



Ecce Holdings (Pty) Ltd.

Nooitgedacht Clay Quarry

Final EIA Report in terms of NEMA

Locality: Bronkhorstspuit

Departmental Ref No: 17/2/3N-248

October 2014

SHANGONI
Management Services (Pty) Ltd



FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Ecca Holdings (Pty) Ltd.

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Locality: Bronkhorstspuit

Departmental Ref No: 17/2/3N-248

October 2014

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PROJECT DETAILS

Mpumalanga Department: Economic Development Environment and Tourism (MDEDET)

Department Reference No: 17/2/3N-248

Project Title:	The establishment of a quarry for mining of refractory and ceramic clays on Portion 25 of the farm Nooitgedacht 436JR, Mpumalanga.
Applicant:	Ecca Holdings (Pty) Ltd.
Project Number:	SAM-NOO-13-03-07
Compiled by:	Khosi Mohlahlo
Updated by:	Salome Beeslaar Wilda Meyer
Date:	October 2014
Location:	Portion 25 of the farm Nooitgedacht 436 JR, Bronkhorstspuit
Technical Reviewer:	Brian Hayes



Approval: RB Hayes (PrEng – ECSA Reg: 970009)



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DEFINITIONS

Environment

The surroundings (biophysical, social and economic) within which humans exist and that are made up of

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

Environmental Aspects

Elements of an organisation's activities, products or services that can interact with the environment.

Environmental Degradation

Refers to pollution, disturbance, resource depletion, loss of biodiversity, and other kinds of environmental damage. Usually refers to damage occurring accidentally or intentionally because of human activities.

Environmental Impacts

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

Environmental Impact Assessment

A study of the environmental consequences of a proposed course of action.

Environmental Impact Report

A report assessing the potential significant impacts as identified during the environmental impact assessment.

Environmental impact

An environmental change caused by some human act.



Land use

The various ways in which land may be employed or occupied. Planners compile, classify, study in addition, analyse land use data for many purposes, including the identification of trends, the forecasting of space and infrastructure requirements, the provision of adequate land area for necessary types of land use, and the development or revision of comprehensive plans and land use regulations.

Pollution Prevention

Any activity that reduces or eliminates pollutants prior to recycling, treatment, control or disposal.

Public Participation Process

A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.

Topography

Topography, a term in geography, refers to the "lay of the land" or the physio-geographic characteristics of land in terms of elevation, slope and orientation.

Vegetation

All of the plants growing in and characterising a specific area or region, the combination of different plant communities found there.

Waste

Waste is unwanted or undesired material left over after the completion of a process. "Waste" is a human concept: in natural processes, there is no waste, only inert end products.



ABBREVIATIONS

AGIS	AGIS Agricultural Geo-Referenced Information System
BID	Background Information Document
DARDLA	Department of Agriculture Rural Development and Land Reform
DWA	Department of Water Affairs
EC	Electrical conductivity
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
GRDM	Groundwater Resource Directed Measures
IDP	Integrated Development Plan
IWULA	Integrated Water Use Licence Application
LoM	Life of Mine
DEDET	Department: Economic Development, Environment and Tourism
MWP	Mining Works Programme
NDM	Nkangala District Municipality
SS	Suspended solids
TDS	Total dissolved Solids
THLM	Thembisile Hani Local Municipality
Al	Aluminium
Ca	Calcium
Cl	Chloride
F	Fluoride
Fe	Iron
K	Potassium
Mg	Magnesium
Mn	Manganese
Na	Sodium
NH ₄	Ammonia
O ₂	Oxygen
SO ₄	Sulphate
Zn	Zinc



EXECUTIVE SUMMARY

The purpose of this document is to supply the Mpumalanga Department: Economic Development Environment and Tourism (MDEDET) with the requested information pertaining to the National Environmental Management Act (NEMA), as amended, and Regulation 28 of the Environmental Impact Assessment (EIA) Regulations, 2010. Contained in this document is a detailed investigation of the activity and site-specific potential impacts associated with the proposed clay quarry on Portion 25 of the farm Nooitgedacht 436 JR. The final outcome aims to identify significant impacts and mitigation measures to minimise adverse impacts that the proposed activities may have on the environment.

The clay quarry for which an Environmental Impact Assessment is being applied for is proposed on Portion 25 of the farm Nooitgedacht 436 JR, situated approximately 17km north of Bronkhorstspuit and 31km northeast of Cullinan in Mpumalanga province in the magisterial district of Nkangala District Municipality (NDM) and within Thembisile Hani Local Municipality (THLM) with the familiar name of KwaMhlanga. GPS coordinates for the proposed site are: 25°33'59.53"S, 28°47'35.50"E.

Ecca Holdings (Pty) Ltd is a subsidiary of the black empowered company Imerys South Africa that is owned by a multi-national French company Imerys. Ecca Holdings (Pty) Ltd was formed in 1992 and specialises in production of chamotte, bentonite, zeolite, and ceramic clays.

Ecca Holdings currently holds the prospecting permit to the proposed site. An application for an Integrated Water Use License (IWUL) has been submitted to the Department of Water Affairs. An application for a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA) was lodged with the Mpumalanga Department of Mineral Resources (DMR). As required by the DMR, the Interested and Affected Parties (I&APs) were consulted and an Environmental Management Programme (EMP) which included an Environmental Impact Assessment (EIA) report in terms of Section 39 of the MPRDA was compiled and submitted to the DMR on 03 July 2013.

The application for environmental authorisation for the afore-mentioned project involves conducting a Scoping Report and Environmental Impact Assessment Report. During the Environmental Scoping Report (ESR) phase, the potential impacts related to the proposed activities were identified. Interested and Affected Parties as well as organs of state were provided with the opportunity to comment and raise queries related to the proposed activities. Identified impacts are quantified and assessed in detail in this report to provide appropriate mitigation measures together with an environmental management plan that will reduce the detrimental effect that the activities may have on the environment.



1. INTRODUCTION

This Environmental Impact Assessment report (EIR) forms part of an application for environmental authorisation for the proposed establishment of a clay quarry on Portion 25 of the farm Nooitgedacht 436 JR in Bronkhorstspuit. The application process is undertaken on behalf of the applicant, Ecca Holding (Pty) Ltd, by Shangoni Management Services (Pty) Ltd (hereafter referred to as Shangoni). Shangoni was appointed as independent environmental practitioner, to assist the applicant with an application for environmental authorisation and ensuring compliance with the 2010 EIA Regulations in terms of the National Environmental Management Act (Act 107 of 1998).

An application to undertake an Environmental Impact Assessment process was submitted to the identified competent authority, Mpumalanga Department: Economic Development Environment and Tourism (MDEDET). The Department subsequently registered the project (**Ref No: 17/2/3N-248**) and the formal Scoping and Environmental Impact Assessment Reporting (S&EIR) process was thereby initiated.

1.1 Applicant

Name of Applicant	Ecca Holding (Proprietary) Limited
Postal Address	PO Box 8118 Centurion 0046
Telephone No.	+27 (0)12 643 5880
Fax No.	+27 (0)12 643 1966
Farm name and portion on which the activities take place	Portion 25 of the farm Nooitgedacht 436JR
Co-ordinates of operation	25°33'59.53"S, 28°47'35.50"E.



1.2 Appointed Environmental Assessment Practitioner

Name of firm	Shangoni Management Services (Pty) Ltd.
Postal address	PO Box 74726 Lynnwood Ridge Pretoria 0040
Telephone No.	(012) 807 7036
Fax	(012) 807 1014
E-mail	wilda@shangoni.co.za

1.2.1 Project Team

Brian Hayes – Quality assurance

Brian is a registered professional engineer (Chemical) with a masters degree in Environmental Engineering from the University of Nottingham. Brian has 20 years' experience in environmental management and environmental engineering.

Khosi Mohlahlo – Environmental consultant

Khosi obtained her B.Sc. (Natural Science) at the University of the Free State in 2006. She obtained her B.Sc. Honours (Environmental Management) at UNISA. Khosi is involved in EIA and EMP development for new mining and prospecting rights, as well as leading EMP performance assessments.

Salome Beeslaar – Environmental consultant

Salome has an M.Sc. degree in Geography from the University of Pretoria. Her fields of experience includes Environmental Impact Assessments (EIA), Environmental Management Programmes (EMP) for new mining rights, mining permits, prospecting permits as well as already existing rights and permits. She also compiles rehabilitation plans, and closure plans and conducts performance assessments.

Wilda Meyer – Environmental Practitioner

Wilda obtained a B.Sc. Hons degree in Geography and Environmental Management through the University of Johannesburg. She has valuable experience in ISO14001 Environmental Management System Implementation, Environmental Management Programme Reports (EMP), Basic Assessment Reports, Scoping Reports and Environmental Impact Assessments (EIA). Wilda also has experience in the compilation of Integrated Water and Waste Management Plans (IWWMP) and Integrated Water Use License Applications (IWULA).



1.3 Current situation

Currently the proposed site is not used for any mining activities. In the past, mining of carbonaceous clay took place on Portion 24, which is an adjacent property located to the north of the proposed site. An old inactive mined out quarry, referred to in this document as “Quarry 2”, exists on Portion 24. This quarry overlaps to the northern side of proposed site (Portion 25) (refer to Figure 1 below). Historical mining activities on Portion 24 were conducted under the control of an abandoned old order right, but there are currently no mining activities as Portion 24 falls under a prospecting permit held by Ecca Holdings. It is the intention of Ecca Holdings to obtain a mining right and environmental authorisation for Portion 25.

Ecca Holdings has an already existing and operational Refractory Minerals Plant on Portion 22 of the farm Nooitgedacht 436 JR, located about 6km away from Portion 25. Ecca Holdings currently utilises the operational refractory mineral plant for processing the raw clay produced from other mining operations in the area, which Ecca Holdings is responsible.

As mentioned previously, the proposed project entails the establishment of a quarry on Portion 25 of the farm Nooitgedacht 436 JR for the extraction of refractory minerals and ceramic clays. No beneficiation will be done on the proposed site. The raw clay produced on from Portion 25 will be transported to the downdraft kilns situated on Portion 22 of the farm Nooitgedacht for processing activities.



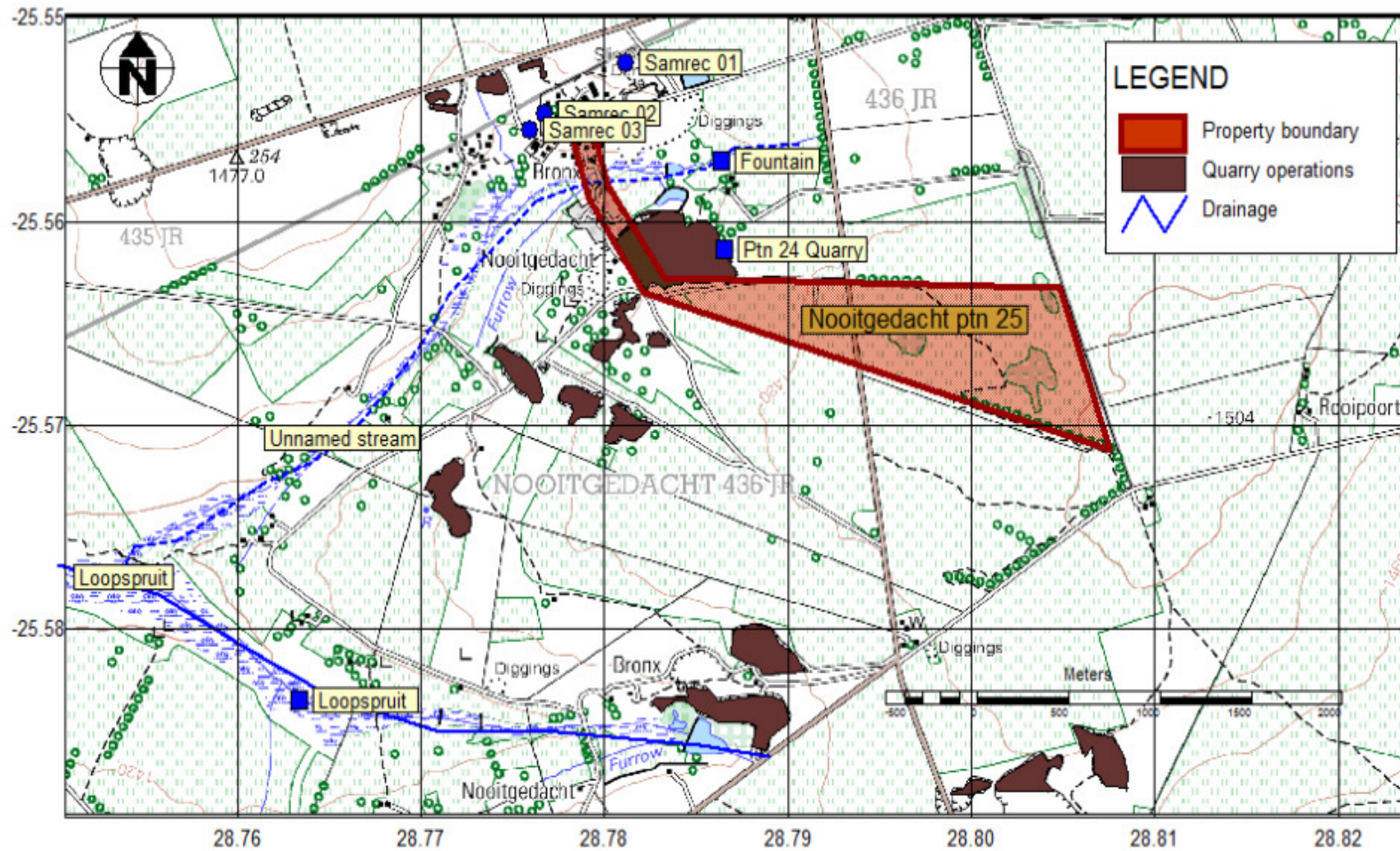


Figure 1: Map illustrating Portions 24 and 25 of Nootgedacht as well as Quarry 2.



