Wilge River should be measured for flow upstream and downstream to determine the effect that the dewatering of the colliery has on the spruit. This should be done before mining commences to determine background values.
- Monitoring should commence before mining to establish background values for future reference.

- A detailed model taking in consideration all Kromdraai Collieries mining activities underground and colliery will be required to estimate the cumulative impact Kromdraai has on the surrounding hydrogeological environment.
- If any significant seepage is encountered during underground mining a full hydrogeological study be done on the impact that the underground mine dewatering will have on the J.C dam.

11.1.6 Recommendations Relating to Blasting

- A minimum recommendation is that a minimum of 500m must be maintained from any blast done. This may be greater but not less. The blaster has a legal obligation concerning the safe distance and he needs to determine this distance.
- All person animals within 500m from a blast must be cleared and where necessary evacuation must be conducted with all the required pre-blast negotiations.
- All roads next to the project area are of concern. Road closure will need to be considered when blasting closer than 500 from the road. The R50 and various service roads will need to be closed for blasting at distances 500m from the pit edge. Local authorities will need to be informed of such requirements and road closure conducted according to authority requirements.
- It is highly recommended that a monitoring program be put in place. This 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.
- A base line of structure inspection should be considered for all privately owned structures within 1500m from the mine. A further consideration of blasting times is when weather conditions could influence the effects yielded by blasting operations. Recommended is not to blast too early in the morning when it is still cool or the possibility of inversion is present or too late in the afternoon in winter as well. Do not blast in fog. Do not blast in the dark. Prevail from blasting when wind is blowing strongly in the direction of an outside receptor. Do not blast with low overcast clouds. These 'do not's stem from the influence that weather have on air blast. The energy of air blast cannot be increased but it is distributed differently to unexpected levels where it was not expected.
- It is recommended that a standard blasting time is fixed and blasting notice boards setup at various entrance routes that will inform the town's people of dates of blasting and blast times. Consideration must be given to the school times as pupils use secondary roads that lead to the main road directly across from the project area.
- Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. Additionally assistance may be sought when blasting is done close to the highways. This will bring about unbiased evaluation of levels and influence from an independent group. Monitoring could be done using permanent installed stations. Audit functions may also be conducted to assist the mine in maintaining a high level of performance with regards to blast results and the effects related to blasting operations.

11.1.7 Recommendations Relating to Impacts on Traffic and nearby roads

- Due to safety considerations regular and suitable gravel maintenance on road D686 is recommended.
- As there will be Heavy Vehicles using the mine's access on a daily basis on the R50 including during early mornings and late afternoons, it is proposed to provide High Mast Lighting at the Site Access on D686, to improve safety and visibility during the night and in winter months when fog or impaired visibility is found more regularly. 'Heavy Vehicles Turning' signs are also proposed from both the south and north approaches.
- Regular Dust Suppression will have to be employed at the mine access and on road D686, to keep any dust generated to a minimum and ensure that the visibility (& safety) for vehicles using the proposed mine access and on D686 is acceptable.

11.1.8 Recommendations Relating to Impacts on Heritage Resources

- Mitigation measures must be implemented with regards to the graves identified during the Heritage Impact Assessment (**See Appendix 8**).
- There are two options when dealing with graves. The first would be to fence it in and write a management plan for the preservation thereof. This option will come into play if there is no direct impact on the graves. It should be kept in mind that there always is a secondary impact on graves since families may not have access thereto once a mine comes into operation. Such a management plan needs to be written by a heritage expert and needs to be signed off by SAHRA. This option is recommended for all three sites identified as there will only be a secondary impact on them.
- The second option is to have the graves exhumed and the bodies reburied. This option is preferred when graves cannot be avoided by the development. Before exhumation can be done a process of social consultation is needed in order to find the associated families and obtain permission from them. For graves younger than 60 years only an undertaker is involved in the process, but for those older than 60 years or with an unknown date of death, an undertaker and archaeologist should be involved. This option is not recommended.
- It should be remembered that due to the natural factors indicated in the report, it is possible that more cultural sites may be present. Also the subterranean presence of archaeological and/or historical sites, features or artifacts are always a distinct possibility. Care should also be taken when development work commences that if any more sites or artifacts are uncovered, a qualified archaeologist be called in to investigate.

11.1.9 Recommendations Relating to Stream Health Macro-invertebrates

- Mitigation measures must ensure that no contaminated water from the proposed Kromdraai North Colliery comes into contact with the water in the receiving water body.

- A bio-monitoring programme should be conducted at least twice yearly to provide the owners and managers of Kromdraai North Colliery with sufficient information to pro-actively manage the aquatic environment.
- The origin of the current levels of sulphates and aluminium must be investigated prior to the commissioning of Kromdraai North Colliery.

11.1.10 Recommendations Relating to Interested and Affected Parties

Most impacts on interested and affected parties that may result from the proposed project are related to environmental components such as surface water, air quality, noise etc, which have been addressed above.

11.2 OBJECTIVES OF THIS REPORT

The objectives for this report were outlined in Section 1.4. These objectives were as follows:

- Present information to the authorities about the proposed project.
- Provide information regarding alternatives that have been considered by Eyethu Coal (Pty) Limited.
- Show how interested and affected parties will be afforded the opportunity to contribute to the project, to comment on the findings of the impact assessment and show that their issues were considered.
- Describe the baseline environment. A description of the receiving environment is given in Section 3.
- Describe the extent of environmental consequences for the construction, operating and closure phases. A summary of the impact assessment findings, for construction, operation and decommissioning, is given in Section 8.
- Proposed mitigation measures for impacts that are considered significant. Mitigation measures are outlined in Section 8. A summary of recommendations is given in Section 11.1 above.
- Describe the environmental feasibility of the proposed project – the potential negative impacts relating to environment can be mitigated appropriately while significant socio-economic benefits to the country could be realised if the project proceeds.
- Present findings of the EIA/EMP in a manner that facilitates decision-making. The completeness of information for decision-making is outlined in Section 11.4 below.

11.3 ENVIRONMENTAL FEASIBILITY OF THE PROPOSED PROJECT

Based on the environmental assessment conducted as described in this report, there are no significant environmental impacts associated with the proposed project that cannot be mitigated.

11.4 COMPLETENESS OF INFORMATION

The environment that is likely to be affected by the proposed Kromdraai North Colliery mining project was detailed in Section 3. All relevant specialist studies were conducted to determine the status quo of the environment within and around the proposed Kromdraai North Colliery project area.

Hence no knowledge gaps exist in terms of the current state of the environment. There is however some limitations with regard to the determination of the future state of the studied environmental aspects.

SECTION TWELVE

Statutory Requirements

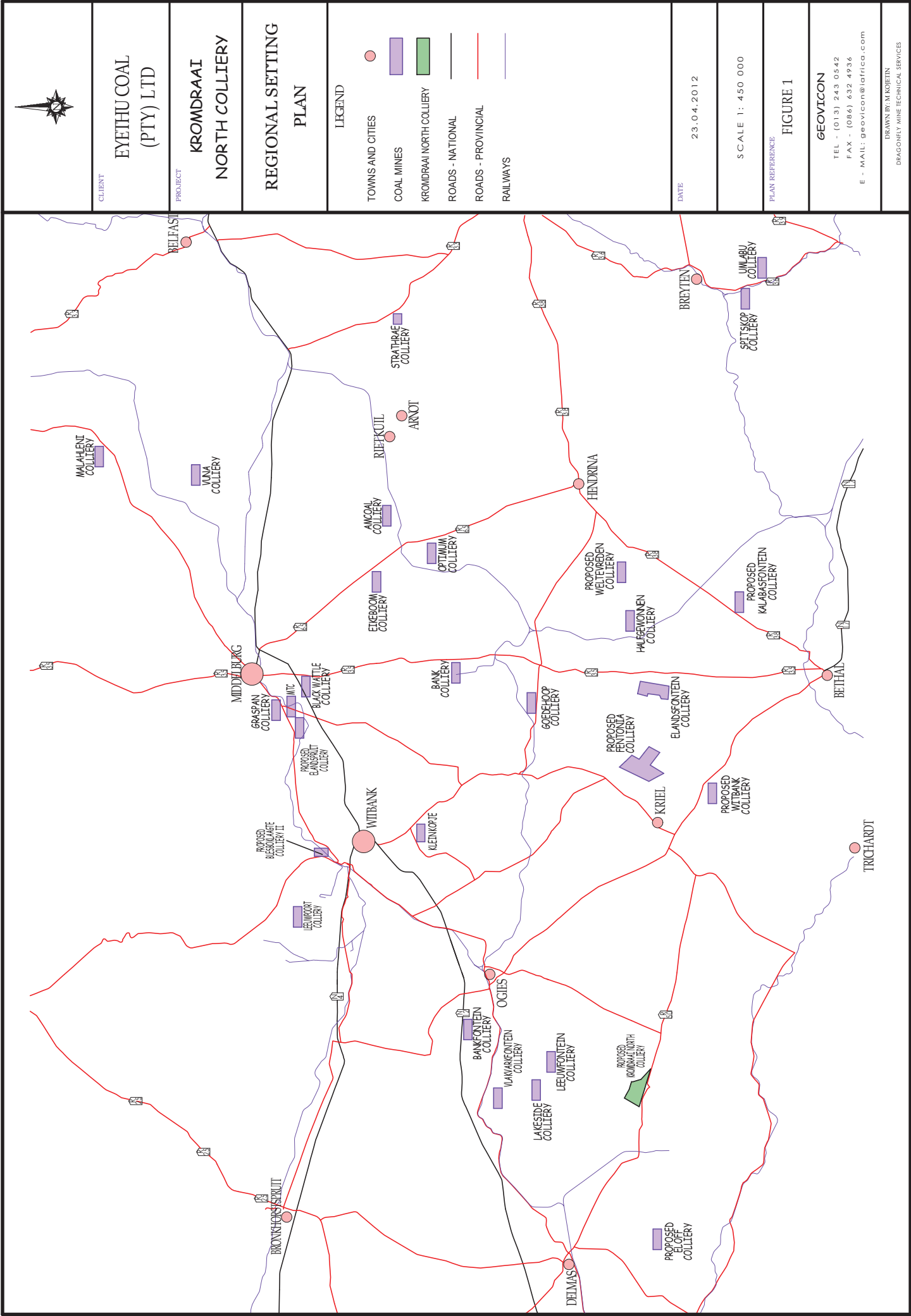
12. STATUTORY REQUIREMENTS

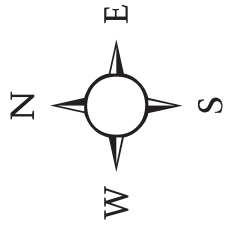
All activities within the proposed area has been evaluated and activities listed in terms of the EIA Regulations and Section 24 (7) of the National Environmental Management Act, 1998 (Act 107 of 1998) have been identified and relevant authorisation have been applied for.

Any other statutory requirements identified by the interested and affected parties will be verified and if necessary relevant authorisations applied for.