1.4 Proposed activities

The proposed project entails the establishment of a quarry on Portion 25 of the farm Nooitgedacht 436 JR for the extraction of refractory minerals and ceramic clays. The proposed mining method is shallow opencast mining. Topsoil, where available, shall be removed by bowl scraper and stored separately. Blasted overburden shall be removed by bulldozer, stored for one year and then immediately backfilled employing the rollover system. Following blasting, clay shall be removed by loader and transported by truck to the sorting area. Cobbing and sorting shall be done manually where after the mine product shall be transported to the downdraft kilns situated on Portion 22 of the farm Nooitgedacht for processing activities.

No beneficiation will be done on the proposed site as Ecca Holdings has an already existing and operational Refractory Minerals Plant located 6km away from Portion 25, on Portion 22 of Nooitgedacht. Currently the raw clay produced from other mining operations in the area, which Ecca Holdings is responsible for is fed into coal-fired kilns in which it is calcinised over a ten day period to produce chamotte. The calcinised clay is then fed into a primary crusher from which two size grades of less than 22mm in diameter, named Super and a larger diameter product named Chamca are produced. The crushed and milled raw white clay is also sold as flint clay

The potable water supply required by the mine is supplied by a borehole situated on Portion 22 of the farm Nooitgedacht 436JR. This water is used for domestic purposes. Note that the use of potable water is not applicable to the proposed quarry area, only to Portion 22, as mentioned.

1.5 Proposed Locality

The proposed clay quarry for which an EIA is being applied for will be located on Portion 25 of the farm Nooitgedacht 436 JR. This site is situated approximately 17km north of Bronkhorstspruit and 31km northeast of Cullinan in Mpumalanga province in the magisterial district of Nkangala District Municipality (NDM) and within Thembisile Hani Local Municipality (THLM) with the familiar name of KwaMhlanga. GPS coordinates for the proposed site are: 25°33'59.53"S, 28°47'35.50"E. Refer to the site locality map in Figure 2 below for an indication of the location and boundaries of the study area. The surrounding towns are indicated in Table 1 below.

Table 1: Direction and distance to the surrounding towns

Direction	Distance from site	Closest town
South-west	±14km	Ekgangala
North-west	±17km	KwamHlanga
North-east	±31km	Cullinan:
South	±27km	Bronkhorstspruit



Direction	Distance from site	Closest town
South-east	±10 km	Vlakfontein
East	±24km	Verena-C
North-east	20km	Wolvenkop-A



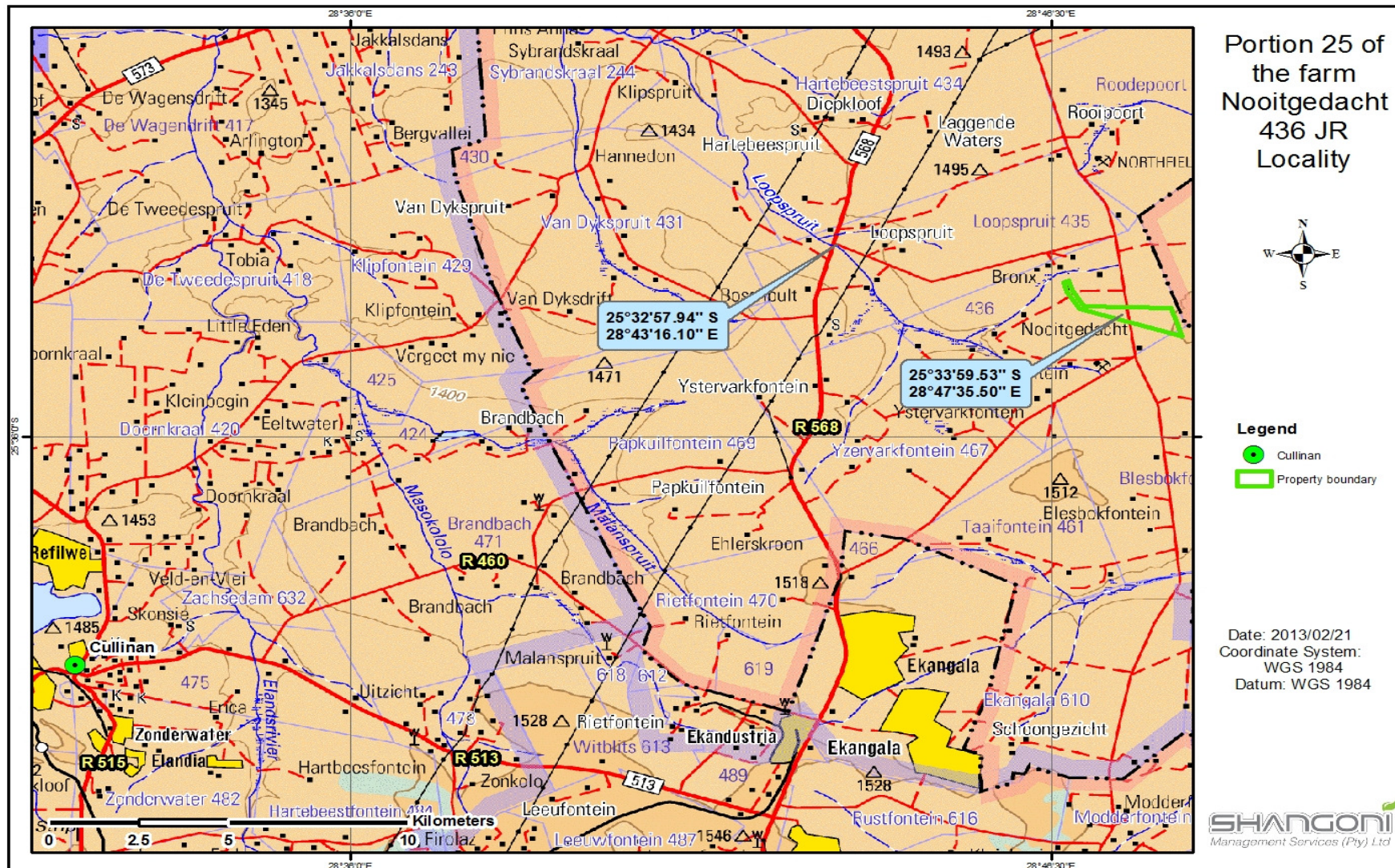


Figure 2: Site locality map

2. ENVIRONMENT AFFECTED BY ACTIVITY

The following section provides a description of the status quo of the environment as well as the social-economic parameters, which characterise the region and the study area (i.e. Portion 25 of the farm Nooitgedacht 436JR).

2.1 Biophysical aspects affected

2.1.1 Geology

According to the Environmental Management Programme report for prospecting, which was compiled for portion 22 of farm Nooitgedacht 436JR, which is a few kilometres away from portion 25, carbonaceous flint clay deposit is located in the lower part of the Ecca Group of the Karoo Sequence in the fairly extensive Nooitgedacht outlier. Overburden comprises a sequence of sandy soils and clays, as well as sandstone and grit with a total thickness of 5-9m. Overlying the ore is sandy carbonaceous flint clay. The orebody is more than 3m thick on average and occurs at a depth of between 9m and 12m below surface. In some places the ore zone contains thin intercalated sandy lenses. Sandy carbonaceous flint clay is found below the orebody and this grade downward into very sandy carbonaceous flint clay and sandstone, whereas the bottom of the sequence is formed by Dwyka tillite. Refer to Figure 3 below for a site geology map.



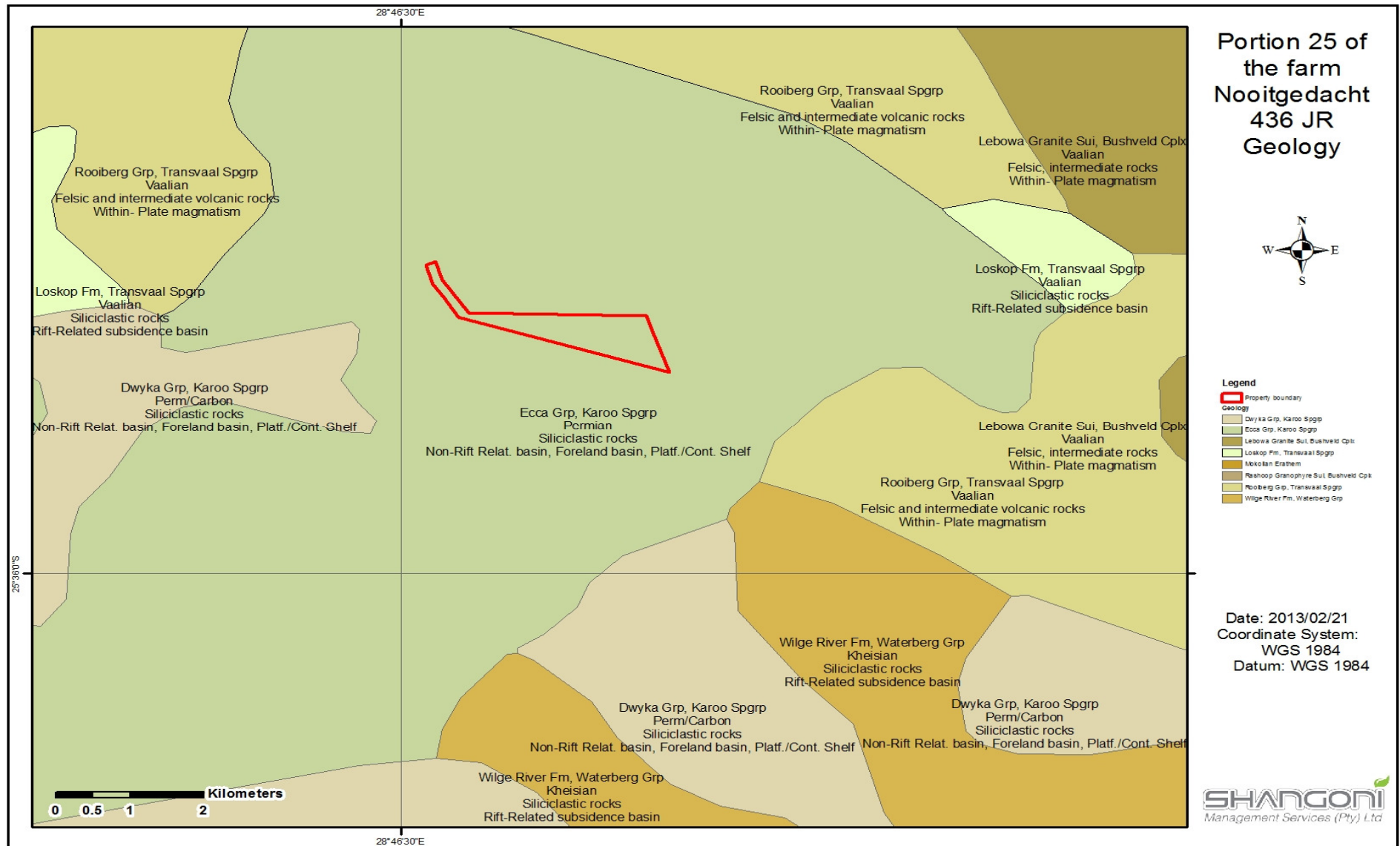


Figure 3: Site Geology

2.1.2 Climate

The climate is mild to hot with hot, wet summers from October to March and cold, dry winters from May to September. Mean annual precipitation for the Highveld area is approximately 650mm - 750 mm (SA Rain Atlas, Index Nr. 226/223716). The average annual precipitation in the Highveld Region varies from about 900 mm to about 650 mm.

The rainy season range from about October to March, with peak precipitation in January.

Storms are often violent with lightning and strong, but short-lived, gusty south-westerly winds and are sometimes accompanied by hail. This region has one of the highest frequencies in South Africa at approximately 4 to 7 occurrences (depending mainly on altitude) to be expected annually at any one spot.

During summer months, the primary wind direction is either from the north or east. During autumn, winds mostly occur from the east, while during winter the primary wind direction is from the south. There are a high percentage of wind calm periods, mostly during dry months. The average monthly wind speed is 10.26m/s for the period 1993 - 2003.

According to wind and weather statistics.2012, Wind finder (http://www.windfinder.com/windstats/windstatistic_Bronkhorstspr.htm), the average monthly wind speed is 10.26 m/s for the period 1993 – 2003. The maximum wind speed of 13.6m/s was measured in October 1995 and the minimum wind speed of 8m/s was experienced in June and July 2000.

2.1.2.1 Rainfall

The average annual precipitation in this Highveld Region varies from approximately 650mm to 900mm. The rainfall occurs mainly in summer, from October to March, the maximum fall occurring in January. The winter months are normally dry and about 85% of the annual rainfall occurs in the summer months. Heavy falls of 125mm to 150mm occasionally occur in a single day.

The rainfall data is summarised in Table 2 below for the average, maximum and average annual rainfall. Rainfall data reflects the values captured at the Rust de Winter Dam (Station B3E004).<http://www.dwaf.gov.za/hydrology/HyDataSets.aspx?Station=B3E004>. The average monthly rainfall is calculated for the years 1965 to 2012.



Table 2: Rainfall data for 1965-2012

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	AVE
1965										3.5	127.3	109	239.8	79.93
1966	156.2	75.7	4.8	4.8	6.4	0	0	0	11.4	78	74.9	118.9	531.1	44.26
1967	264.4	151.4	97	281.9	10.7	0	0	3.6	2.5	55.6	77	75.7	1019.8	84.98
1968	83.3	56.4	78.2	71.4	11.9	0	0	6.1	0	30.2	159.5	131.3	628.3	52.36
1969	36.6	85.8	198.9	30.5	36.8	0.5	0	3.1	46.7	102.9	77.7	135.2	754.7	62.89
1970	50.3	48.5	21.1	5.6	14	1	1.3	3.3	4.3	106.2	81	120.7	457.3	38.11
1971	150.6	45.2	7.1	172.2	11.7	0	0	0	22.1	32.3	101.1	161.3	703.6	58.63
1972	163.8	49.8	93.2	20.3	7.1	0	0	0	33	38.6	99.8	55.1	560.7	46.73
1973	128.8	48.3	24.1	51.8	0			0	51.6	34.9	64	74.8	478.3	39.86
1974	67.5	101	23.3	73.9	7.6	0.1	8	16.5	16	58.4	76.2	60.3	508.8	42.40
1975	188.7	171.3	75.9	117.3	15.6	5.7	0	0	0	17	75.6	167.8	834.9	69.58
1976	111.5	166.8	62.7	48.7	24.1	0	0	0	9	82.8	76.3	133.4	715.3	59.61
1977	76.5	76.5	134.6	6	5	0	0	12.6	49.7	113.8	44	83.8	602.5	50.21
1978	333.9	91.6	69.4	11.3	0	0	0	4	22.7	70.8	48.9	24.5	677.1	56.43
1979	77	36.7	86.4	54.4	5.6	0	6.1	25.5	2	76	218.8	43.2	631.7	52.64
1980	105.8	134.7	87.3	33	0	0	0	0	13.5	21	153.4	143.8	692.5	57.71
1981	62.2	88	63.7	25	7.2	10.4	0	16.7	16.9	35.9	37.4	120.7	484.1	40.34
1982	163.7	79	72	30.6	0	0	4.7	0	2.3	56.2	118.1	80.4	607	50.58
1983	201.1	22.7	47.1	58.4	19.6	7.7	7.1	52.8	1.7	37	166.5	72.4	694.1	57.84
1984	88.8	12.5	110.5	3.5	0	27.7	11.3	1.5	4.3	97.6	59.9	71.6	489.2	40.77
1985	153.6	128	88.5	0	19.1	0	3.7	7.9	30.3	83.1	19.1	154.3	687.6	57.30
1986	34.1	69.3	58.7	30.1	0	5.2	0	0	18	115.1	94.6	167.2	592.3	49.36
1987	96.5	44.8	68	9.7	0	0	0	25.5	80.9	32.4	236.5	134.6	728.9	60.74
1988	51.1	54.7	72.3	43.8	0	7.9	0	3.5	31	104.5	13.1	86.5	468.4	39.03
1989	23.7	118.4	53.5	54.2	0	35.3	0	11.1	10	53.7	192.4	120.8	673.1	56.09



YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	AVE
1990	28.9	84.4	92.6	32.5	32	0	7.8	0	3.6	20.4	49.7	73.2	425.1	35.43
1991	115.2	147.2	166.8	0	0	4.6	0	0	0	52.4	82.5	110.1	678.8	56.57
1992	52.6	83.3	35.2	28.5	0	0	0	0	0	55.8	85	98.7	439.1	36.59
1993	98.6	126.6	71.8	27.8	4.1	0	0	7.2	28.8	200.6	86.5	132.7	784.7	65.39
1994	124.3	104	72.2	8.7	4.6	0	0	0	8.9	80.9	72.6	174.8	651	54.25
1995	108.2	35.7	166.7	93	22.9	0	0	10.9	0	50.2	124.3	106.9	718.8	59.90
1996	166.9	209.7	88.6	23.5	7.3	0	6.7	0	0	143.1	80.2	103.1	829.1	69.09
1997	49.7	41	129.8	29	86.6	0	0	9.9	24.1	67.9	132.4	168.6	739	61.58
1998	138.7	104.8	39.3	26	0	0	0	0	28.7	72.6	127.5	130.4	668	55.67
1999	171.7	25.9	20.2	40.6	56.4	0	2.1	0	0	12.2	27.7	164.8	521.6	43.47
2000	244.5	183.9	73.9	76.5	19.5	13.8	0	0	0	82.5	109.2	70.3	874.1	72.84
2001	26.4	148.1	11.8	64.5	40.1	4.5	0	0	5.4	61.2	235.8	132.7	730.5	60.88
2002	65.7	39.3	18.8	39.8	31.3	0.5	0	49.5	0	97.3	1	126.9	470.1	39.18
2003	162.4	78.7	17.9	0	0	0	0	0	0	41.9	106	79	485.9	40.49
2004	136.8	108.9	143.2	32	0	16	31	0	0	12.4	96.2	35.9	612.4	51.03
2005	77.4	61.6	96.7	41.4	0	0	0	0	0	0	236.6	88.6	602.3	50.19
2006	174.9	81.9	91.9	25.8	4	0	0	10	0	24.7	119.8	21.3	554.3	46.19
2007	14.2	0	255	30.5	0	33.8	3.9	0	32.7	114	255	255	994.1	82.84
2008	242.5	0	255	0	255	17	0	0	0	29.5	96.4	109.9	1005.3	83.78
2009	225	11.9	84.3	0.6	9.8	40.1	255	0	12.8	50.5	255	144.6	1089.6	90.80
2010	137.4	7.4	120.3	192.5	19.9	0	255	255	255	255	30.5	178	1706	142.17
2011	179.6	34.6	60.3	101.1	0	6.2	0	6.4	0	56.8	27.3	98.4	570.7	47.56
2012	105.9	255	255	8.8	0	0	0	0	0	0	0	0	624.7	156.18
Total	5717.2	3931	4065.6	2161.5	795.9	238	603.7	542.6	879.9	3119.4	4930.3	5251.2	32236.3	2686.36
Average	121.64	83.64	86.50	45.99	16.93	5.06	12.84	11.54	18.72	66.37	104.90	111.73	685.88	57.16

Source: <http://www.dwaf.gov.za/hydrology/HyDataSets.aspx?Station=B3E004>



2.1.2.2 Temperatures

Table 3 below indicates the mean monthly maximum and minimum temperatures for the proposed site. Average daily maximum temperature is 27°C in January and 17°C in July. However, in extreme cases these may rise to 38°C and 26°C respectively. Average daily minima range from 13°C in January to 0°C in July, whereas extremes can be as low as 1°C and -13°C respectively. The highest mean monthly maximum of 27°C occurs during January, while the lowest mean monthly maximum of 0.7°C occurs during June.

Table 3: Minimum and maximum monthly temperatures

MONTH	Max	Min
January	27.0	13.8
February	26.3	13.1
March	24.9	11.6
April	23.0	7.6
May	20.3	3.0
June	17.7	0.7
July	17.5	0.8
August	20.6	1.8
September	23.6	6.1
October	26.0	10.4
November	25.9	11.9
December	26.8	13.3
Mean	23.3	7.58

Source: <http://www.meoweather.com/history/South%20Africa/na/25.8083333/28.7405556/Bronkhorstspuit.html>

2.1.2.3 Mean monthly evaporation

Evaporation figures for the area fluctuate between a minimum of 84mm in June and a maximum of 191mm in January. The average total evaporation per year is 1758mm for Symons pan and 2030mm for "A" pan. Refer to Table 4 below for the mean monthly evaporations.

Table 4: Mean Monthly Evaporation

MONTH	SYMONS PAN (mm)	"A" PAN (mm)
January	191	218
February	163	185
March	157	176
April	121	134
May	103	115
June	84	94



MONTH	SYMONS PAN (mm)	"A" PAN (mm)
July	92	108
August	122	146
September	166	202
October	189	224
November	180	212
December	190	216
Total	1758	2030

Source: <http://www.dwaf.gov.za/hydrology/HyDataSets.aspx?Station=B3E004>

2.1.3 Topography

Information on topography was extracted from AGIS (Agricultural Geo-Referenced System). This atlas combines agricultural-, orientation- & demographic information as well as scanned maps & satellite images including the first SPOT 5 high resolution data of South Africa. In general terms, the study area is described as the Interior Plain of South Africa.

The topography of the proposed site is steeper on the western side and elevated on the eastern side. Regionally, the area is flat to relative flat with a slope not exceeding 5%. Slope class of the proposed site is $\leq 2\%$, which indicates a slope that is level to very gentle. The terrain types of the site are plains with open low hill or ridges. Refer to Figure 4 below for a topographical map.



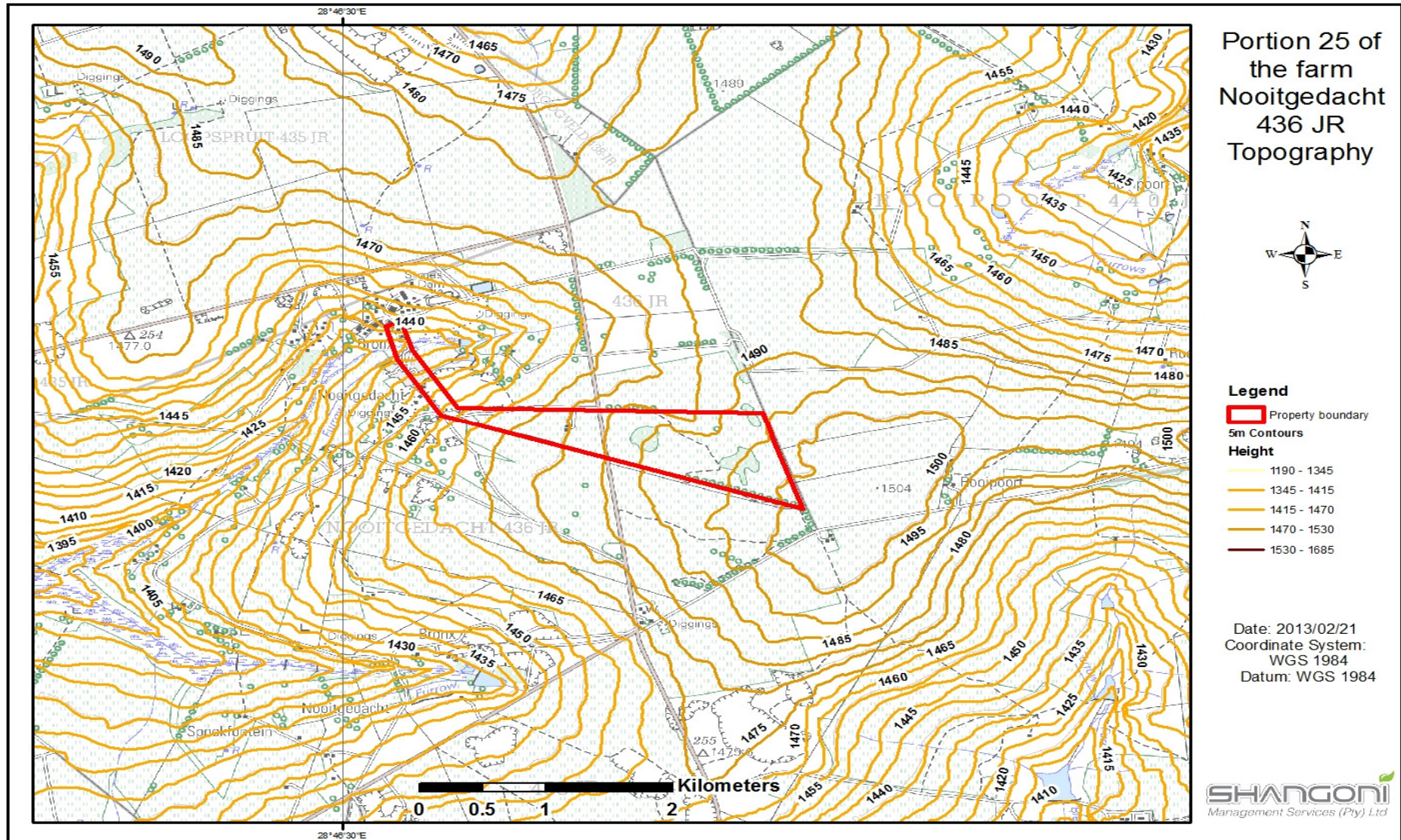


Figure 4: Topography of the proposed site

2.1.4 Vegetation

2.1.4.1 General

The study area corresponds to the Savanna Biome and more particularly to the Central Sandy Bushveld vegetation unit as defined by Mucina & Rutherford (2006). It corresponds to the ecological types known as the Central Sandy Bushveld.