SECTION THIRTEEN

Comment Reply Sheet












EYETHU COAL
(PTY) LTD

KROMDRAAI NORTH
COLLIERY MINING
RIGHT AREA

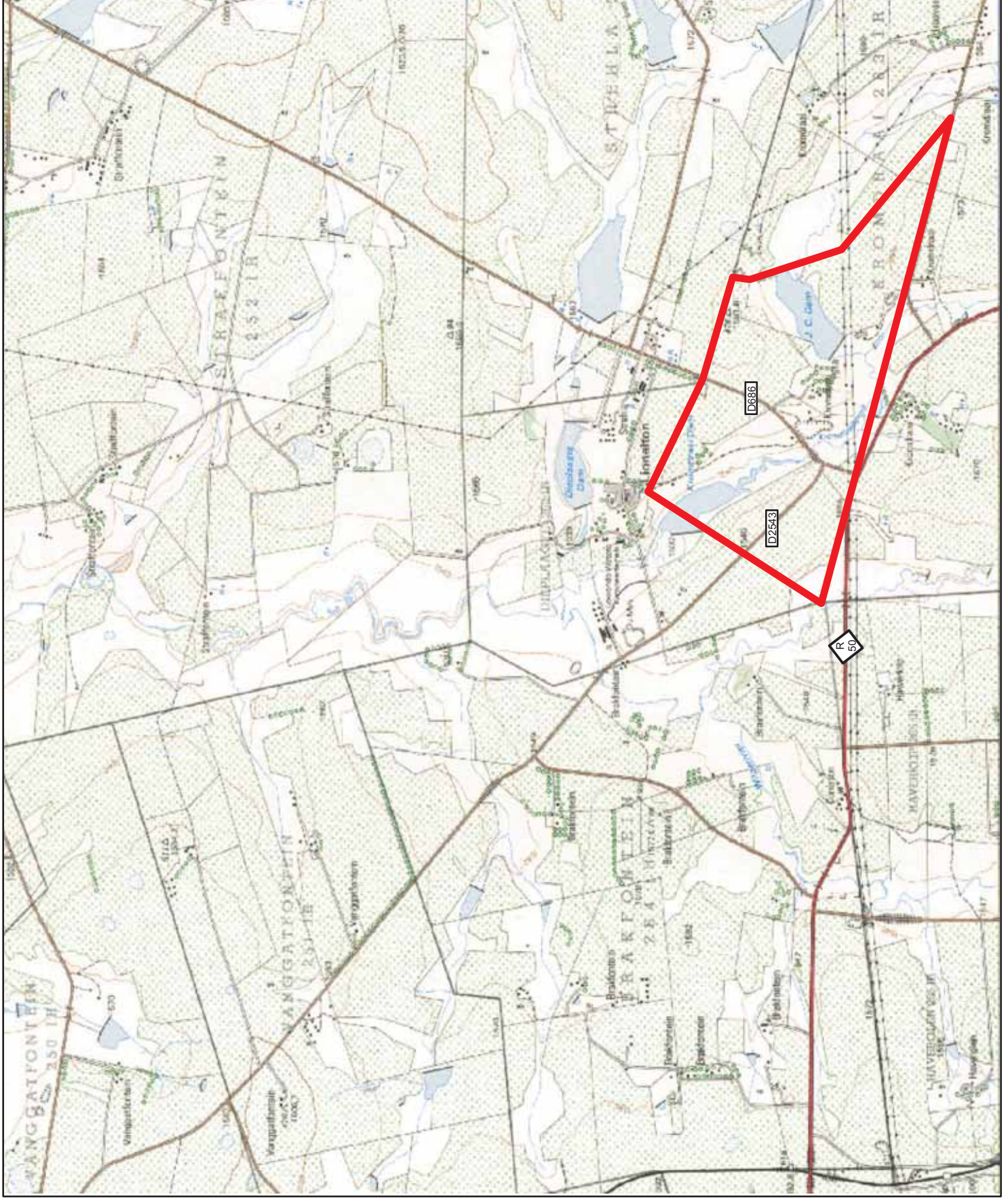
FIGURE 2: LOCALITY PLAN

NATIONAL GRID
DEGREE SQUARE
TOPO SHEET NO.: 2628 BB

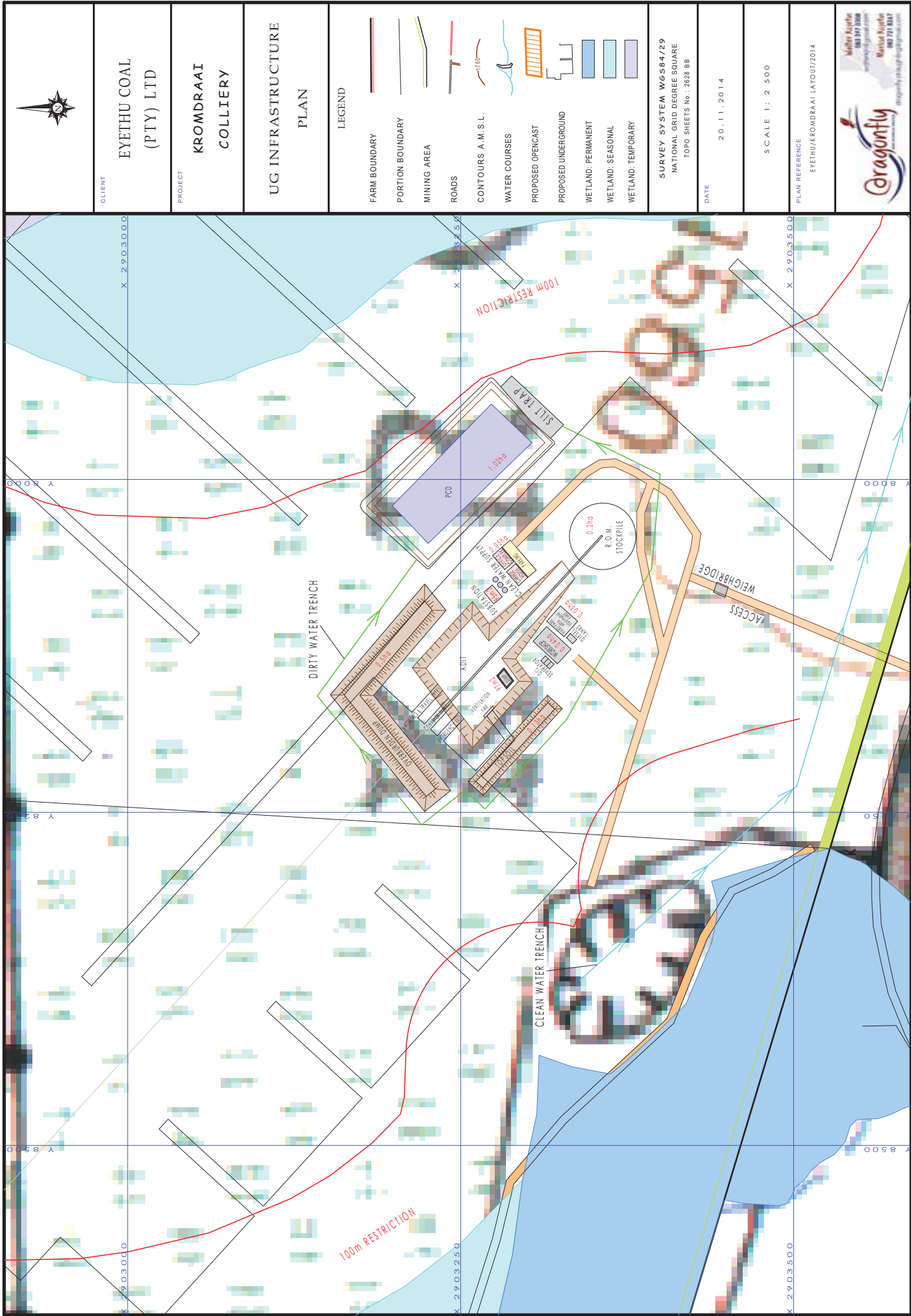
LEGEND

- | | |
|---|-------------------|
|  | Mining Right area |
|  | Arterial routes |
|  | Cultivated lands |
|  | Excavations |
|  | Power lines |
|  | Secondary roads |
|  | Streams |

DRAWN BY GEOVICON ENVIRONMENTAL (PTY) LTD
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YETHU COAL
(PTY) LTD

KROMDRAAI
COLLIERY

PLAN

LEGEND

FARM BOUNDARY

PORTION BOUNDARY

MINING AREA

ROADS

CONTOURS A.M.S.L.

WATER COURSES

PROPOSED OPENCAST

PROPOSED UNDERGROUND

WETLAND: PERMANENT

URVEY SYSTEM WGS84/29
NATIONAL GRID DEGREE SQUARE
TOPO SHEETS No.: 2628 BB

DATE _____

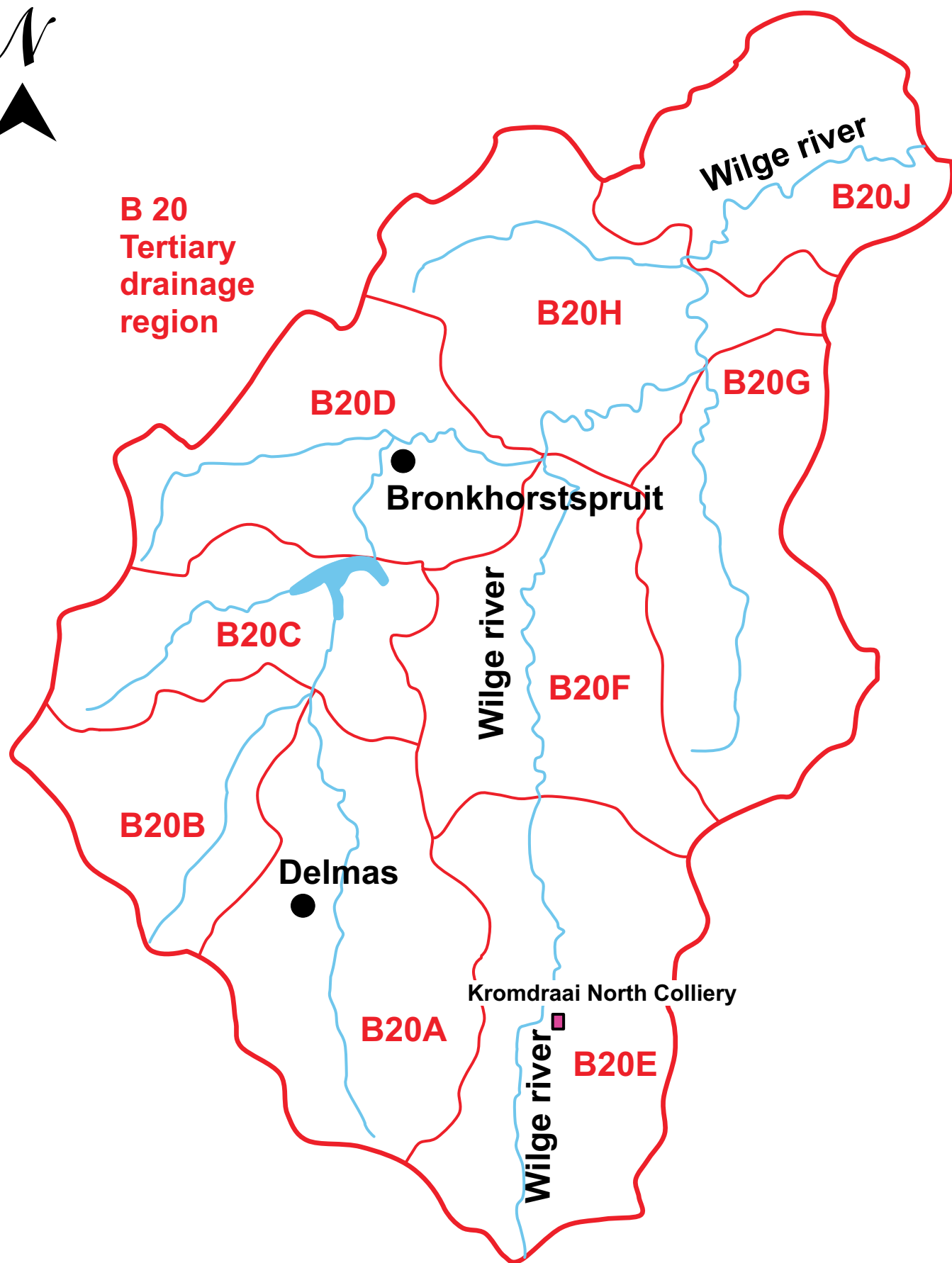
20.11.2014

SCALE 1: 2 500

PLAN REFERENCE

EYETHU/KROMDRAAI LAYOUT/2014





B20E Quaternary drainage regions

 Kromdraai North Colliery

Figure 6: Tertiary and quaternary drainage regions in the vicinity of Kromdraai North Colliery (situated in Water Management Area number 4)