This vegetation type extends in a broad arc south of the Springbokvlakte from the Pilanesberg in the west through Hammanskraal and Groblersdal to Gamasemola in the east. A generally narrow irregular band along the north- western edge of the Springbokvlakte (including Modimolle) extending into a series of valleys and lower-altitude areas within the Waterberg including the upper Moloko River Valley near the Vaalwater, the corridor between Rankins Pass and the Doorndraai Dam, and the lowlands from the Mabula area to South of the Hoekberge. It is located on low undulating areas dominated by tall, deciduous woodland on deep sandy soils (typified by *Terminalia sericea* and *Burkea africana*). On shallow, gravel soils the floristic composition consists of *Combretum apiculatum* while *Acacia*, *Ziziphus* and *Euclea* are prominent on areas consisting of eutrophic soil and some less sandy soils. *Acacia tortilis* may dominate some areas along valleys. Dystrophic sands are dominated by grassy herbaceous layer with relatively low basal cover. Refer to the Table 5 below for the list of trees, shrubs and herbs deemed as important taxa to the proposed site.

Table 5: Trees, shrubs and herbs deemed as important taxa to the proposed site

Tall Trees	Shrubs	Herbs
<i>Acacia burkei</i>	<i>Combretum hereroense</i>	<i>Dicerocaryum senecioides</i>
<i>A. robusta</i>	<i>Grewia bicolor</i>	<i>Barleria macrostegia</i>
<i>C. zeyheri</i>	<i>Indigo ferafilipes</i>	<i>Blephari integrifolia</i>
<i>Sclerocarya birrea</i>	<i>G. monticola</i>	<i>Crabbea angustifolia</i>
<i>Burkea africana</i>	<i>Strychno spungens</i>	<i>Evolvulu salsinoides</i>
<i>Combretum apiculatum</i>	<i>Agathisa nthemumbojeri</i>	<i>Geigeria burkei</i>
<i>Terminalia sericea</i>	<i>Gnidia sericocephala</i>	<i>Harmannia lancifolia</i>
<i>Ochna pulchra</i>	<i>Felicia fascicularis</i>	<i>Indigo feradaleoides</i>
<i>Peltophorum africanum</i>		<i>Justicia anagalloides</i>
<i>Rhus leptodictya</i>		<i>Kyphocarp aangustifolia</i>
		<i>Lophio carpustenuissimus</i>
		<i>Waltheria indica</i>
		<i>Xerophyte humilis</i>
		<i>Hypoxi shemerocallidea</i>
		<i>Alg oegreatheadii</i>

(Source: EMP: 2002)



2.1.4.2 Site specific vegetation

During the site visit, conducted as part of the study done for the mining right application, IWULA as well as the EIA, *Commelina erecta*, *Protea caffra*, *Asclepias fruticosa* as well as *Gladiolus spp* were identified as species indigenous to the proposed site. *Commelina erecta* is characterised by soft, jointed stems, which grow upright only if supported by other plants. Usually they lie on the ground and grow up to 1m long. The principal leaves are linear to somewhat lance-shaped.

Protea caffra is a small tree or shrub that occurs in open or wooded grassland usually on rocky ridges. Its leaves are leathery and hairless. The flower head is solitary or in clusters of 3 or 4 with the involucre bracts a pale red, pink or cream colour.

Asclepias fruticosa is a species of milkweed native to South Africa. *Asclepias fruticosa* is characterised by simple, lanceolate to linear, alternate, glabrous, light green, margin entire, apex sharply pointed leaves.

Wetland vegetation:

This section was compiled using information from the 'Wetland delineation for a proposed clay mine on Portion 25 of the farm Nooitgedacht 436 JR', conducted by Spatial Ecological Consulting, 2014.

The wetland vegetation is dominated by species occurring in the permanent and seasonal wetness zones of a wetland. Several wetland species are also present in the temporary wetness areas of the wetlands. The vegetation is therefore a clear indication of wetland conditions on this site. The species recorded in the wetland during the site visit is included in the attached wetland study. This is not a complete species list as a complete floristic survey was not included as part of the study.

A number of alien and invasive species are present in the wetland units, mostly in the seepage wetland units. The seepage wetland units are also overgrazed, especially the eastern and southern seepage wetland units. Trampling is also present in several areas. The vegetation in the unchanneled valley bottom wetland unit is however very diverse and include some unique and protected species, including orchids. Although the vegetation in the seepage areas has been modified and some invasive species are present in all the wetland units, the vegetation is still in good condition in the unchanneled valley bottom wetland unit.

2.1.4.3 Red data species, conservation status, endemism and biodiversity

According to the vegetation survey, no rare or endangered species exist in the area. The Central Sandy Bushveld is "Vulnerable" with less than 3 % conserved in a number of scattered nature reserves. The conservation target is 19% and 2% is protected (Gustav Klingbiel and Ohrigstad Dam Nature reserves). A total of 22% of this unit has been transformed, including 19% cultivated and 4% urban and split up areas. Erosion varies from very low to high.



Red Data Species are plant or animal species that are considered threatened, vulnerable, or endangered. According to Mucina, L., & Rutherford, M. C. (2006), there is no Red Data vegetation species that are known to occur on the proposed site.

2.1.5 Animal life

2.1.5.1 General animal life

The following information on animal life was extracted from the Environmental Management Programme report for prospecting, which was compiled for Portion 22 of farm Nooitgedacht 436JR dated June 2002. As previously mentioned, portion 22 is situated a few kilometres from Portion 25.

Refer to Table 6 below for bird species that are common to the area. Table 7 indicates red data mammal species that could occur on the site.

Table 6: Bird species common to the area

Birds Species	
Common name	Scientific name
Black Crow	<i>Corvus capensis</i>
Familiar chat	<i>Cercomela familiaris</i>
Orange-throated longclaw	<i>Macornyx capensis</i>
Cattle Egret	<i>Bubulus ibis</i>
Rock Pigeon	<i>Columba guinea</i>
Red-faced Mousebird	<i>Colius indicus</i>
Laughing Dove	<i>Streptopelia senegalensis</i>

(Source: EMP, 2002)

According to the SA-ISIS, bio-map project that forms part of the standard Environmental Management Programme report, dated June 2002, the following red data mammal species could occur on the site (refer to Table 7 below).

Table 7: List of Red data mammal species that could occur on-site

Red data mammal species	
Common name	Scientific name
Cheetah	<i>Acinonyx jubatus</i>
Impala	<i>Aepyceros melampus</i>
Springbok	<i>Antidorcas marsupialis</i>
Black wildebeest	<i>Connocha etesgnou</i>
Bontebok / Blesbok	<i>Damaliscus dorcas</i>
Water rat	<i>Dasymysin comtus</i>
Burchell's zebra	<i>Equus burchellii</i>



Red data mammal species	
Common name	Scientific name
Brown hyaena	<i>Hyaena brunnea</i>
Waterbuck	<i>Kobus ellipsiprymnus</i>
Wild dog	<i>Lycaon pictus</i>
Klipspringer	<i>Oreotragus oreotragus</i>
Aardvark	<i>Orycteropus afer</i>
Oribi	<i>Ourebia ourebi</i>
Grey reebok	<i>Peleacapreolus</i>
Mountain reedbuck	<i>Reduncafulvorufula</i>
Striped mouse	<i>Rhabdomyspumilo</i>
Kudu	<i>Tragelaphus strepsiceros</i>

(Source: EMP:2002)

None of the above-mentioned red data mammal species were however observed during the site visit, conducted as part of the study done for the mining right application, IWULA as well as the EIA,

2.1.6 Soils

Information on soils is extracted from AGIS (Agricultural Geo-Referenced System) and the 'Wetland delineation for a proposed clay mine on portion 25 of the farm Nooitgedacht 436 JR', conducted by Spatial Ecological Consulting, 2014. This atlas combines agricultural-, orientation- & demographic information as well as scanned maps & satellite images including the first SPOT 5 high resolution data of South Africa. The general soil pattern is red excessively drained sandy soils with high base status and eutrophic leaching status. This soil falls in pattern, Plintic Catena Upland Duplex Margalitic Soils rare, indicating land types with exposed rocks, stones or boulders; covering 60 - 80% of the area. The water holding capacity of the soil is 21mm-40mm.

The land has moderate to high wind or water erosion hazard. Soils have a low to moderate erodibility. This is due to the fact that most of the original topsoil had been removed through extensive erosion by unknown activities in the past. Soil mapping of the site was done according to the Taxonomic System for South Africa. The Glenrosa and Mispah soil forms were found on-site.

Glenrosa soil form:

The Glenrosa soil form consists of an orphic A-horizon over a lithocutanic B-horizon. The landscape is dominated by the Glenrosa soil form, which varies from 40cm to 1.5m in depth. The soils on-site are definitely not deep as can be seen from the soil survey, but also from the vegetation occurring on-site. Vegetation is dominated by grass with no trees occurring naturally in the area due to the thin soil layer on top of the underlying geological material



The soils on-site interestingly developed from two different types of geological material namely grit and shale. It seems as if strata of shale are situated on top of the grit. Pedogenesis has already turned the shale into soil, and is currently weathering the underlying grit. In other instances pedogenesis has not even turned the shale into soil. As can be seen from this, soil-forming processes vary spatially. The soil horizon, which forms the lithocutanic B-horizon, is dominated by geological material highly resistant to weathering. In many instances the orphic A- horizon is quite dark indicating the accumulation of organic material in the form of grass roots in this horizon. This is also the case in the American Prairies where grassveld leads to the formation of a humic A-horizon. In South Africa however, the temperatures are too extreme leading to the oxidation of the organic material and preventing humic A-horizons from forming.

In many instances there is a thin transitional layer between the orphic A-horizon and the underlying lithocutanic B-horizon. These horizons can be classified as yellow- brown apedal B-horizons and in one instance even a red apedal B-horizon was found in this position. However the horizons never exceeded 30cm in depth and for this reason cannot be seen as diagnostic. It is however clear that the deeper the soil deposit, the more dominant the yellow-brown and red apedal B-horizons. The yellow- brown and red apedal B-horizons never dominated the lithocutanic B-horizons, showing that soil forming processes are severely hampered on-site, probably due to the lack of water or even lack of leaching due to the impermeable shale and grit layers present.

It is well known that soil forms normally coincide with vegetation, for example the Bushveld Acacias, which normally grow on the Arcadia soil form (vertic A-horizon over unspecified material). Here it was also assumed that the phenomena would be relevant. However it is not the case. On a site outside the mining area a stand of Poplar trees occurs, and it is accepted that the soils should be wetter since these trees normally grow close to water. It was however interesting to find that these trees are growing on a Glenrosa soil approximately 45cm deep form. The transitional horizon between the orphic A- and the lithocutanic B-horizon in this case is more yellow, showing that the soil here is somewhat wetter than at a higher elevation. The yellow colour is in many instances the result of hydrated soil particles, or can also form on geological material low in Ferro-iron. In this case the former is probably true since the Poplar trees would not have grown here if there were no water.

Wetland soil:

This section was compiled using information from the '*Wetland delineation for a proposed clay mine on portion 25 of the farm Nooitgedacht 436 JR*', conducted by Spatial Ecological Consulting, 2014.

The soil in the valley bottom wetland unit and portions of the adjacent seepage wetland units are very high in organic content and can mostly be classified as a peat. This is an indication of permanent wetness. The soil in the temporary wetness areas is a sandy soil, mostly brown in colour and becoming lighter in colour with depth. Mottling is present in the sandy soil, mostly red mottles. Both low chroma and high chroma mottles are present, depending on the wetness of the soil. The soil in the eastern



seepage area is a brown sandy soil with a few mottles around 15cm depth. The soil becomes more yellowish with depth until it is completely yellow.

Some erosion is taking place in the wetland, but the erosion is not significant. Some channel formation is also taking place in the northern seepage wetland unit, but this is also not significant. Some infill is also present in the wetland units, with the most significant infill on the northern seepage wetland.

2.1.7 Surface water

The discussion on surface water is based on the Desktop Hydrogeological Study conducted by Shangoni Aquiscience for Ecca Holdings Refractory Minerals Nooitgedacht, Portion 25, June 2013 (refer to Appendix 4C). The proposed site is located in the B31B quaternary catchment of the Olifants Water Management Area and the Central Transvaal (Bushveld) Basin (Refer to Figure 5). The central coordinates of the proposed site are S 25.563 and E28.7815 (central). Information pertaining to water management for the B31B quaternary is shown in Table 8 (GRDM).

The major surface water drainage system in the B31Bquaternary catchment is the Elands River that flows in a north-western direction and is situated approximately 21km west of the proposed operations. However, there are some smaller and non-perennial surface water features present in close proximity of the proposed quarry and these are: i) a wetland or sequence of depressions to the immediate north, and ii) the Loopspruit, a non-perennial stream in the sub-catchment area of the Elands River. The Loopspruit drains north-west towards the Klip- and Hartbeesspruit, 8km to the north-west where after the Hartbeesspruit confluences with the Harts River approximately 14km to the north-west. The present Eco Status category of the catchment is a B category defined as “largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.”



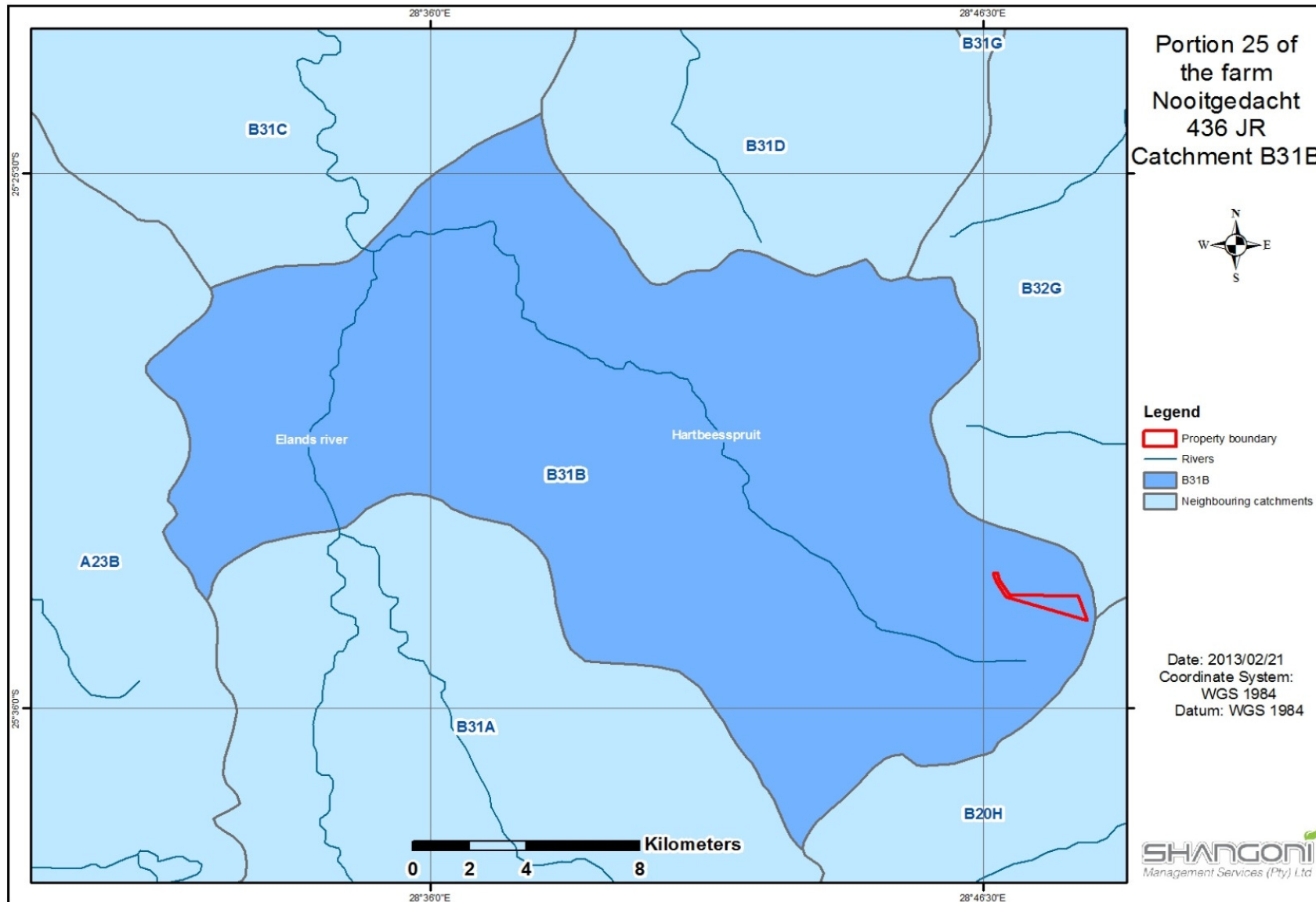


Figure 5: Quaternary catchments

Table 8: Quaternary catchment information (GRDM) for the B31B catchment

Attribute	B31B
Area	385.1km ²
Mean annual rainfall	640mm/a (±140 mm/a)
Mean annual runoff	26mm/a
Major catchment	Elands River
Minor sub-catchments	Loopspruit, Klipspruit, Hartbeesspruit
Baseflow	6mm/a
Population	29 000Count
Mean annual evaporation	1800 - 2000mm/a
Climatic water balance	-1200
Total groundwater use	0.02-0.04mm ³ /a
Present Eco Status Category	B Category
Recharge	31.37mm/a
	4.9%
Exploitation potential	4mm ³ /a
Vegetation type	Mixed Bushveld/savannah
Land use	Farming
Groundwater General Authorization	150m ³ /ha/a

2.1.7.1 Mean annual runoff

The total mean annual runoff is approximately 26mm per year. The Olifants River and some of its tributaries, notably the Klein River, Olifants River, Elands River, Wilge River and Bronkhorstspuit, rise in the Highveld grasslands.

2.1.7.2 Surface water quality

Surface water quality analysis was conducted for the proposed mining activities at Nooitgedacht. The results of the analysis are discussed in detail below and were extracted from the report titled: “*ECCA Holdings Refractory Minerals Nooitgedacht portion 25 Desktop Hydrogeological study*”, dated June 2013, prepared by Shangoni AQUIScience (Pty) Ltd.

Nooitgedacht property

Five (5) surface water samples were taken during the hydrocensus for the Nooitgedacht property and sent for chemical and bacteriological analyses at Aquatico, a SANAS accredited water laboratory. The surface sample locations included:

- Quarry 2 (portion 24 quarry);
- Fountain (‘wetland upstream’);
- Downstream from the fountain and proposed Nooitgedacht quarry (‘wetland downstream’);
- Loopspruit upstream from proposed Nooitgedacht quarry; and
- Loopspruit downstream from Nooitgedacht quarry.



The hydrochemical and bacteriological results can be viewed in Table 10. The results were evaluated according to the SANS 241: 2011 requirements for domestic use and classified according to the colour coded classification system for domestic use (refer to Table 9). The data in Table 10 indicates that the only “pristine” water in terms of quality is that of the fountain. The fountain water quality recorded GOOD (class 01) water which is according to the DWA suitable for lifetime use. All variables are well within the IDEAL (class 0) water quality except for total coliforms which recorded a count of 11 CFU/100 ml. This count can (in the absence of *E. coli*) be regarded as insignificant. The remaining surface water quality datasets can either be classified as POOR (class 03) or UNACCEPTABLE (class 04). These substandard classifications (in view of domestic water) are the direct result of high levels of *E. coli* in the Loopspruit and in the stream downstream from the fountain. Quarry 2 recorded an acidic pH of 3.87 together with high levels of soluble aluminium (Al). Refer to Figure 6 for locations of surface water sampling points relative to mine infrastructure.

Table 9: Colour coded classification system proposed by the DWA, WRC and DoH (WRC, 1998)

Classification	Risk
Class 0	<u>Ideal</u> drinking water suitable for lifetime use
Class 01	<u>Good</u> drinking water suitable for lifetime use
Class 02	<u>Marginal</u> drinking water which may be used without health effects by the majority of individuals in all age groups but may cause some effects in sensitive individuals.
Class 03	<u>Poor</u> drinking water which poses a risk of chronic health effects, especially in babies, children and the elderly.
Class 04	<u>Unacceptable</u> water quality posing severe acute health effects even with short term use.

Table 10: Hydrochemical and bacteriological results for surface water quality

Locality / Guideline	Unit	Domestic use SANS 241(1) ^a	Ptn 24 quarry	Fountain ('Wetland upstream')	Wetland downstream	Loopspruit upstream	Loopspruit downstream
Parameter							
pH	-	5 - 9.7	3.87	5.66	7.33	6.18	7.07
EC	mS/m	≤170	11.4	1.63	14.4	1.94	6.33
TDS	mg/l	1200	16.0	<1	77.0	1.0	25.0
Ca	mg/l		1.30	0.03	14.50	0.31	4.92
Mg	mg/l	-	0.80	0.03	4.80	0.13	1.63
Na	mg/l	200	<0.013	<0.013	3.05	<0.013	1.41
K	mg/l	-	<0.018	0.10	0.32	0.04	<0.018
MALK	mg/l	-	<2.48	<2.48	14.2	<2.48	6.2
Cl	mg/l	300	<0.423	<0.423	<0.423	<0.423	<0.423
SO ₄	mg/l	500	13.2	<0.04	45.5	0.0	12.3
NO ₃ -N	mg/l	11	0.44	0.14	0.24	0.24	0.38
NH ₄ -N	mg/l	1.5	0.048	0.063	0.049	0.033	0.044
PO ₄ -P	mg/l	-	0.008	<0.008	<0.008	<0.008	<0.008
F	mg/l	1.5	0.26	<0.055	0.23	0.16	0.18
Al	mg/l	0.3	1.74	<0.003	<0.003	<0.003	<0.003
Fe	mg/l	2	0.213	<0.003	<0.003	<0.003	<0.003
Mn	mg/l	0.5	0.061	<0.001	0.016	<0.001	<0.001
Tot Hardness	mg/l	-	7	0.0	56	1.0	19



SAR	ratio	-	0.001	0.005	0.18	0.002	0.14
Total coliforms	cfu/100 ml	0	-1.00	11	32	31	220
E.coli	cfu/100 ml	0	-1.00	<1	24	15	160
DWA classification*			Class 03	Class 01	Class 03	Class 03	Class 04
Worst parameters			pH	Total coliforms	E.coli	E.coli	E.coli
^a SANS 241: 2011							
*Note that the classification in terms of domestic use standards is not implying usage but merely aids to interpret a specific dataset							

(Source: Desktop Hydrogeological study, dated June 2013)

The hydrochemistry for the surface water features, displayed as Stiff diagrams and an Expanded Durov diagram, are illustrated in Figures 7 and 8. The following interpretations can be made from these diagrams:

- The “fountain” (wetland upstream) and Loopspruit upstream localities are dominated by the Ca or Mg cations and the bicarbonate (HCO₃) anion. The fountain and Loopspruit upstream plot in fields 2 and 1 respectively, both of which can be regarded as fresh.
- A significant deterioration in water quality is noted in the downstream localities relative to their upstream counterparts. Although the hydrochemical results are still well within domestic requirements, the deterioration should nevertheless be regarded as significant. The Stiff diagrams and Durov diagram for both localities indicate domination by the Ca cation and the SO₄ anion. The SO₄ domination on the anion side may be an indication of impacted water and should be closely monitored.
- Quarry 2 is also dominated by the Ca cation and the SO₄ anion and plots in field 5 of the Expanded Durov diagram which may be an indication that sulphide minerals may be present in the host rock. The acidic pH of 3.87 may support this theory.



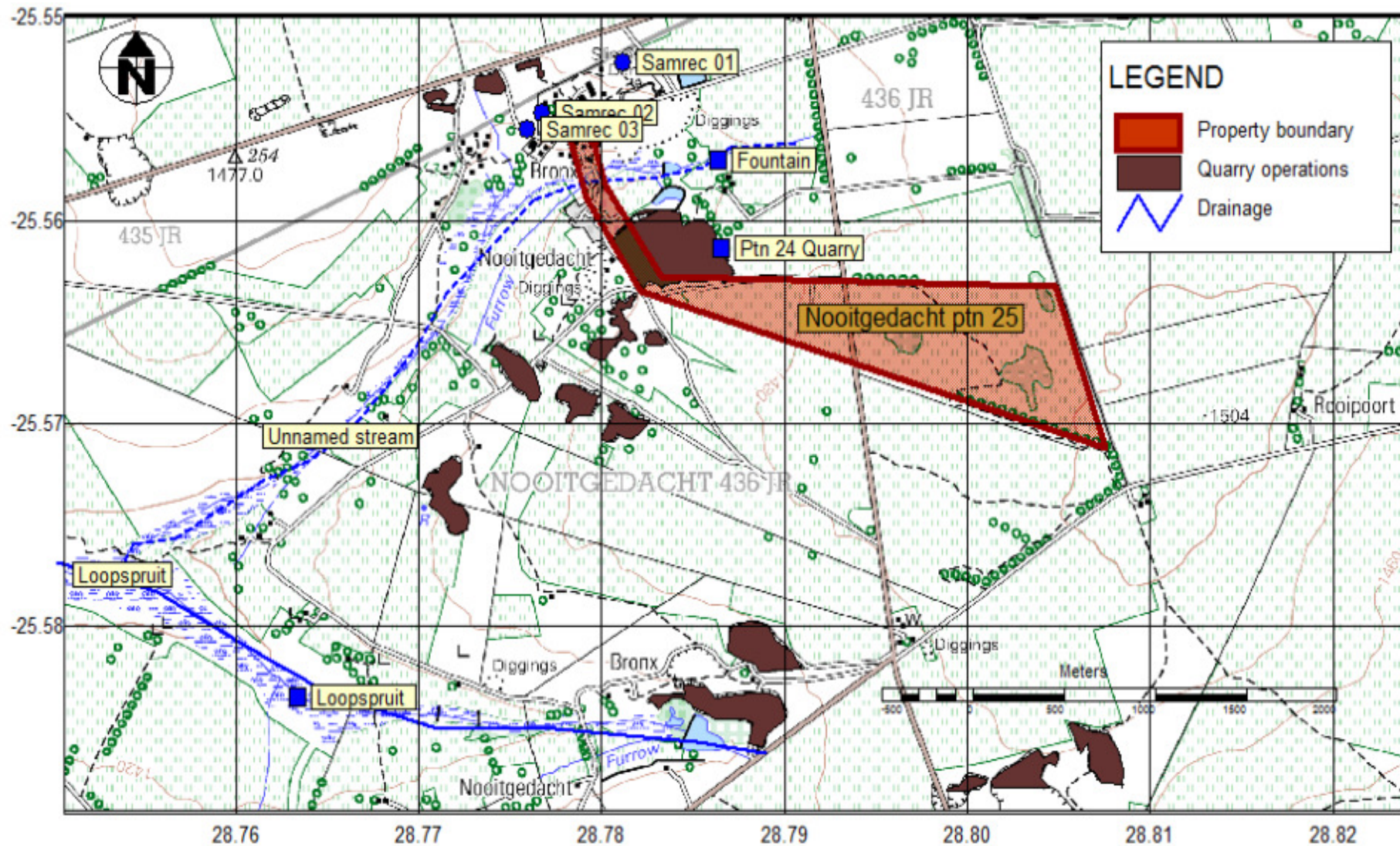


Figure 6: Locations of surface water sampling points relative to mine infrastructure