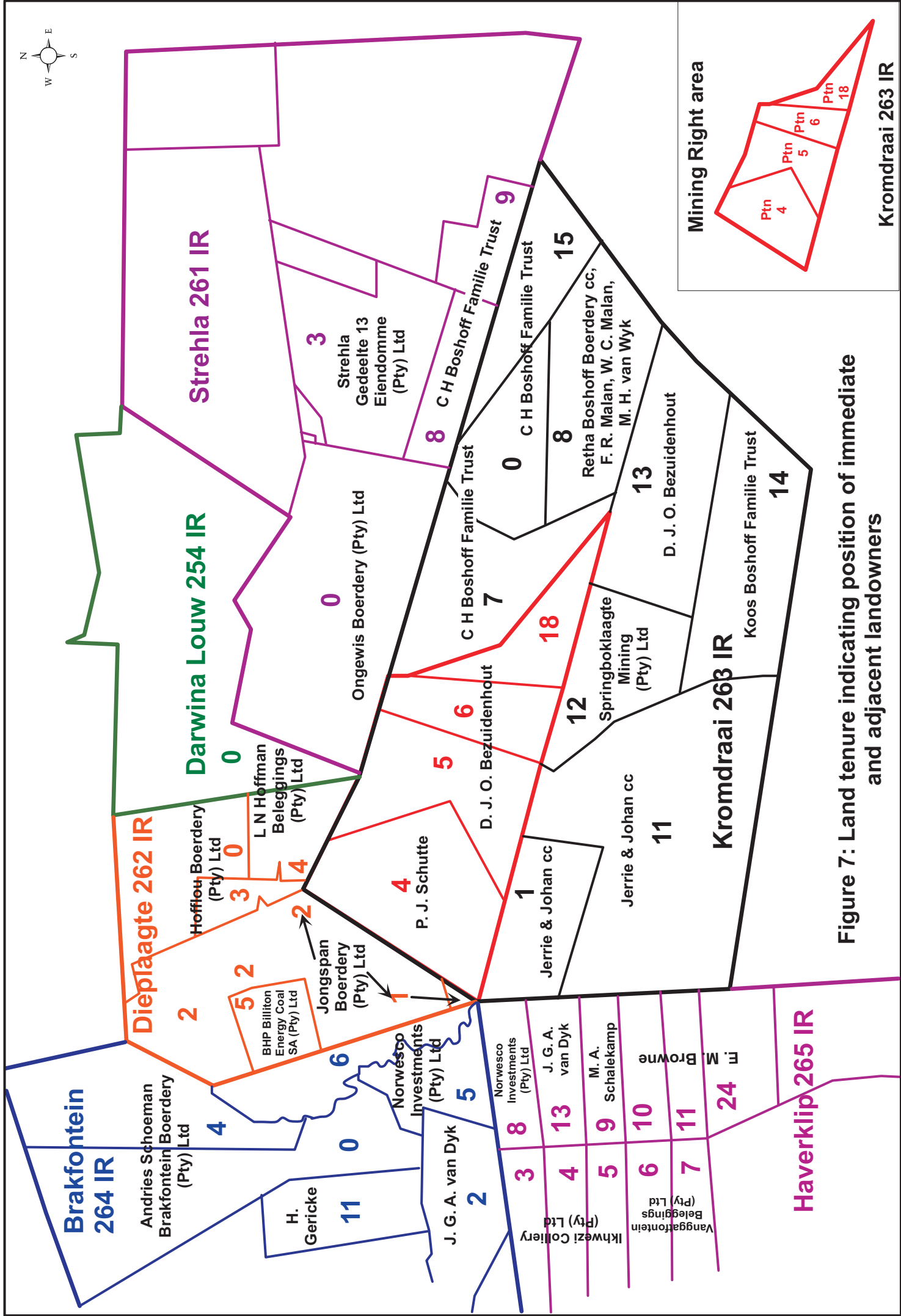
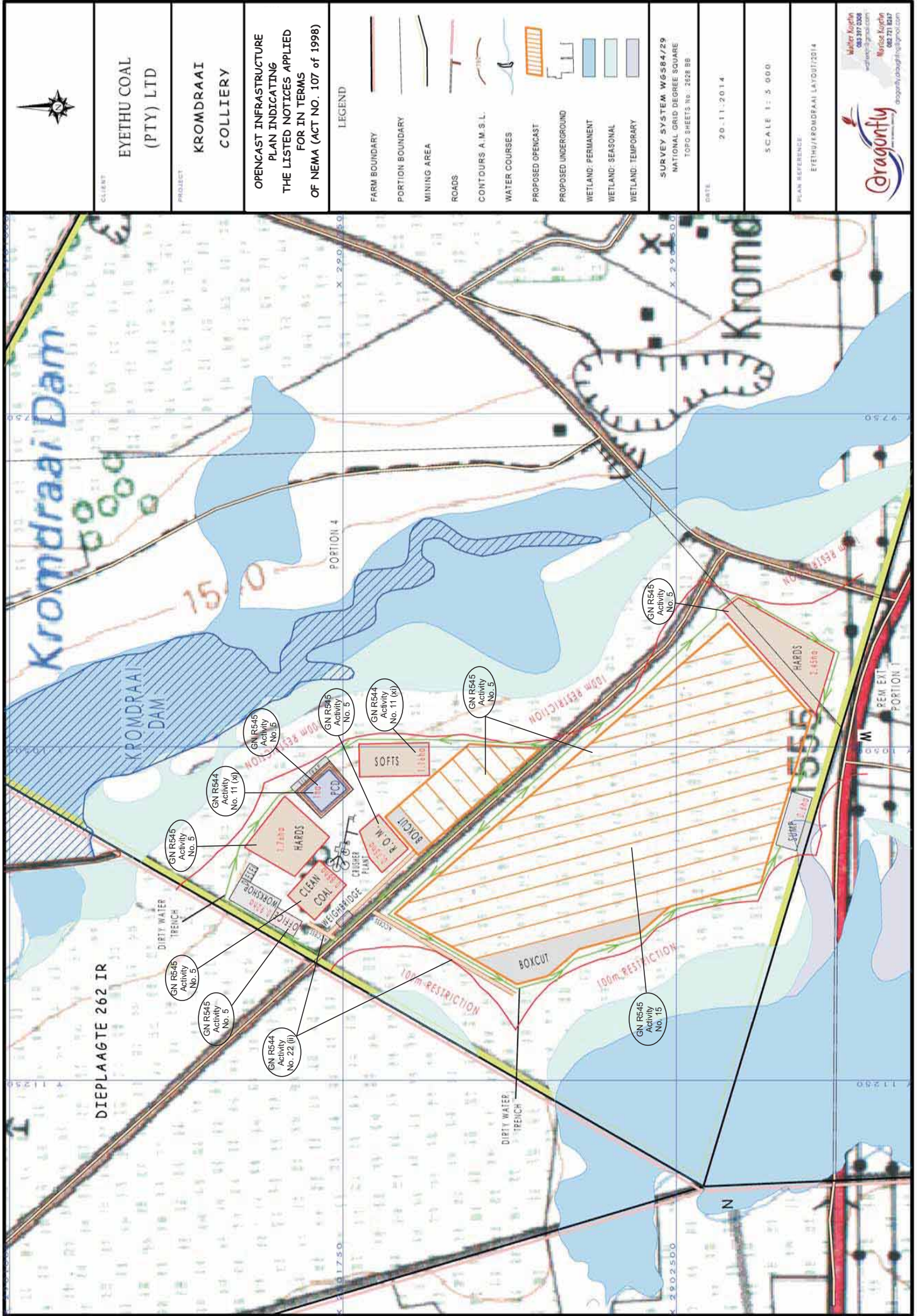
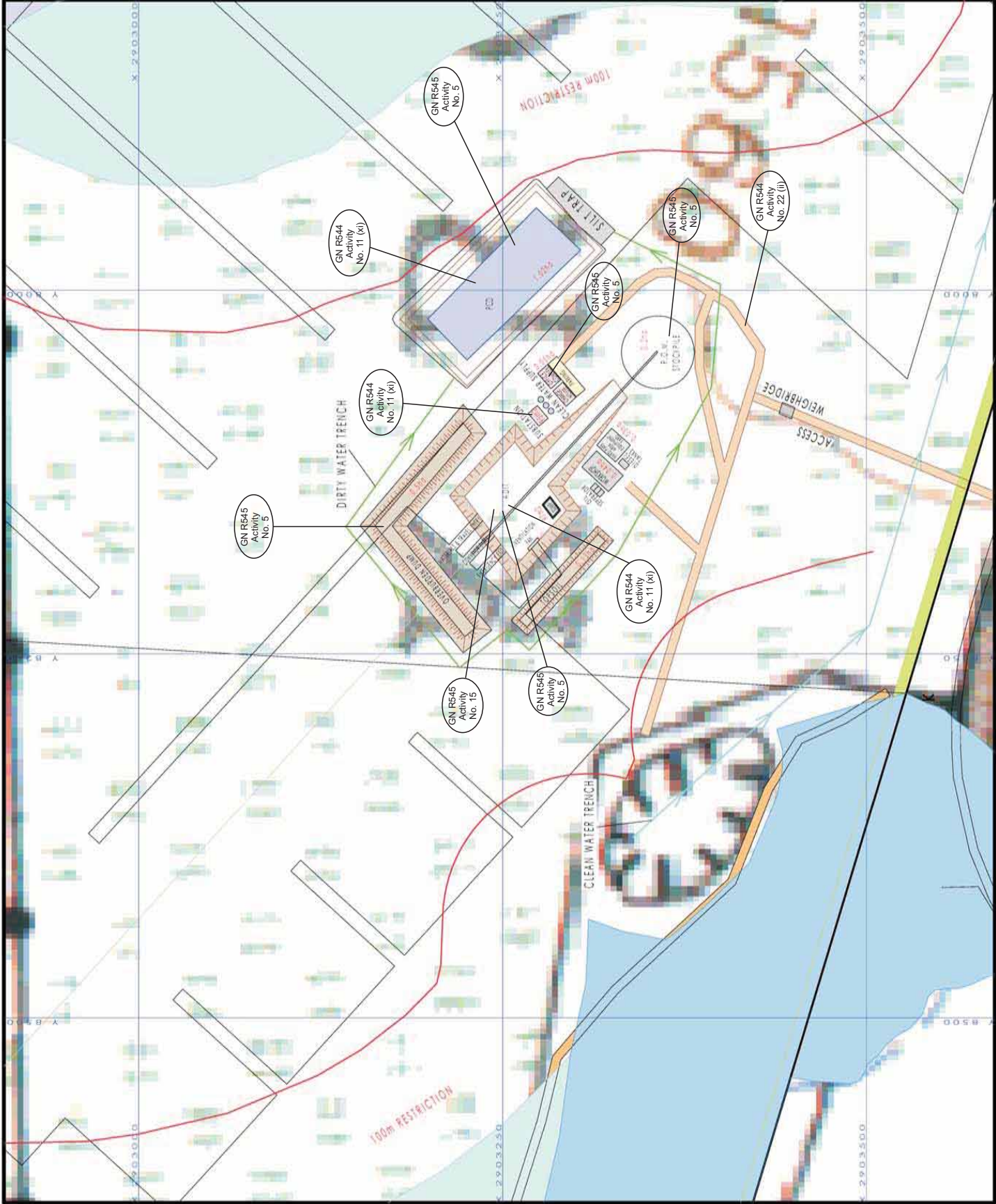


Figure 7: Land tenure indicating position of immediate and adjacent landowners





CLIENT

EYETHU COAL
(PTY) LTD

PROJECT

KROMDRAAI
COLLIERY

UNDERGROUND INFRASTRUCTURE
PLAN INDICATING
THE LISTED NOTICES APPLIED
FOR IN TERMS
OF NEMA (ACT NO. 107 OF 1998)

LEGEND

- FARM BOUNDARY
- PORTION BOUNDARY
- MINING AREA
- ROADS
- CONTOURS A.M.S.L.
- WATER COURSES
- PROPOSED OPENCAST
- PROPOSED UNDERGROUND
- WETLAND: PERMANENT
- WETLAND: SEASONAL
- WETLAND: TEMPORARY

SURVEY SYSTEM WGS84/29
NATIONAL GRID DEGREE SQUARE
TOPO SHEETS No. 2028 88

DATE

20.11.2014

SCALE 1: 2 500

PLAN REFERENCE

EYETHUKROMDRAAI LAYOUT/2014



Typical geological borehole Kromdraai North opencast

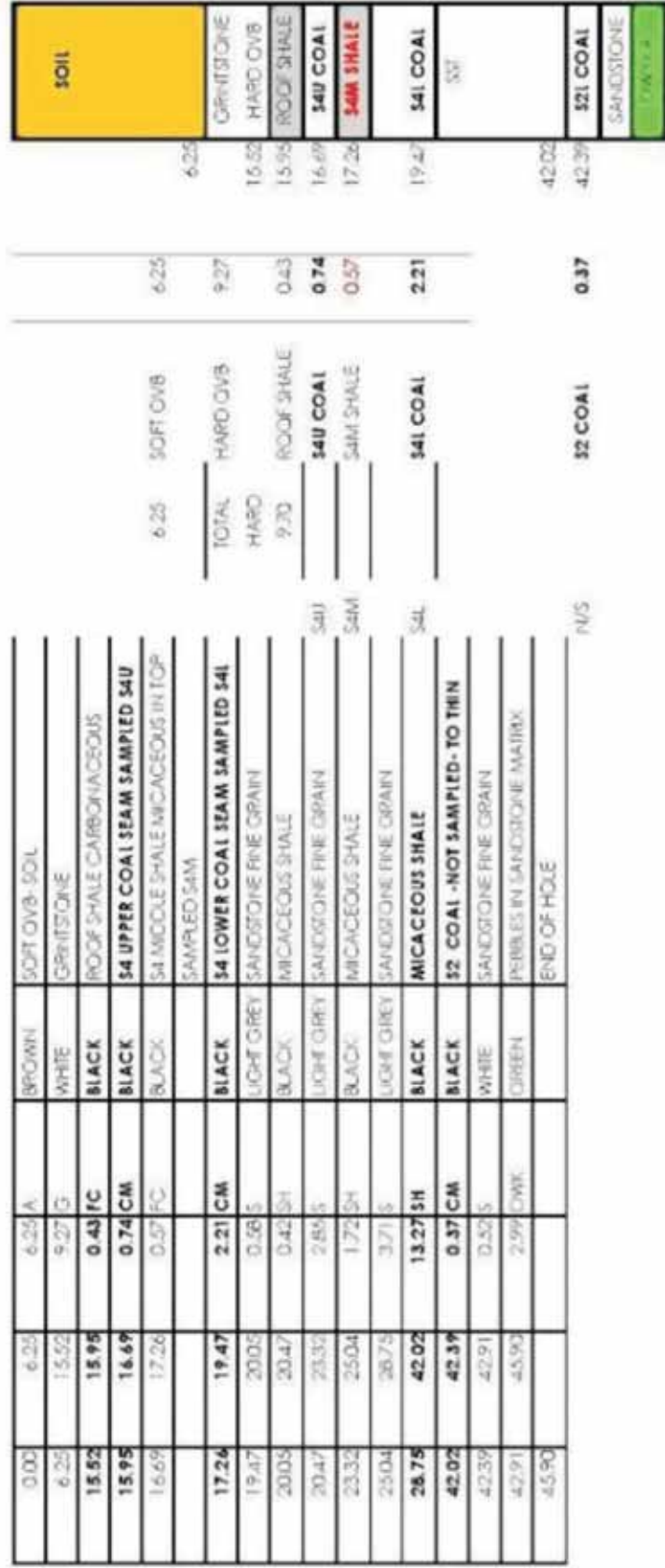
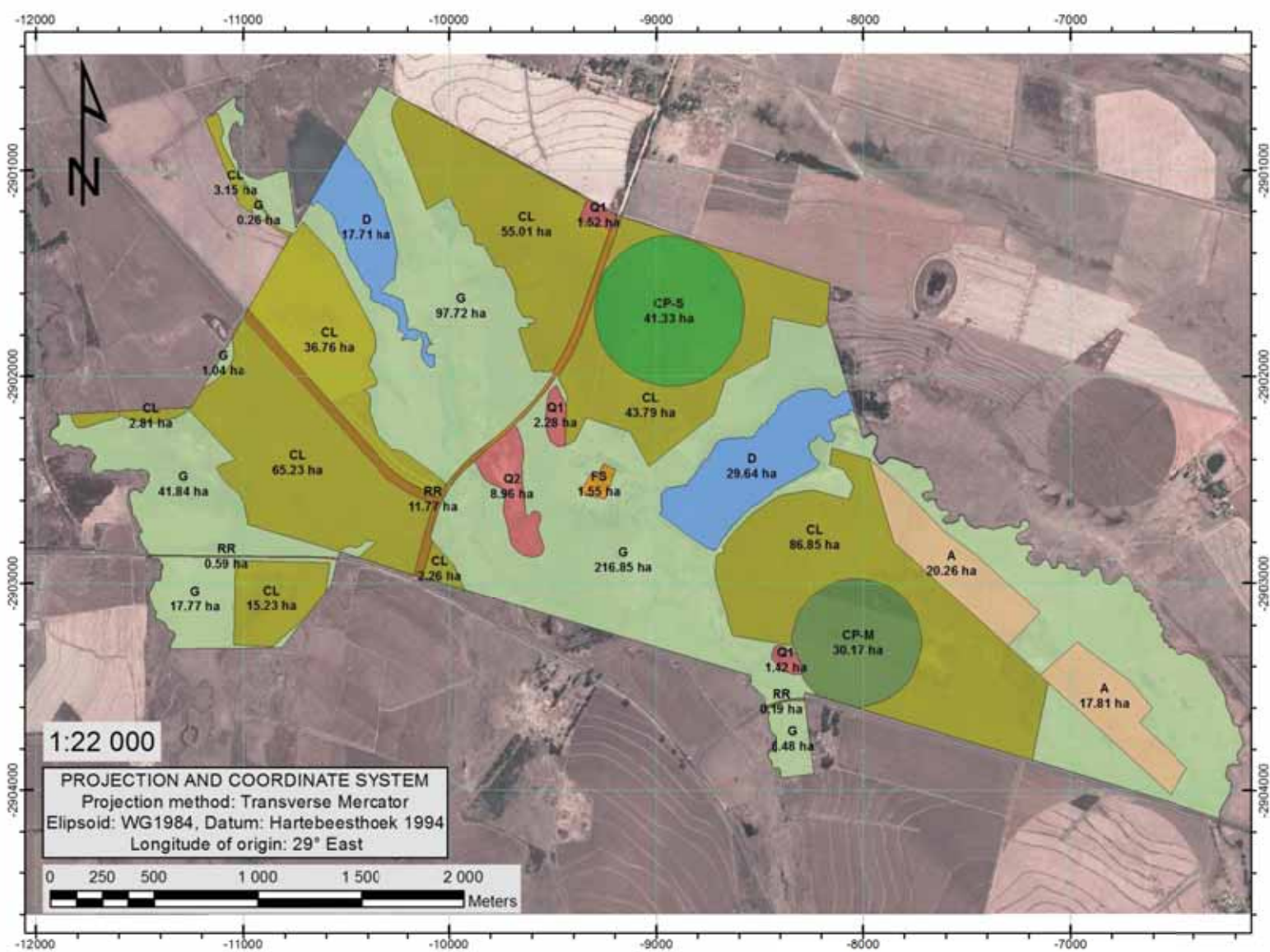