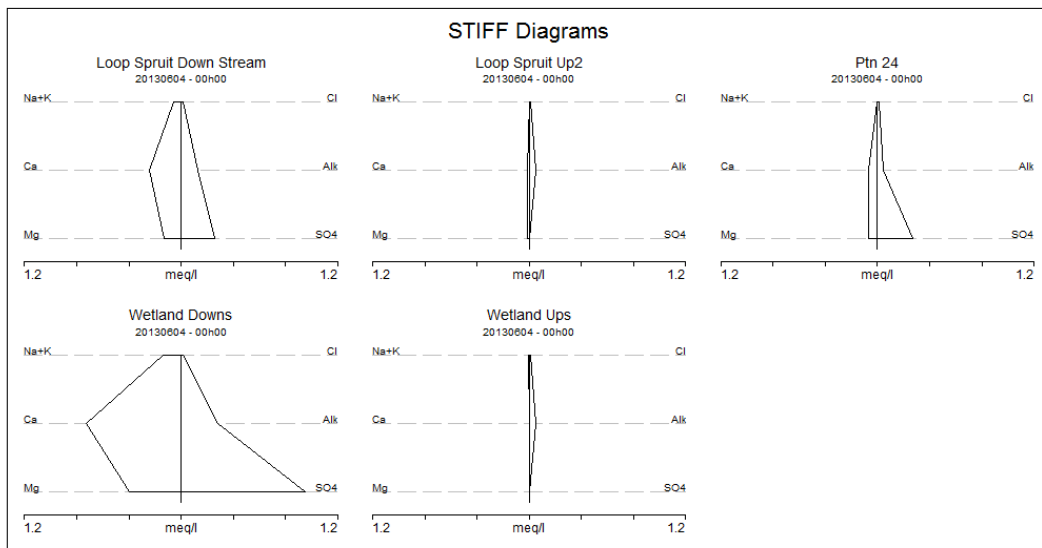


Figure 7: Stiff diagrams showing major cations and anions (in meq/l) for surface water localities

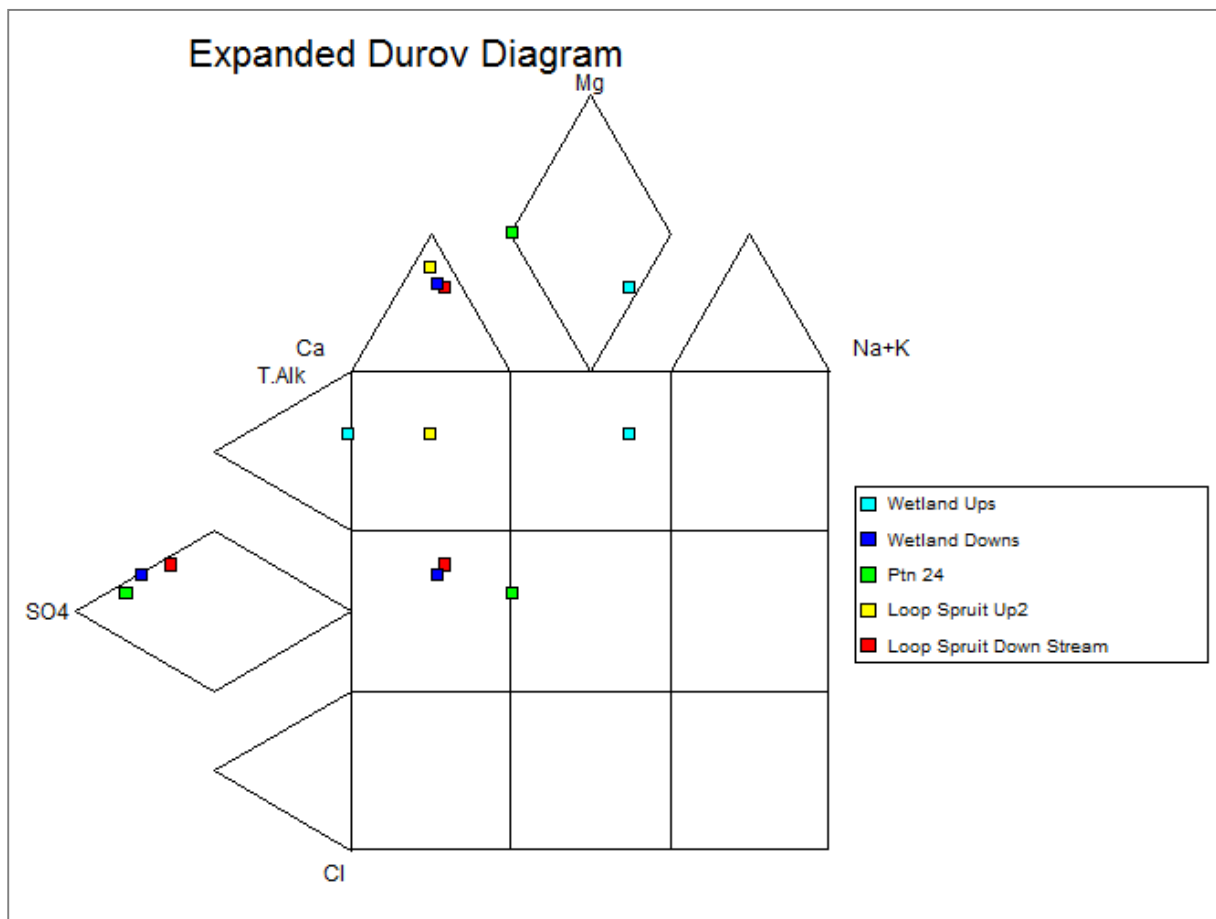


Figure 8: Expanded Durov diagram for surface water localities showing dominance of cations and anions (in meq/l)



2.1.7.3 Surface water use

The following information on surface water use was extracted from the approved Environmental management programme report for prospecting, dated June 2002, which was compiled for Portion 22 of farm Nooitgedacht 436JR. Surface water in the area is used mainly for agricultural purposes, with little domestic use. The adjacent operations makes use of some water for dust suppression. Other possible surface water users in the area include a coal mining operation and informal settlements.

2.1.8 Groundwater

The discussion on groundwater is based on the Desktop Hydrogeological Study conducted by Shangoni Aquiscience for Ecca Holdings Refractory Minerals Nooitgedacht, Portion 25, June 2013.

2.1.8.1 Aquifer classification

The aquifer classification system used to classify South African aquifers is the National Aquifer Classification System developed by Parsons (1995). This system has a certain amount of flexibility and can be linked to second classifications such as a vulnerability or usage classification. Parsons suggests that aquifer classification forms a very useful planning tool that can be used to guide the management of groundwater issues. He also suggests that some level of flexibility should be incorporated when using such a classification system.

The South African Aquifer System Management Classification is presented by five major classes:

- Sole Source Aquifer System
- Major Aquifer System
- Minor Aquifer System
- Non-Aquifer System
- Special Aquifer System

The following definitions are taken from Parsons (1995) and applied as an aquifer classification system:

Sole Source Aquifer System

“An aquifer that is used to supply 50% or more of domestic water for a given area, and for which there are no reasonable alternative sources should the aquifer become depleted or impacted upon. Aquifer yields and natural water quality are immaterial”.

Major Aquifer System

“Highly permeable formations, usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good”.



Minor Aquifer System

“These can be fractured or potentially fractured rocks that do not have a high primary hydraulic conductivity, or other formations of variable hydraulic conductivity. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large quantities of water, they are both important for local supplies and in supplying base flow for rivers”.

Non-Aquifer System

“These are formations with negligible hydraulic conductivity that are generally regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer unusable. However, groundwater flow through such rocks does occur, although imperceptible, and needs to be considered when assessing risk associated with persistent pollutants”.

Special Aquifer System

“An aquifer designated as such by the Minister of Water Affairs, after due process”.

2.1.8.2 Nooitgedacht property

The area where the proposed Nooitgedacht quarry is to be situated is directly underlain by rocks of the Ecca Group occurring in the Karoo sequence of rocks. It consists predominantly of tillite, mudstone, sandstone and shale. Although the Ecca Group is extensively intruded by dolerite, no significant dykes, sills or faults are known to occur in the immediate vicinity of Nooitgedacht. The hydrogeology can be summarised as follows:

- Shallow groundwater occurrences and movement are confined to joints, fractures and cracks in the Karoo mudrock and sandstone formations and their weathered and fractured contact zones.
- Insignificant fracturing prevails in these geological formations and contact zones whilst bedding plane openings and fractures are small, limited in extent, irregularly distributed and often not interconnected.
- Aquifer yields are typically between 0.1 l/s and 0.5 l/s with relatively good water quality and is classified as a d2 Intergranular and Fractured Aquifer.
- According to the Parsons Aquifer Classification System, the aquifer can be regarded as a Minor Aquifer.

2.1.8.2 Aquifer hydraulics

2.1.8.2.1 Aquifer parameters and sustainable yields

Aquifer testing or pump testing is the most reliable method for estimating the hydraulic characteristics and parameters of the aquifer system through its response to stress during and following abstraction. The aquifer parameters are used to quantify water resources and facilitate in resource management. Aquifer testing involves the withdrawal of measured quantities of water from or the addition of water to, a borehole(s), and the measurement of resulting changes in head in the aquifer both during and after the period of abstraction or addition.



A constant discharge test is conducted to determine the aquifer parameter values (T = Transmissivity and S = Storativity), as well as to identify the occurrence and location of possible groundwater boundaries and fracturing. A borehole is pumped at a near constant rate for the duration of the test. The groundwater drawdown during and following abstraction (when pump is switched off) is measured and recorded according to a prearranged time schedule. The drawdown data obtained from the constant discharge and recovery tests allows for the calculation of the sustainable yield including the hydraulic characteristics (T and S) of the aquifer. The pump test data was analysed using the FC method. FC refers to flow characterisation of groundwater flow to a borehole. This method of analysis takes into account factors such as the derivatives of draw-down versus time data, boundary information and error propagation. The method has been developed by the Institute for Groundwater Studies (IGS).

Borehole details are summarised in Table 11 and the results in Table 12. Time-drawdown graphs are illustrated in Figures 9 and 10. The pumping tests were conducted at low flow rates that varied between 1.3 l/s and 0.59 l/s for *Samrec 01* and 0.98 l/s to 0.76 l/s for *Samrec 02*. Due to the fact that submersible centrifugal pumps were used for the abstraction, constant rates could not be obtained throughout the tests.

Table 11: Pump test information

Borehole	Latitude /Longitude	Borehole depth (m)	Pump depth (m)	Static level (m)	Test duration (min)	Abstraction rate (ave) l/s	Max drawdown
Samrec 01	S25.55219 E28.78119	50	44	12	240	0.83	28.3
Samrec 02	S25.55467 E28.77678	-	-	8.4	20	0.88	20.5

Transmissivity values that were calculated from the pumping tests varied from 1 – 1.1 m^2/d (matrix transmissivity), 1.4 to 1.8 m^2/d (recovery transmissivity), and 3.0 m^2/d (fracture transmissivity). Storativity for the aquifer was calculated to be 0.001, a typical value for hard rock Karoo aquifers. Hydraulic conductivity is estimated to be in the range of 0.025 to 0.05 m/d , which is typical for Karoo aquifers. It is important to note that the storativity value given for the aquifer should be regarded as an estimate only since storativity cannot be accurately calculated without drawdown data from an observation borehole.

Table 12: Pump test results

Borehole	Sustainable yield (l/s)#	T_{matrix} (m^2/d)	$T_{fracture}$ (m^2/d)	T_{rec} (m^2/d)	S^*
Samrec 01	0.83	1.1	2.6	1.8	0.001



Samrec 02	0.78	1	-	1.4	0.001
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#Basic FC method

* Storativity cannot be accurately calculated without drawdown data from an observation borehole. Data given therefore should be regarded as estimates.