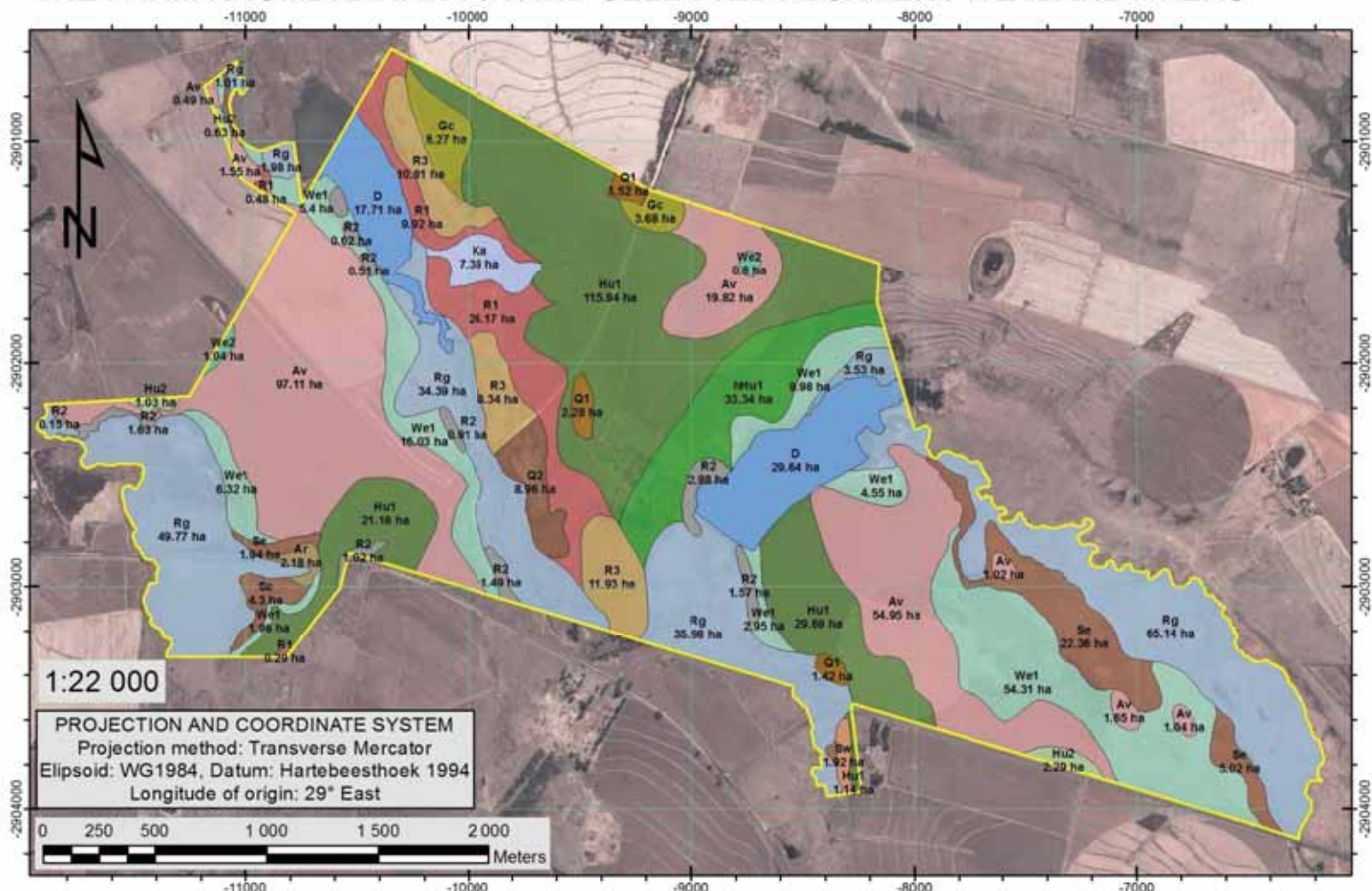
Figure 9: Generalised Stratigraphic layers of the area

FIG.10: CURRENT LAND USE MAP OF PARTS OF PORTIONS 4, 5, 6 AND 18 OF THE FARM KROMDRAAI 263 IR AND SELECTED ADJACENT WETLAND AREAS



LAND USE CODE	PRE-MINING LAND USE	AREA (ha)	AREA (%)
CP-S	Centre pivot irrigation: soya beans	41.33	4.71
CP-M	Centre pivot irrigation: maize	30.17	3.44
CL	Cultivated land: maize and soya beans	311.09	35.43
A	Abandoned lands	38.07	4.34
G	Grazing: mainly cattle, some sheep; grass harvesting in places	381.96	43.49
FS	Farmstead with associated outbuildings	1.55	0.18
D	Farm dams	47.35	5.39
RR	Public roads	12.55	1.43
Q1, Q2	Quarry: construction materials	14.18	1.61
Total		878.25	100.0

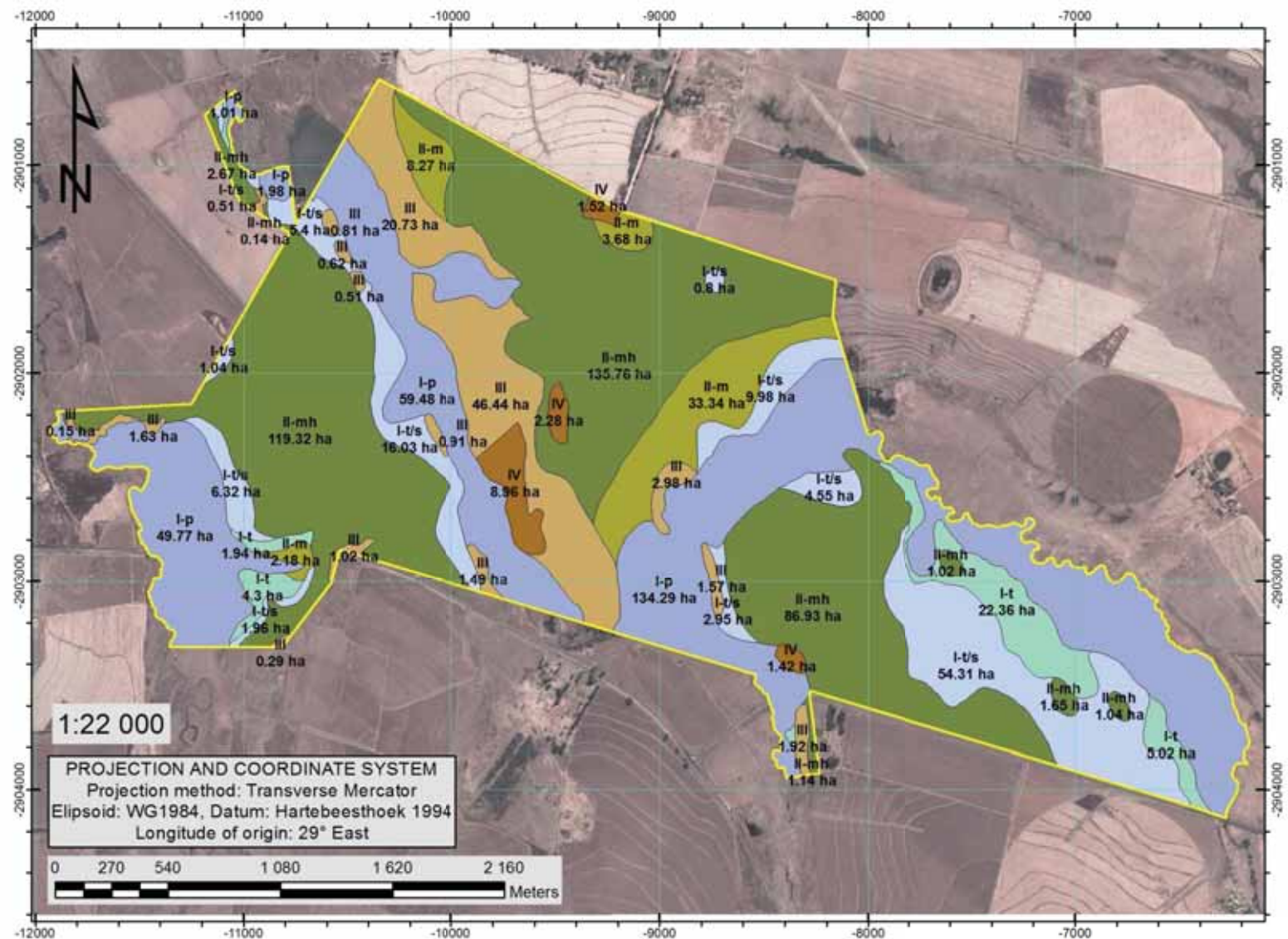
FIG.11: DETAILED SOIL-LANDFORM MAP OF PARTS OF PORTIONS 4, 5, 6 AND 18 OF THE FARM KROMDRAAI 263 IR AND SELECTED ADJACENT WETLAND AREAS