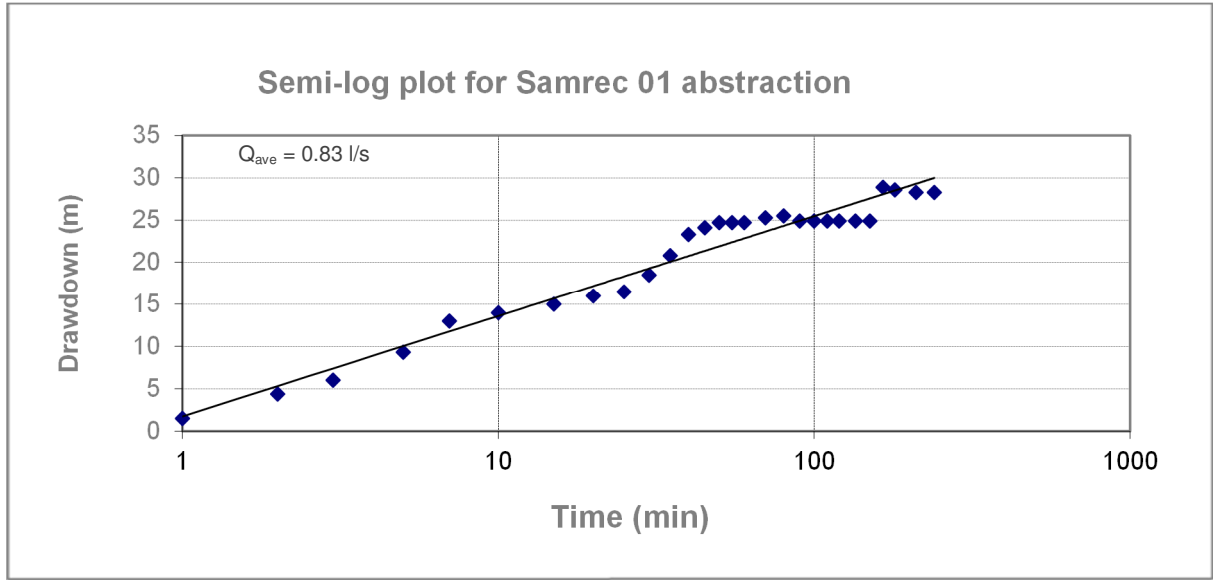


Figure 9: Time drawdown graph for Samrec 01

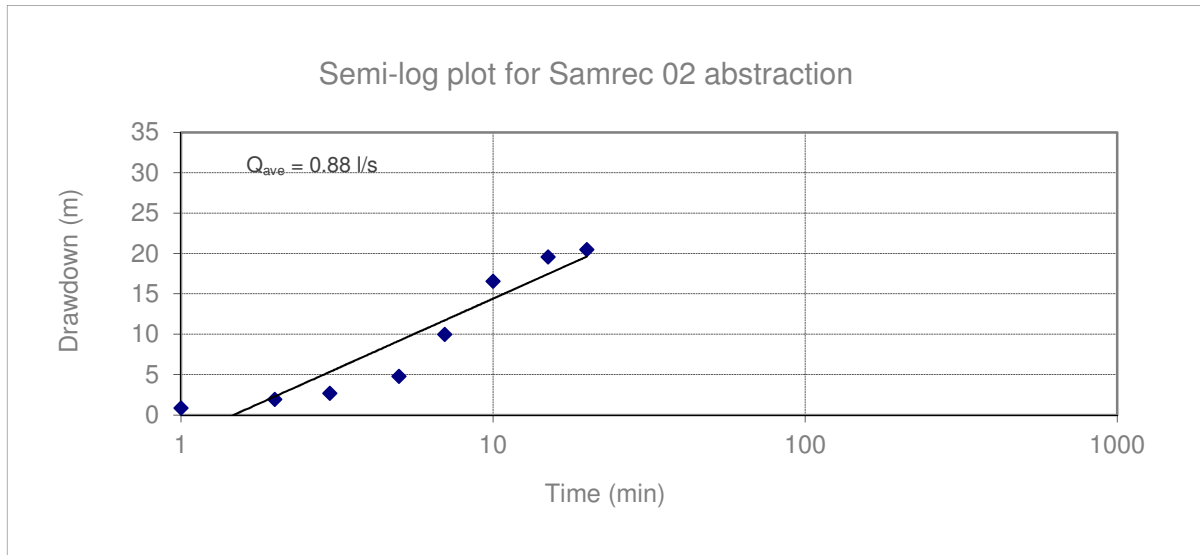


Figure 10: Time drawdown graph for Samrec 02

2.1.8.2.2 Drawdown and zone of influence model

Figure 13 shows a typical drawdown curve which may be expected during pumping from Samrec 01 using the aquifer parameters calculated. The graph shows a drawdown which may be expected following continuous pumping for 24hours. A drawdown of approximately 30m with a zone of influence



of 150 m is predicted. It is recommended that the borehole only be pumped continuously for a period of 20 - 24hrs which should be followed by a full recovery period.

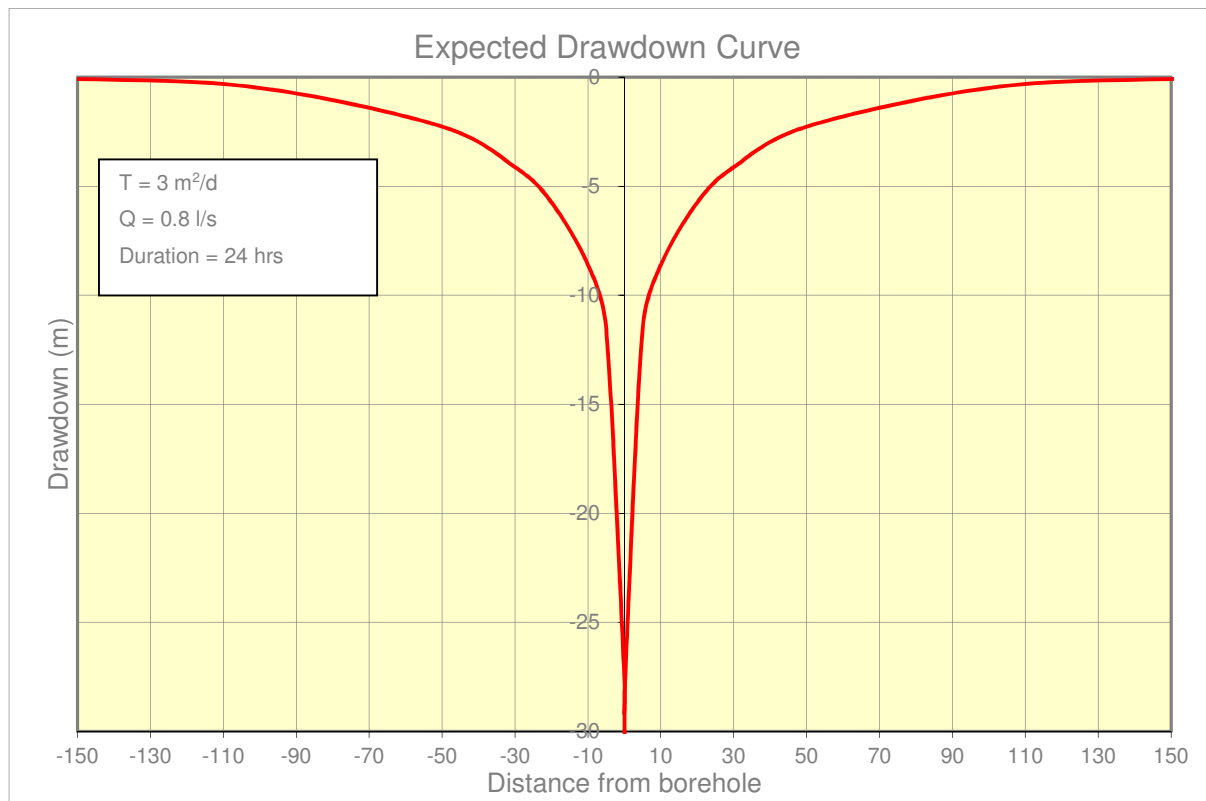


Figure 11: Typical drawdown curve expected using the drawdown function

2.1.8.3 Groundwater recharge estimation

The first approach adopted is the CMB (Chloride Mass Balance) approach. This method is based on the principle that chloride behaves as a conservative tracer and is neither absorbed nor lost as it flows from precipitation to groundwater. Thus the method assumes that chloride in recharge water percolating vertically through the unsaturated zone and into the aquifer is derived entirely from precipitation (i.e. no chloride is derived from the soil or unweathered zone) and the chloride concentration of groundwater is controlled by evapotranspiration processes. Thus the proportion of rainfall that occurs as recharge can be quantified as the ratio between the two concentrations.

Because of the absence of groundwater chemistry the CMB approach for estimating recharge could not followed. However, the GRDM database gives an estimated recharge value which is based upon the CMB method and shown in Table 13 below.



Table 13: Recharge estimation

Recharge estimation		
Method	% of rainfall	mm/a
GRDM	4.9	31.37

2.1.8.4 Aquifer vulnerability

Groundwater plays an important role in supplying water to many regions of Southern Africa due to its low annual average precipitation of 460mm, which is well below the world average of 860mm. The quality of groundwater resources in South Africa has therefore received considerable focus and attention on the need for a proactive approach to protect these sources from contamination (Lynch *et. al.*, 1994). Groundwater protection needs to be prioritised based upon the susceptibility of an aquifer towards pollution. This can be done in two ways, namely i) pollution risk assessments and ii) aquifer vulnerability. Pollution risk assessments consider the characteristics of a specific pollutant, including source and loading while aquifer vulnerability considers the characteristics of the aquifer itself or parts of the aquifer in terms of its sensitivity to being adversely affected by a contaminant should it be released.

The DRASTIC model concept developed for the USA (Aller *et. al.*, 1987) is well suited for producing a groundwater vulnerability evaluation for South African aquifers. The DRASTIC evaluates the intrinsic vulnerability (*IV*) of an aquifer by considering factors including **D**epth to water table, natural **R**echarge rates, **A**quifer media, **S**oil media, **T**opographic aspect, **I**mpact of vadose zone media, and hydraulic **C**onductivity. Different ratings are assigned to each factor and then summed together with respective constant weights to obtain a numerical value to quantify the vulnerability:

$$\text{DRASTIC Index (IV)} = DrDw + RrRw + ArAw + SrSw + TrTw + Irlw + CrCw \quad (1)$$

Where D, R, A, S, T, I, and C are the parameters, r is the rating value, and w the constant weight assigned to each parameter (Lynch *et al.*, 1994). The scores associated with the vulnerability of South African aquifers are shown in Table 14 below.

Table 14: South African National Groundwater Vulnerability Index to Pollution (Lynch *et al.*, 1994)

Score	Vulnerability
50-87	Least susceptible
87 - 109	Moderate susceptible
109 - 226	Most susceptible



The concept of DRASTIC in vulnerability assessments is based on:

- A contaminant is introduced at the surface of the earth
- A contaminant is flushed into the groundwater by precipitation
- A contaminant has the mobility of water
- The area evaluated is 0.4km² or larger

The weighting for each parameter is constant. The minimum value for the DRASTIC index that one can calculate (assuming all seven factors were used in the calculation) is therefore 24 with the maximum value being 226. The higher the DRASTIC index the greater the vulnerability and possibility of the aquifer to become polluted if a pollutant is introduced at the surface or just below it. Note that conductivity values for fractured rock aquifers are difficult to estimate and sufficient information on hydraulic conductivity values for Southern Africa is not available at present. In addition, due to the considerable variation over short distances in hard rock aquifers, the use of this parameter was in doubt.

Table 15 summarises the rating and weighting values and the final score for the vulnerability of the aquifer in vicinity Nooitgedacht portion 25. The final DRASTIC score of 110 indicates that the aquifer/s in the region has a medium to high susceptibility to pollution and a high level of aquifer protection is therefore required. This high score is mostly due to the very shallow water table and fountain in the vicinity.

Table 15: Drastic vulnerability scores

Factor	Range/Type	Weight	Rating	Total
D	0 - 15 m	5	8	40
R	10 - 50 mm	4	6	24
A	Fractured and weathered	3	3	9
S	Sandy-clay loam	2	4	8
T	2-6%	1	9	9
I	Karoo (northern)	5	4	20
C	-	3	-	-
DRASTIC SCORE = 110				

Reasonable and sound groundwater protection measures are recommended to ensure that no cumulative pollution affects the aquifer, during short- and long-term. DWA's water quality management objectives are to protect human health and the environment. Therefore, the significance of this aquifer classification is that if any potential risk exists, measures must be taken to limit the risk to the environment, which in this case is:

- The protection of the underlying aquifer;
- The fountain and natural drainage to the north and north-west respectively; and



- The Loopspruit to the west of Nooitgedacht draining in north-west.

2.1.8.5 Groundwater depth

Domestic boreholes on the surrounding farms indicate that the depth of the water table is approximately 20m below surface.

2.1.8.6 Ground water quality

A detailed hydrocensus was conducted in a 2 km radius on and around Nooitgedacht portion 25 to obtain a representative population of water users on the properties of portion 25 and adjacent land owners. Six (6) landowners were surveyed as interested and affected parties (IAP). Details of the IAPs including surveyed boreholes and surface water features in vicinity are shown in Table 17. Note that no boreholes were found on the properties of the IAPs. Water use by the IAPs will be mostly from the fountain on portion 22.