SOIL-LANDFORM LEGEND

MAP UNIT	LANDFORM COMPONENT	SOIL COMPONENT	AREA (ha)	AREA (%)
Hu1	Gently to moderately sloping crest and midslopes (2-8% slope)	Deep to very deep (100->150 cm), well-drained, dark red or red, apedal, sandy clay loam to clay loam of the Hutton form underlain by weathered or hard rock or degraded ferricrete; common small hard Fe/Mn nodules present in places in deep subsoil; associated with Bainsvlei and Avalon forms	167.95	19.12
hHu1	Strongly sloping midslopes (8-15% slope)	As for Hu1, but sloping phase	33.34	3.80
Hu2	Gently sloping midslopes (2-5% slope)	Mainly deep (100-150 cm), well-drained, sandy loam to sandy clay loam topsoil on red, apedal, sandy clay loam subsoil of the Hutton form underlain by weathered or hard rock or degraded ferricrete; common small hard Fe/Mn nodules present in places in deep subsoil	3.95	0.45
Gc	Gently sloping midslopes (2-5% slope)	Moderately deep (50-80 cm), well-drained, yellow-brown, apedal, sandy clay loam on hard plinthite of the Glencoe form; common small hard Fe/Mn nodules present in subsoil; closely associated with moderately deep Avalon form	11.95	1.36
Av	Gently sloping midslopes (2-5% slope)	Mainly deep (depth to soft plinthite 100-130 cm), moderately well-drained, yellow-brown, apedal, sandy clay loam upper subsoil on soft plinthite lower subsoil of the Avalon form; in places with degraded hard plinthite lower subsoil over prominently mottled saprolite; associated with Bainsvlei form	177.77	20.27
Sw	Moderately sloping midslopes (5-8% slope)	Moderately deep (50-80 cm), para-duplex soil: red-brown weak or moderate blocky sandy clay loam topsoil, sharply underlain by well-drained, red-brown, moderate to strong blocky, sandy clay loam, clay loam or sandy clay subsoil of the Swartland form, longuing into weathered or hard dolerite	1.92	0.22
Ar	Gently to moderately sloping midslopes or upper footslopes (4-8% slope)	Moderately deep or deep (70-120 cm), well or moderately well drained, black or very dark grey, strong blocky, vertic, clay of the Arcadia form, on weathered dolerite or shale	2.18	0.25
We1	Level to moderately sloping footslopes (1-8% slope)	Shallow (effective depth 30-40 cm), somewhat poorly drained, dark coloured, sandy clay loam topsoil on plinthic, sandy clay loam to clay loam subsoil of the Westleigh form; associated with Longlands, Kroonstad and Rensburg forms	102.49	11.67
We2	Level pan-like depressions (0-1% slope)	Shallow (effective depth 30-40 cm), somewhat poorly to poorly drained, dark coloured, sandy clay loam topsoil on plinthic, sandy clay loam to clay loam subsoil of the Westleigh form; associated with Rensburg form	1.84	0.21
Se	Gently sloping upper footslopes (2-5% slope)	Deep (effective depth 40-50 cm), somewhat poorly to poorly drained para-duplex soil: grey brown or grey, rust streaked, weak or moderate blocky sandy clay loam topsoil sharply underlain by grey brown or grey, mottled at depth, moderate to strong blocky, sandy clay loam, clay loam or clay subsoil of unknown depth, of the Sepane form	34.52	3.94
Ka	Gently to moderately sloping footslopes (2-8% slope)	Moderately deep soil materials: poorly to very poorly drained, black, weakly structured, sandy clay loam topsoil with rusty root channels in places overlying dark grey, mottled/gleyed, clay loam subsoil of the Katspruit form; associated with Westleigh form	7.38	0.84
Rg	Level valley bottoms (0-2% slope) with distinct, narrow river channel and in places gently sloping (2-4% slope) lower footslopes	Deep soil materials: poorly to very poorly drained, black, structured, vertic, clay topsoil with rusty root channels in places overlying dark grey, gleyed, calcareous clay subsoil of the Rensburg form; associated with Longlands, Kroonstad and Westleigh forms; sheet and river bank erosion evident	191.80	21.85
R1	Strongly sloping areas with <10% rock outcrops (mainly gritstone) in complex association with mainly shallow, red, brown or yellow, sandy loam to sandy clay loam of the Hutton, Mispah and Clovelly forms; land surface slightly uneven to uneven		36.86	4.20
R2	Gently sloping areas with >10% rock outcrops (mainly gritstone) in complex association with lithosols; land surface slightly uneven to rough		11.69	1.34
R3	Strongly sloping area with >30% rock outcrops (mainly dolerite and gritstone) in complex association with lithosols; land surface uneven to very rough		31.08	3.54
Q1	Gently sloping areas with drastically disturbed sites probably quarried for construction materials		5.22	0.59
Q2	Strongly sloping areas with drastically disturbed sites probably quarried for construction materials		8.96	1.02
D	Farm dam		47.35	5.39
TOTAL			878.25	100.0

FIGURE12: CURRENT LAND CAPABILITY MAP OF PARTS OF PORTIONS 4, 5, 6 AND 18 OF THE FARM KROMDRAAI 263 IR AND SELECTED ADJACENT WETLAND AREAS



LEGEND: PRE-MINING LAND CAPABILITY				
LAND CAPABILITY MAP UNITS	DESCRIPTION	MAP UNITS	AREA (ha)	% OF AREA
I-p	Class 1 – Wetland: permanent	Ka, Rg, D	246.53	28.08
I-t/s	Class I – Wetland: temporary/seasonal	We1, We2	104.33	11.88
I-t	Class I – Wetland: temporary	Se	34.52	3.94
II-mh	Class II – Arable land: moderately high potential	Hu1, Hu2, Av	349.67	39.84
II-m	Class II – Arable land: moderate potential	hHu1, Gc, Ar	47.47	5.41
III	Class III – Grazing land	Sw, R1, R2, R3	81.55	9.30
IV	Class IV – Wilderness land	Q1, Q2	14.18	1.61
Total			878.25	100.0

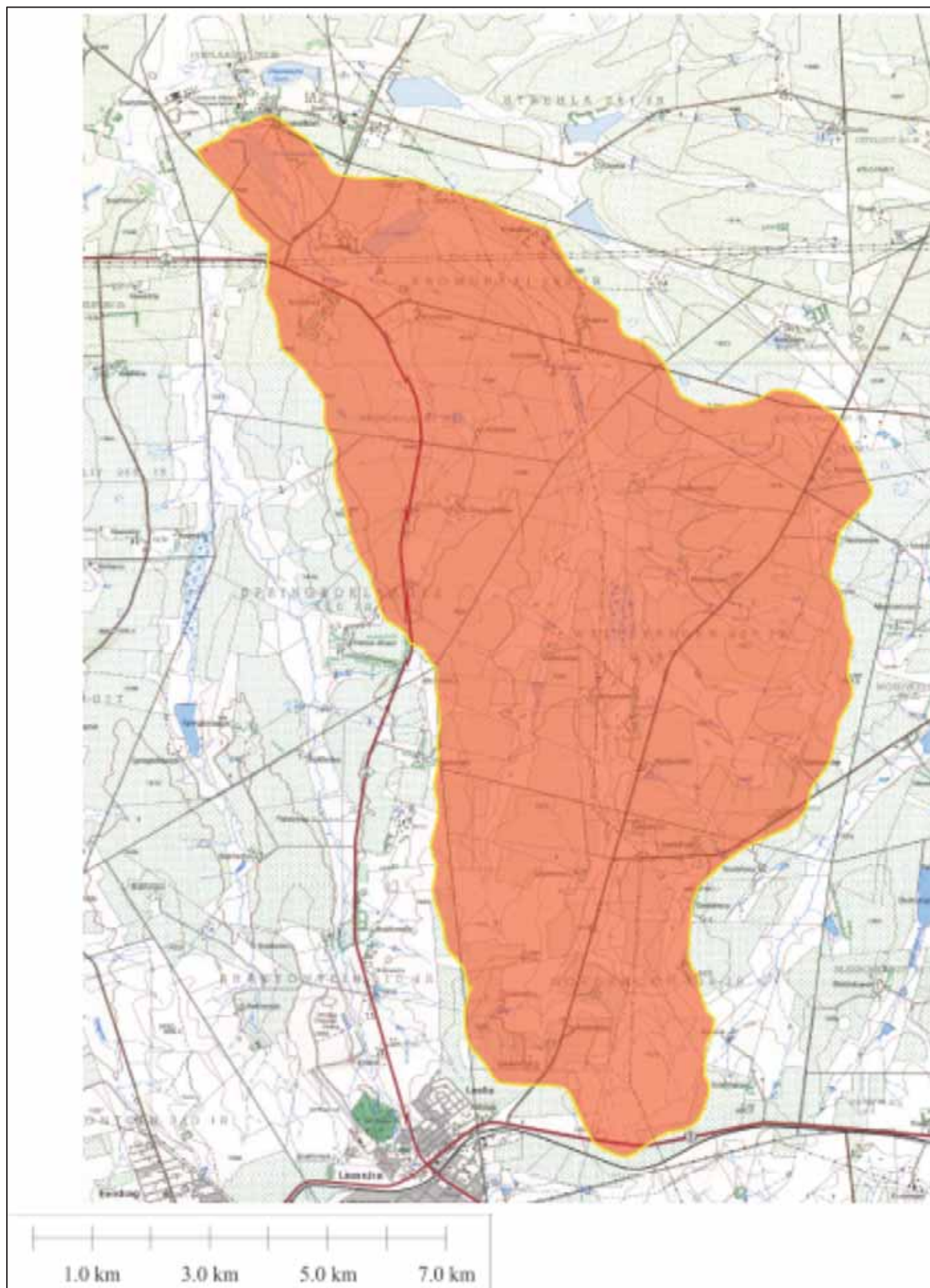


Figure 13: Kromdraai North Colliery's catchment delineation

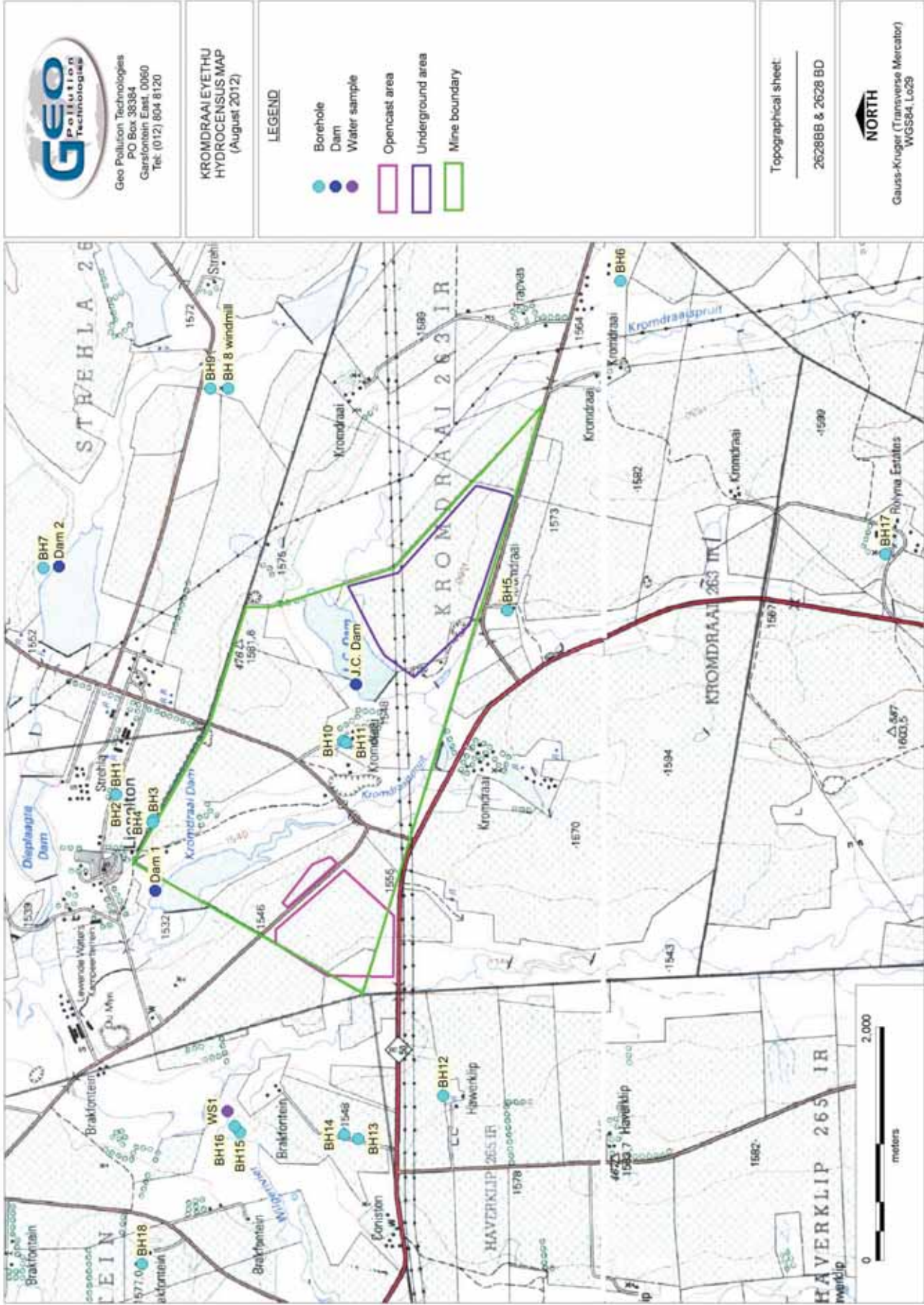


Figure 14: Positions of hydrocensus monitored points

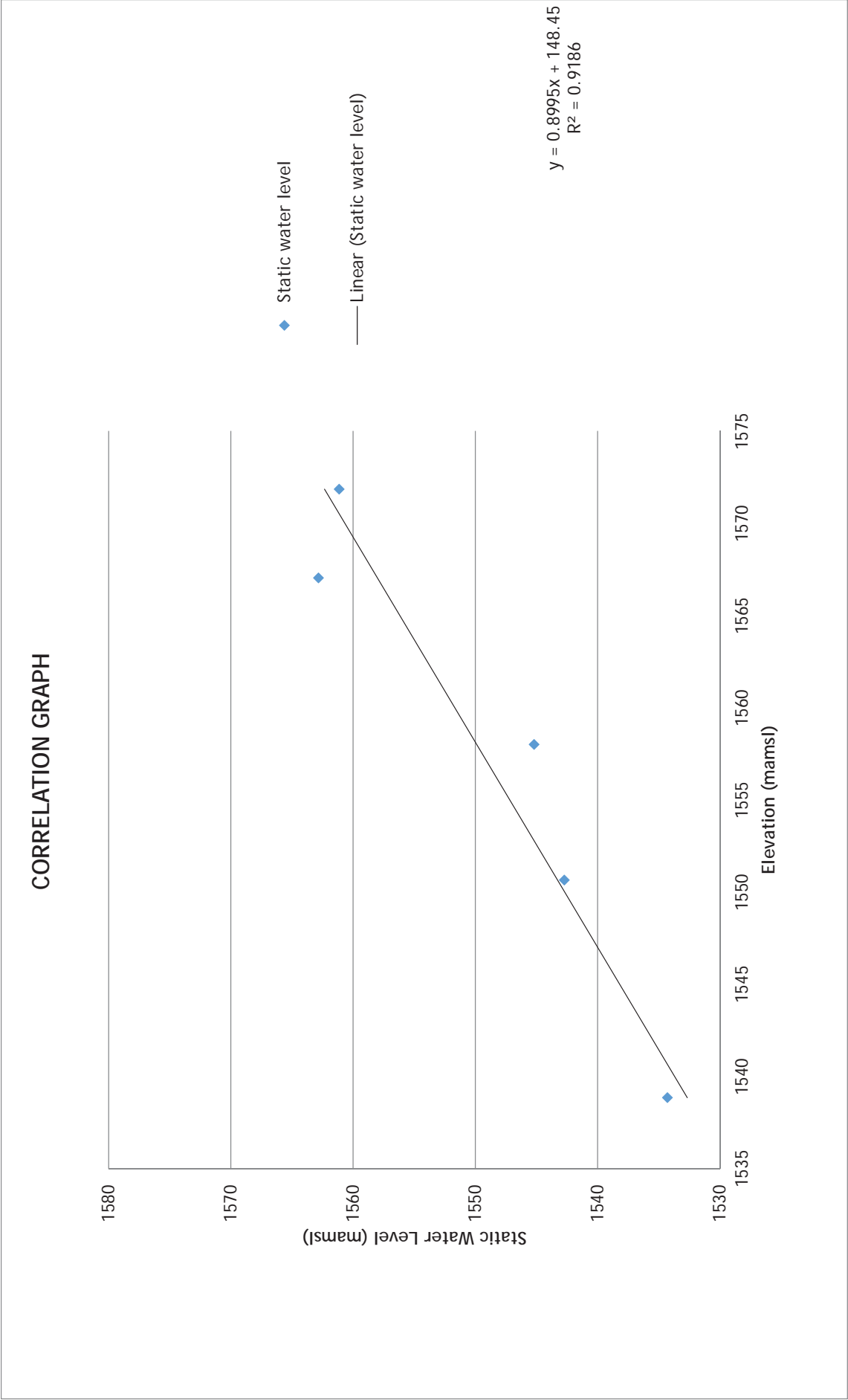


Figure 15: Correlation graph of static water level and topography

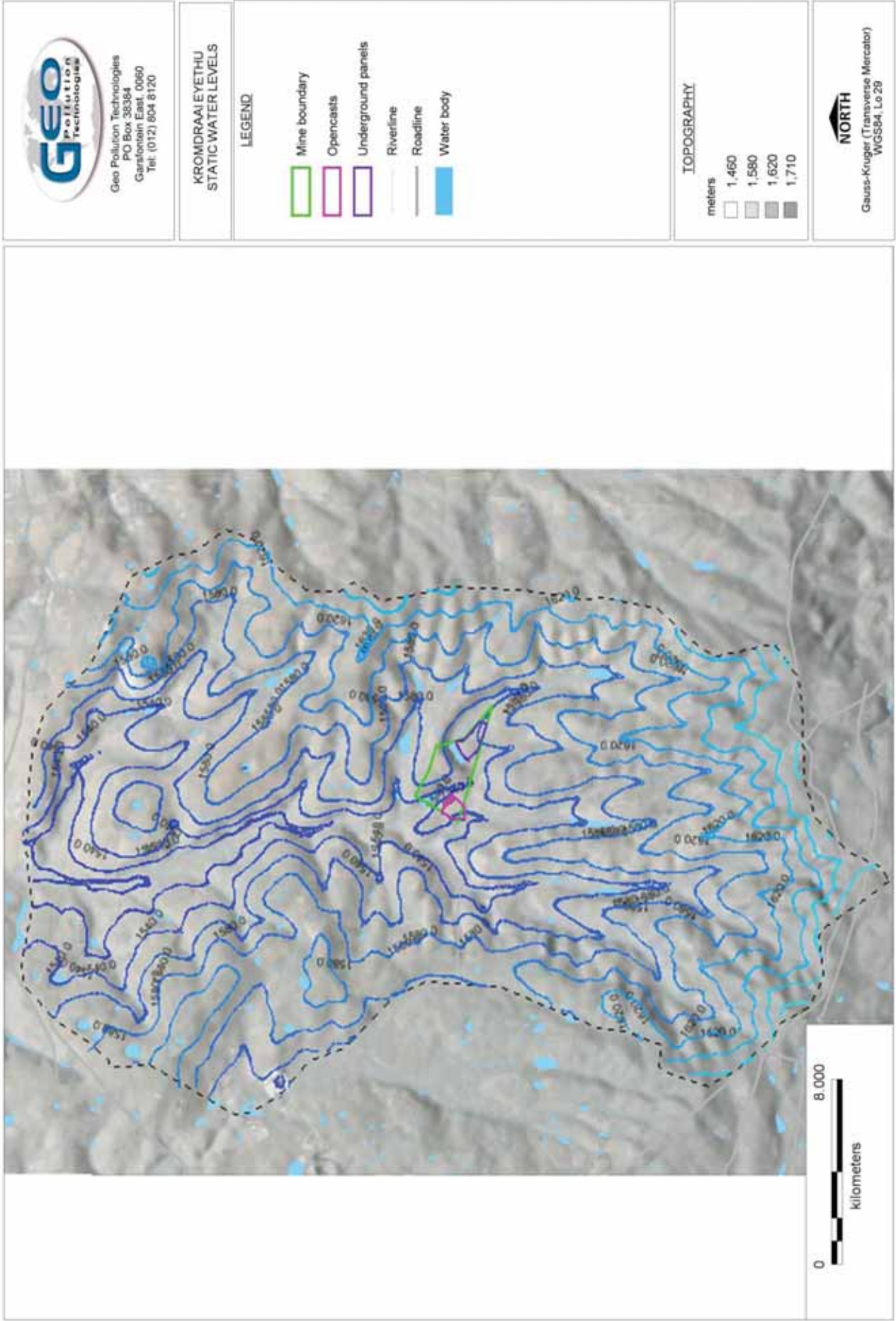


Figure 16: Static groundwater levels Pre-mining

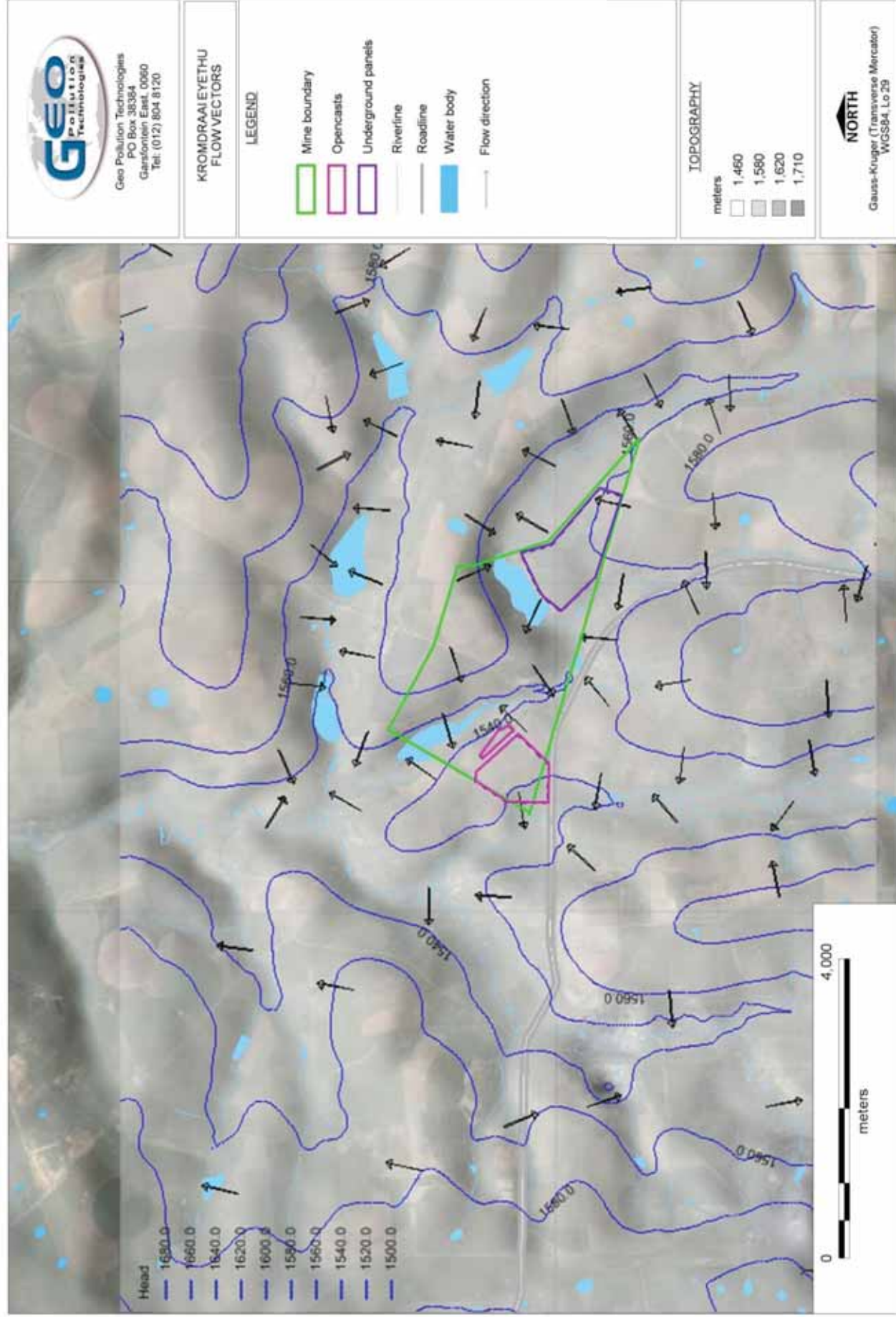


Figure 17: Groundwater Flow Directions - Pre mining

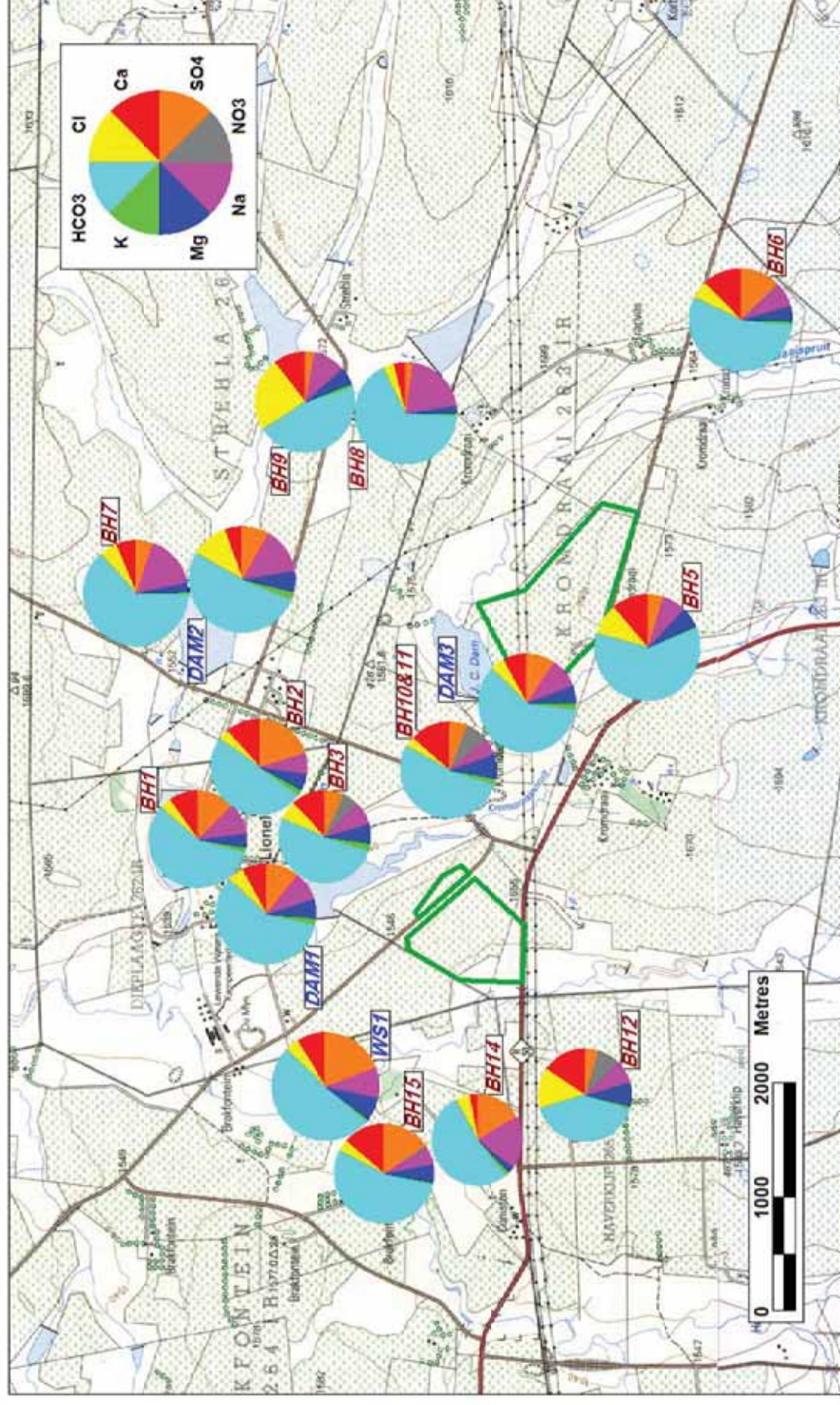
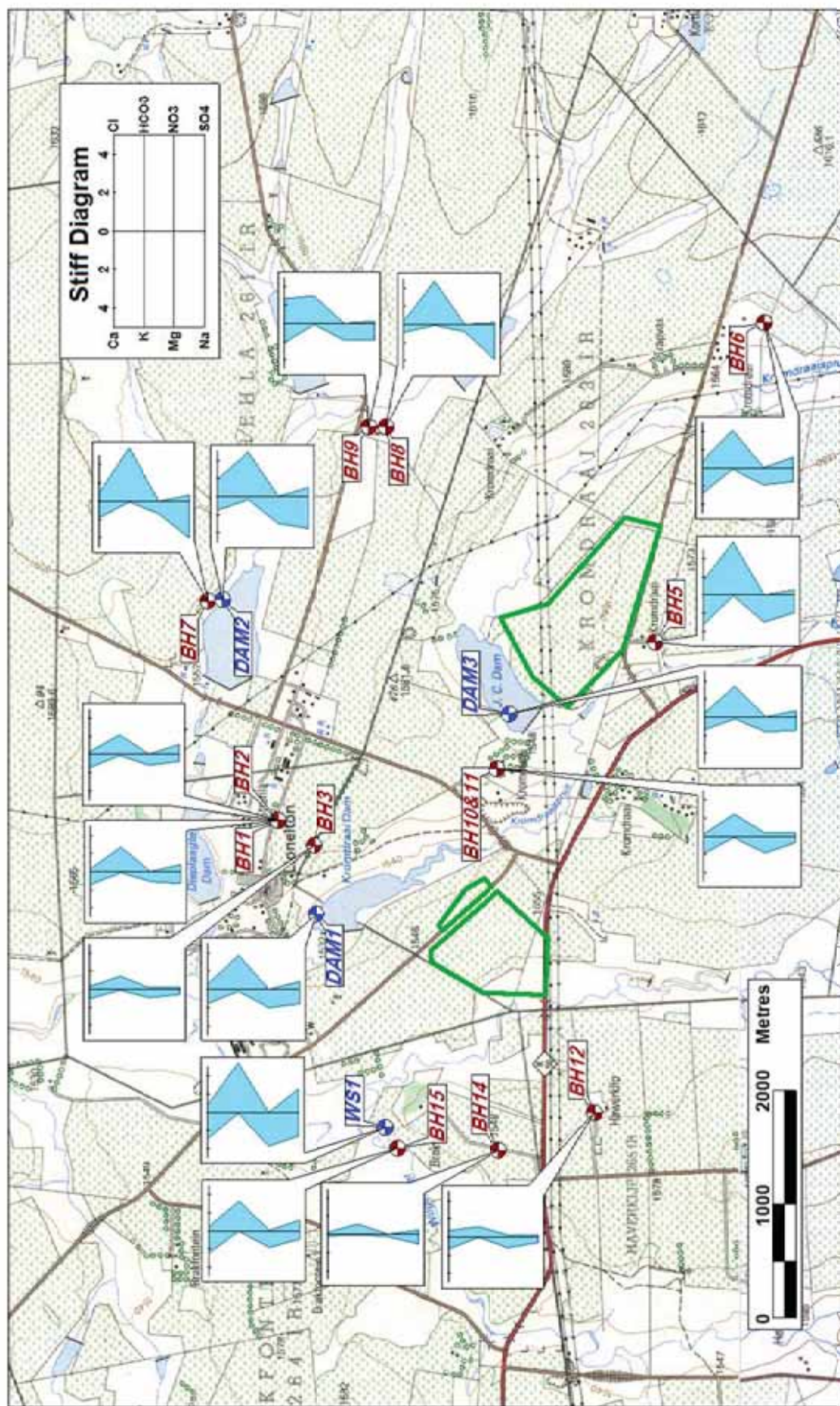


Figure 18: Pie Diagrams (groundwater and surface water)



Proposed Kromdraai Colliery

Stiff Diagrams of Major Cations & Anions



Figure 19: Stiff Diagrams (groundwater and surface water)

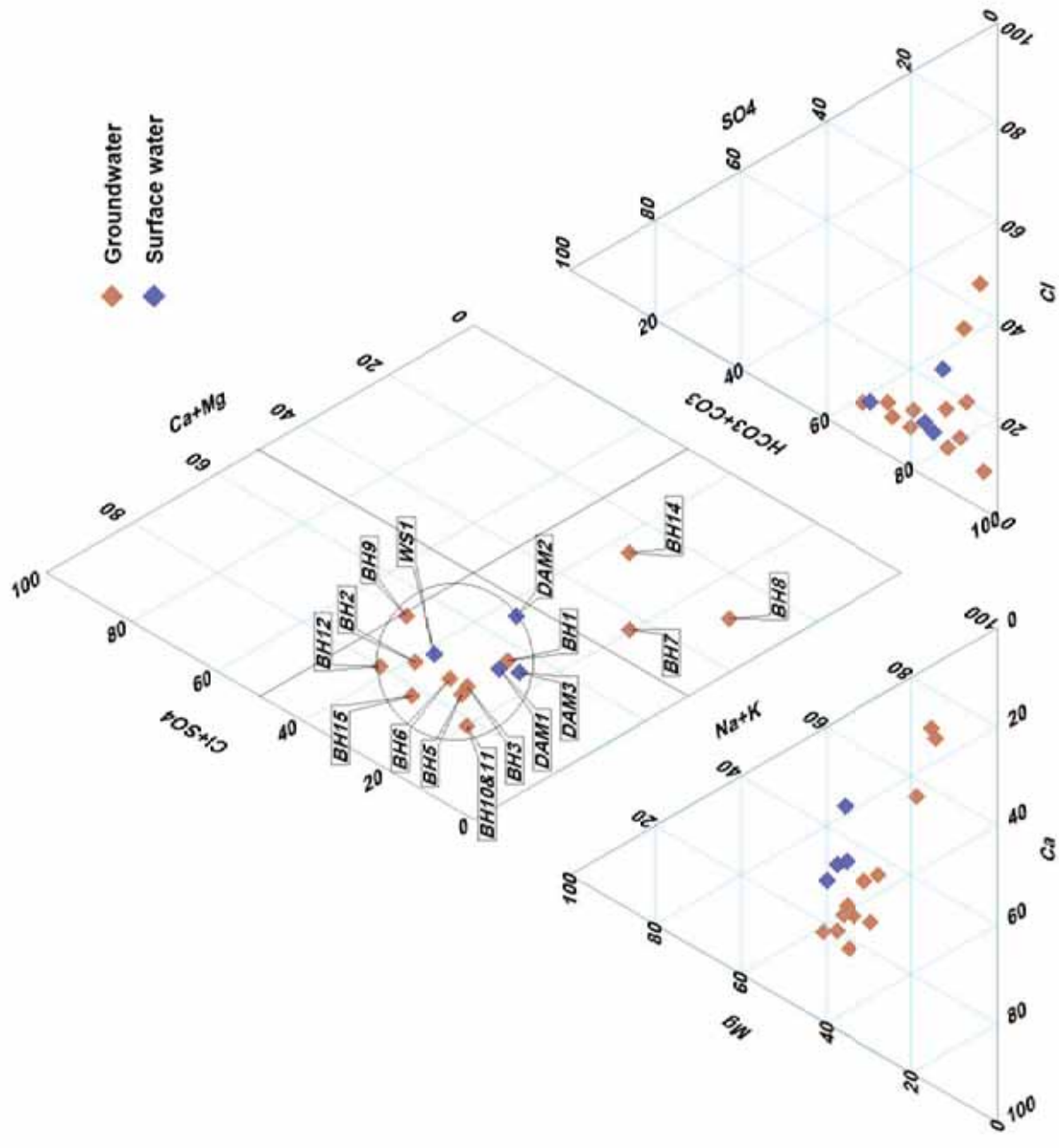


Figure 20: Piper Diagram

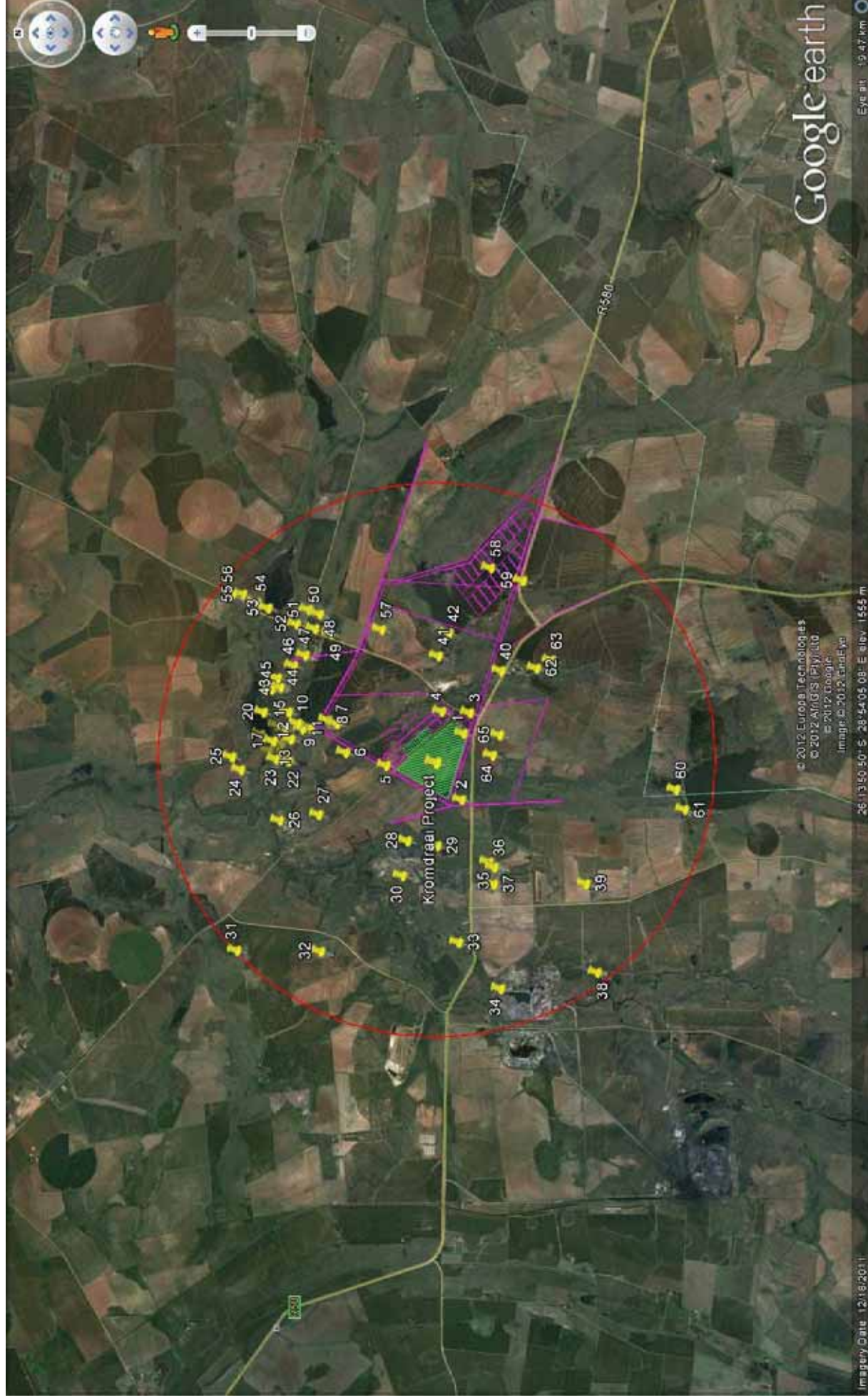


Figure 21: Aerial view and surface plan of the proposed mining area with identified points of interest

Kromdraai Colliery - Fly Rock

Maximum Throw Distance vs Burden/Stemming Height

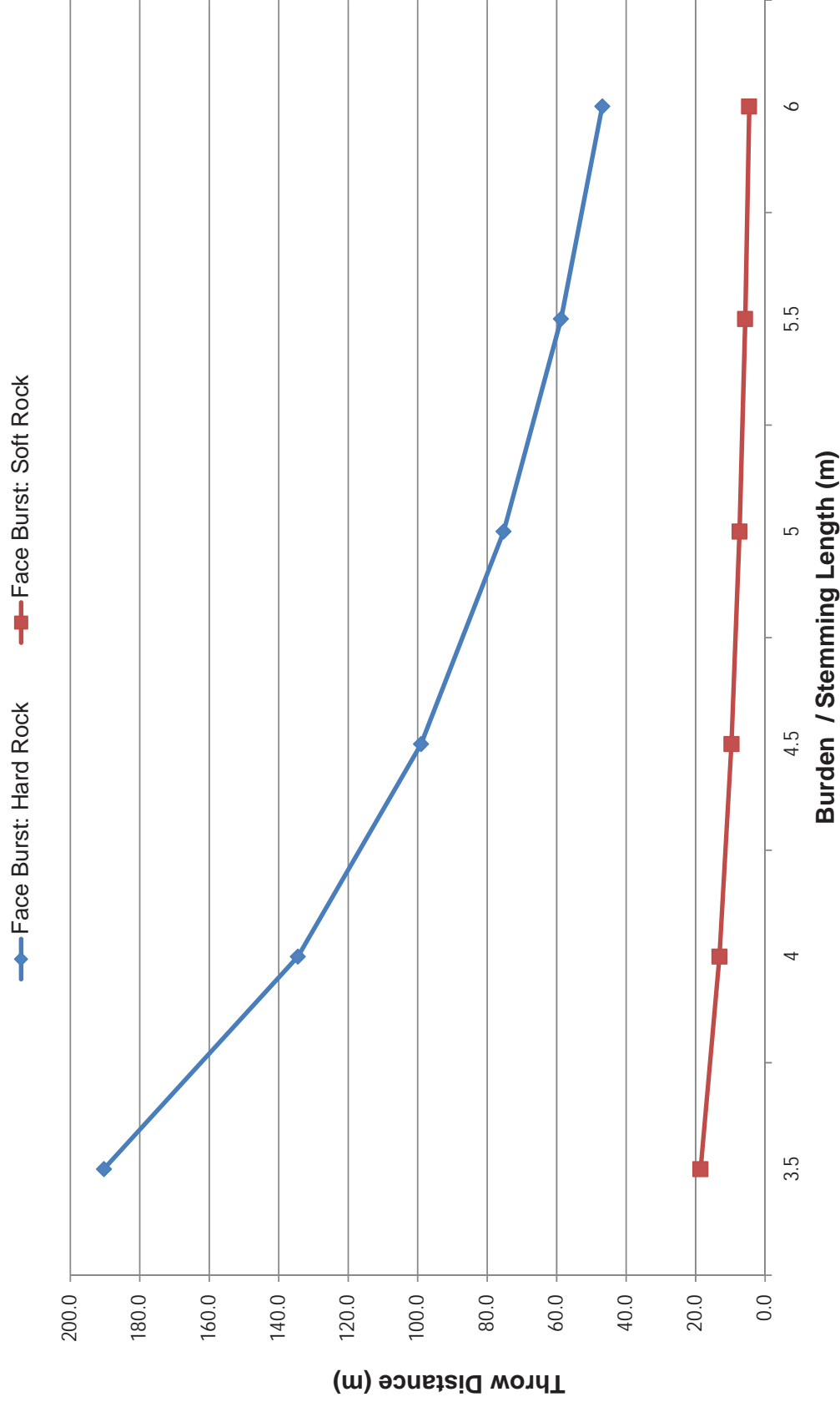
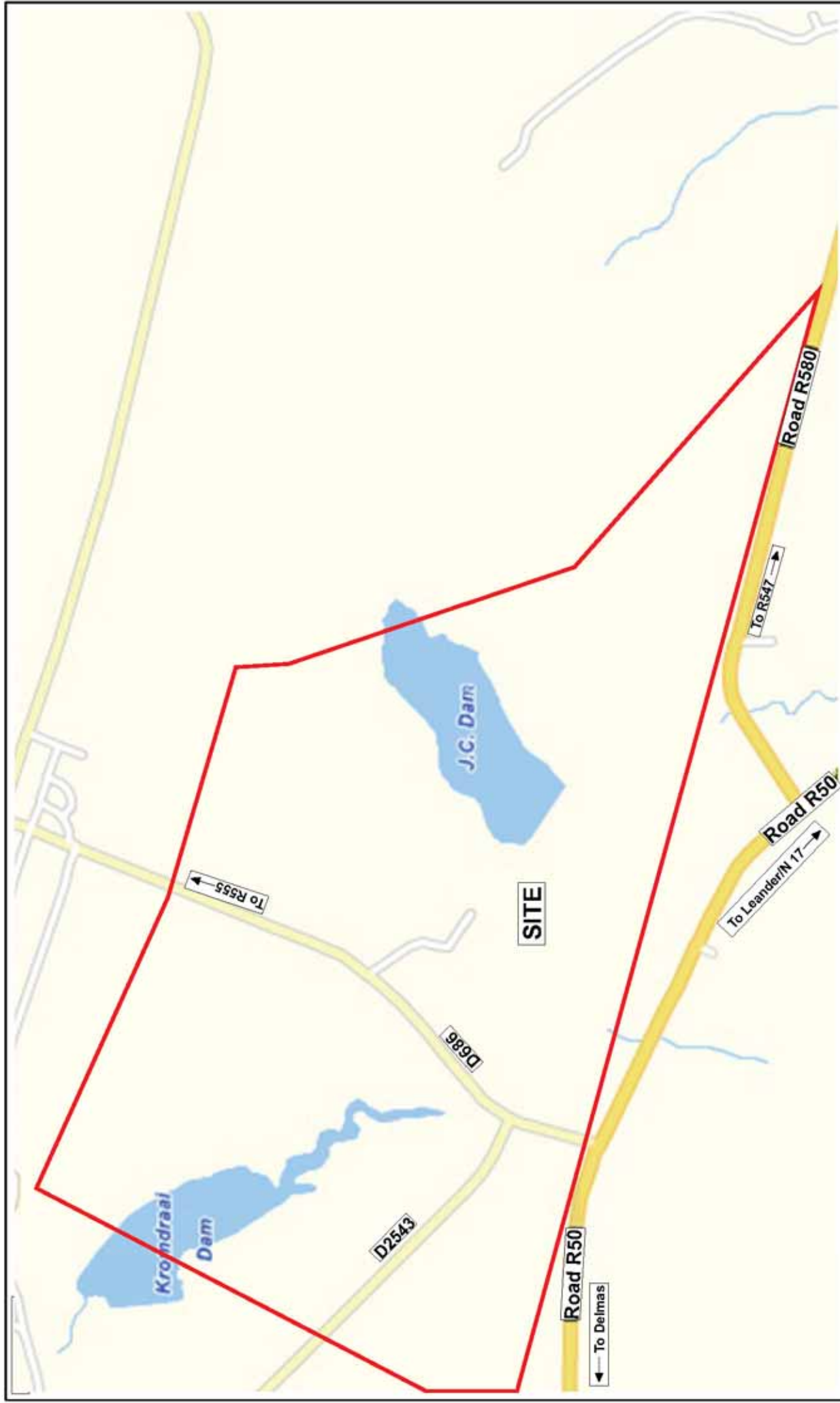


Figure 22: Predicted fly rock



<p>Project:</p> <p>Ptn 4, 5, Rem 6, 18 Kromdraai 263 IR (Kromdraai North Colliery)</p>	<p>Figure Description:</p> <p>Locality Plan</p>	<p>No.</p> <p>1</p>
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14552.R_Ptn 4, 5, Rem 6, 18 Kromdraai 263 IR Locality Plan 01.cdr



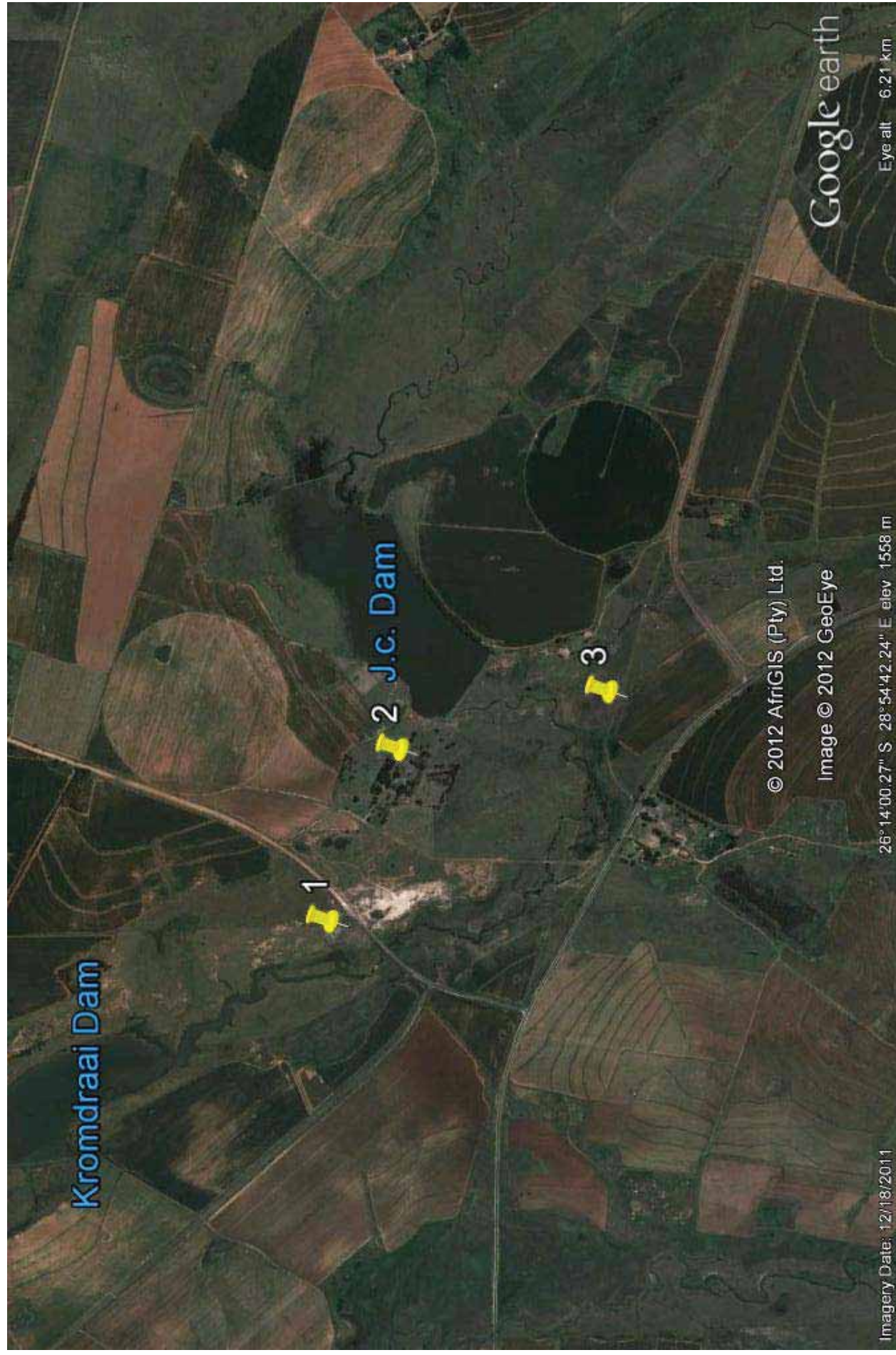


Figure 24: Plan indicating the identified cultural heritage significant sites

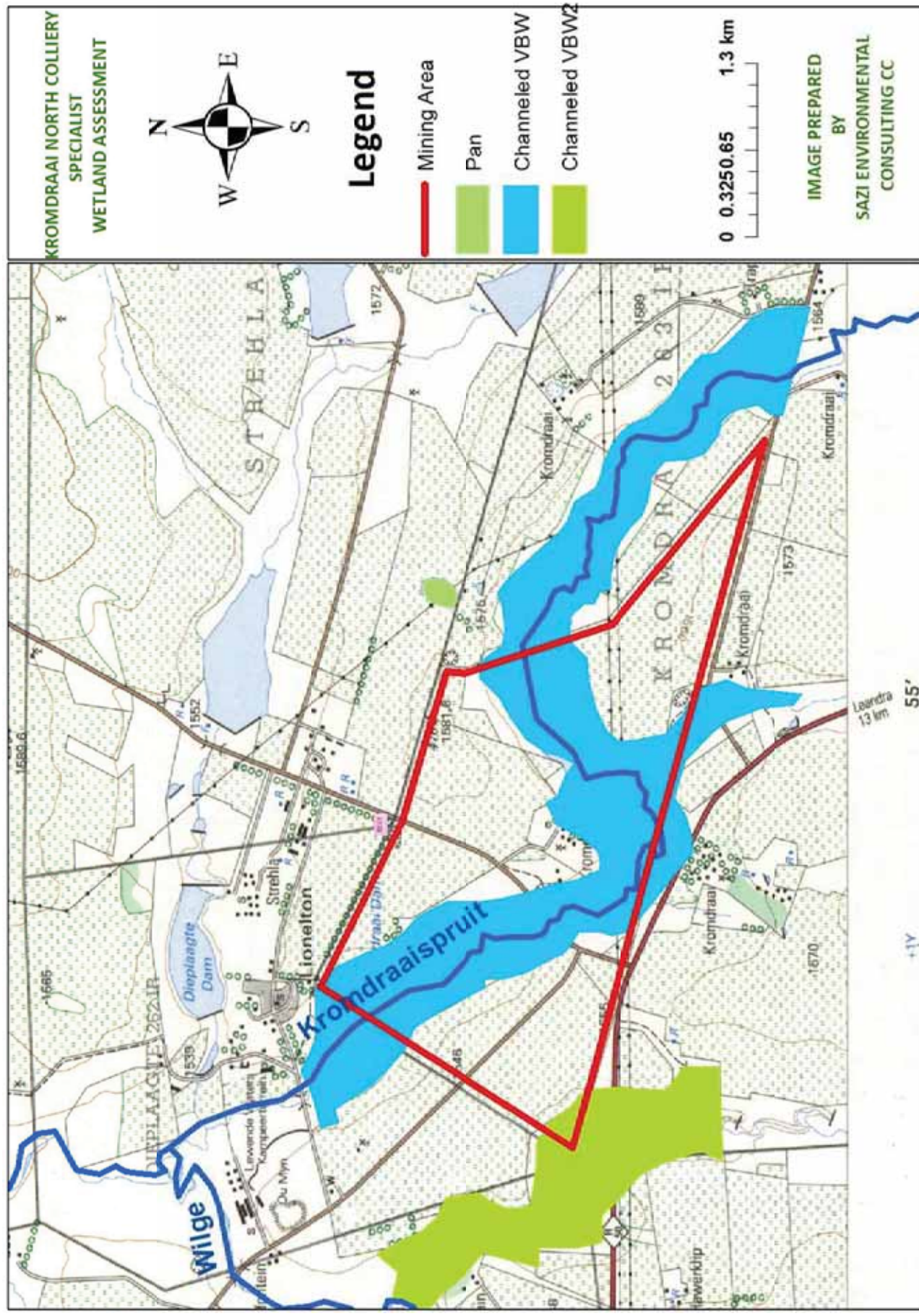


Figure 25: Wetlands identified within the proposed mining area