Only one dataset for groundwater quality, the domestic borehole (Samrec 03) is available. The borehole is a large diameter well and is approximately 4 m deep. The water from the borehole is abstracted for domestic use on the premises. The hydrochemistry and bacteriological quality are shown in Table 16. The water quality profile can be described as slightly acidic, non-saline and soft with all variables recording well within the SANS 241: 2011 requirements and DWA's IDEAL (class 0) domestic use guidelines (DWAf, 1996). The pH recorded a slightly acidic value at 5.92 but is not uncommon for the area and especially the shallow, primary aquifer with near absent base metals such as Ca, Mg and Na. An Expanded Durov and Stiff diagram are shown in Figures 14 and 15 respectively. The profile is dominated by the Mg cation and the HCO₃ anion and plot in field 2 of the Expanded Durov diagram which indicates recently recharged, fresh and shallow groundwater.

Table 16: Hydrochemical and bacteriological results for the domestic borehole (Samrec 3)

Locality / Guideline	Unit	SANS 241(1) 2011 ^a	Samrec 03
Parameter			
pH	-	5 - 9.7	5.92
EC	mS/m	≤170	3.91
TDS	mg/l	1200	6.0
Ca	mg/l		1.26
Mg	mg/l	-	1.05
Na	mg/l	200	0.01
K	mg/l	-	0.09
MALK	mg/l	-	<2.48
Cl	mg/l	300	<0.423



Locality / Guideline Parameter	Unit	SANS 241(1) 2011 ^a	Samrec 03
SO ₄	mg/l	500	1.4
NO ₃ -N	mg/l	11	1.74
NH ₄ -N	mg/l	1.5	0.046
PO ₄	mg/l	-	<0.008
F	mg/l	1.5	0.21
Al	mg/l	0.3	<0.003
Fe	mg/l	2	<0.003
Mn	mg/l	0.5	<0.001
Tot Hardness	mg/l	-	7
SAR	ratio	-	0.002
Total coliforms	cfu/100 ml	0	<1
<i>E.coli</i>	cfu/100 ml	0	<1
DWA classification*			Class 0
Worst parameters			-

^aSANS 241: 2011

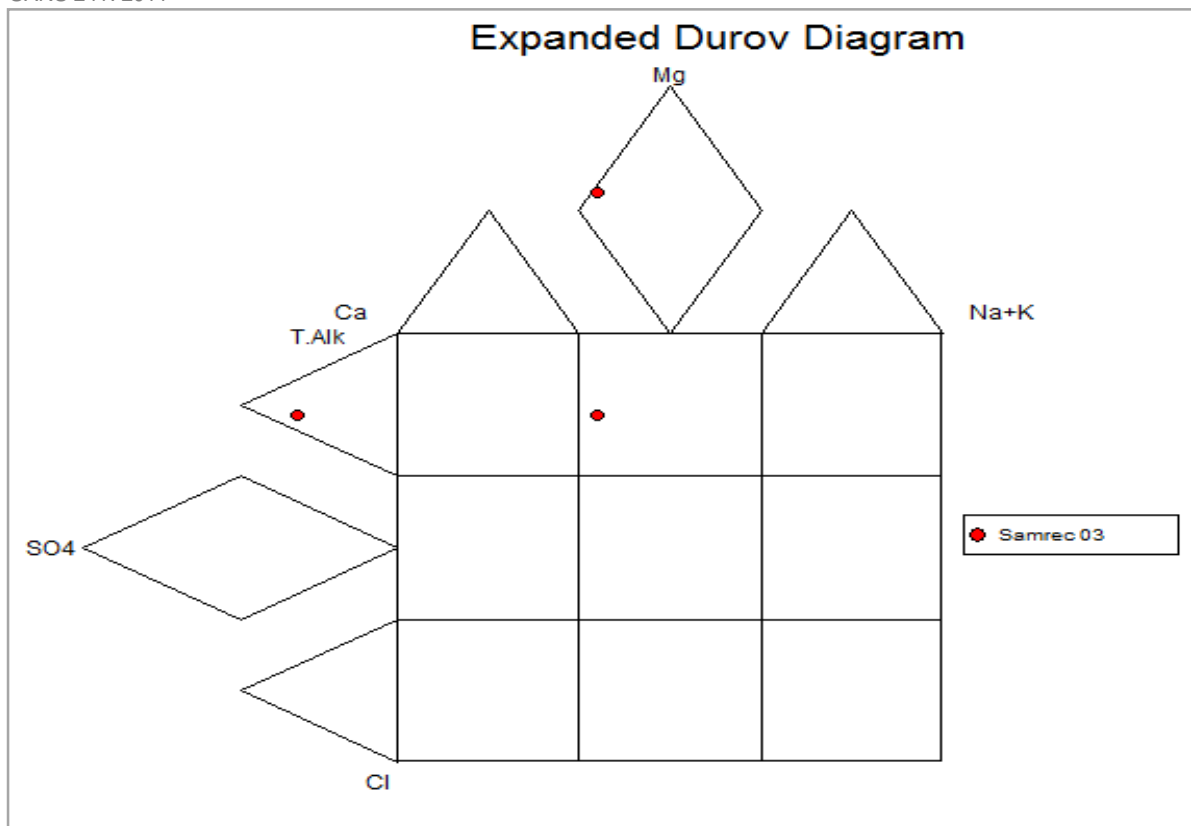


Figure 12: Expanded Durov diagram for the domestic borehole (Samrec 03) showing dominant cations and anions in meq/l



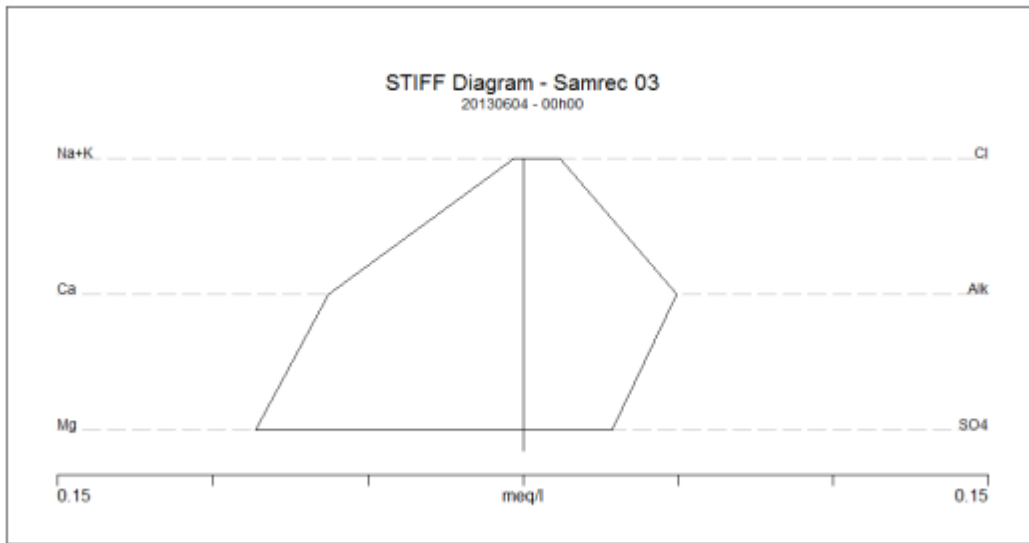


Figure 13: Stiff diagram for the domestic borehole showing dominant cations and anions in meq/l



Table 17: Nooitgedacht Portion 25 hydrocensus results

Borehole ID	Coordinates	Property	Owner	Type	SWL (m)	Borehole depth (m)	Application	Pump type	Approximate yield (l/s)
Boreholes / fountains									
Samrec 01	S25.55219 E28.78119	Nooitgedacht ptn 22	Ecca Samrec Nooitgedacht	Borehole	12	50	Domestic (back-up borehole)	Submersible	1
Samrec 2	S25.55467 E28.77678	Nooitgedacht ptn 22	Ecca Samrec Nooitgedacht	Borehole	8.4	Unknown	Domestic (back-up borehole)	Submersible	1
Samrec 03	S25.55481 E28.77669	Nooitgedacht ptn 22	Ecca Samrec Nooitgedacht	Borehole	1.9	4	Domestic	Submersible	6 – 9
Fountain (wetland upstream)	S25.55794 E28.78632	Nooitgedacht ptn 22	Ecca Samrec Nooitgedacht	Borehole	4.90	0	Domestic	Submersible	1 – 2
Surface water									
Ptn 24 Quarry	S25.56236 E28.78705	Nooitgedacht ptn 24	Ecca Samrec Nooitgedacht	Quarry	±30	NA	None	NA	NA
Loopspruit	S25.58352 E28.76341	Nooitgedacht 463/Jr/2	-	Perennial stream	NA	NA	Domestic, livestock watering, aquatic	NA	NA
Interested and Affected Parties (IAPs)									
NA	S25.56300 E28.78148	Portion 25	TebokoMokoe na (resident)	Fountain/stream	NA	NA	Domestic use of fountain	NA	NA
NA	S25.56300 E28.78148		G. Venter	Fountain/stream	NA	NA		NA	NA



Borehole ID	Coordinates	Property	Owner	Type	SWL (m)	Borehole depth (m)	Application	Pump type	Approximate yield (l/s)
NA	S25.56300 E28.78148	Portion 25	Johanna Mtsweni (resident)	Fountain/stream	NA	NA	Domestic use of fountain	NA	NA
NA	S25.56300 E28.78148	Portion 25	Petros Mtsweni (resident)	Fountain/stream	NA	NA	Domestic use of fountain	NA	NA
NA	S25.56300 E28.78148	Portion 25	GeelboyMoeti (shop owner)	Fountain/stream	NA	NA	Domestic use of fountain	NA	NA
NA	S25.56300 E28.78148	Nooitgedacht portion 152	Johannes Ngodela (resident)	Fountain/stream	NA	NA	Domestic use, irrigation, livestock watering	NA	NA



2.1.8.7 Groundwater use

Groundwater in the area is used mainly for agricultural purposes, with little domestic use.

2.1.8.8 Water Authority

The relevant water authority is the Mpumalanga Department of Water Affairs.

2.1.9 Land use and land capability

There is currently no farming (livestock, crops and game) and no industrial activities on the area for which the EIA authorisation is being applied for. In the past, mining of carbonaceous clay did occur under the auspices of the holder of the abandoned old order rights. The adjacent property (Portion 24) to the north has in the past also been exploited, but there are currently no mining activities as the area falls under a prospecting permit of which Ecca Holdings is in possession. Livestock graze on adjacent areas.

According to AGIS, the general land capability of the farm Nooitgedacht in Mpumalanga is high potential arable land.

The site contains a plant species called *Dichapetalum cymosum* commonly known as “Gifblaar”, which is a small prostrate shrub poison leaf occurring in the northern parts of Southern Africa.

2.1.9.1 Existing structures

The investigation of the property revealed the possible existence of some form of “accommodation” on the eastern border of the property. Located in the central portion of the property are modern homesteads that at present have no heritage value. On the central southern border of the proposed mining “footprint” there occurs a “modern” cemetery containing some 15 graves as identified by the heritage assessment study.

2.1.10 Noise

There is currently no noise generating activities on the proposed site. There are also no sources of noise from the surrounding area.

2.1.11 Air Quality

Although rural development areas have been established in the surrounding Kwandebele and Bophuthatswana, the air quality of the proposed site remains undisturbed and unpolluted. Activities which have potential to impact on the air quality are limited since the proposed site is situated in a rural area.



2.1.12 Sensitive landscapes

2.1.12.1 Wetlands

This section was compiled using information from the 'Wetland delineation for a proposed clay mine on Portion 25 of the farm Nooitgedacht 436 JR', conducted by Spatial Ecological Consulting, 2014.

An **artificial** wetland area has been identified on the western side of the proposed site. This wetland is formed due to an old quarry (refer to Figure 14).

The main wetland on the site is a **natural** unchanneled valley bottom wetland that becomes channelled downstream of the site. The wetland is a peatland, with a dam located upstream of the site. Some development is present around the wetland including a few informal houses and paths. An old open mine quarry is present to the south of the wetland. It is unclear what was mined, but it appears to have been coal. A brick-making industry is present to the north of the site. The main wetland has a wide permanently and seasonally wet zone and a narrow temporary wetness zone. Seepage wetlands enter the main wetland from the north and the south of the main wetland. Large portions of the seepage wetlands are also permanently to seasonally wet.

Another **natural** seepage wetland is located on the eastern portion of the site (refer Figure 14). The seepage wetland is not connected to the main wetland by surface channels or watercourses, but a sub-surface connection likely exists. This seepage appears to be a shallow perched aquifer, which implies that there is not a large amount of water that collects in this wetland, however it is still protected under law.

The hydrology of the eastern and southern seepage areas are still fairly natural, with few impacts on present. The hydrology of the northern seepage is impacted upon by a few disturbances, including some development in the wetland and some infill in the wetland. This also resulted in some channel (UCVB) is affected by several dams located upstream of the site. The wetland may also be affected by the old excavation located to the south of the wetland. An artificial wetland is now present in the bottom of this excavation.

Refer to Table 18 below for the wetland units and sizes. Also refer to Figure 14 below for a map indicating the wetland in relation to the mining activities, as well as a 500m buffer around the wetland.

Table 18: Wetland units present on the site and their sizes

HGM Unit	HGM Type	Ha	Extent (%)
1	Valley-bottom without a channel	33.0	46
2	Hillslope seepage linked to a stream channel - South	8.4	12
3	Hillslope seepage linked to a stream channel - North	17.0	23
4	Hillslope seepage linked to a stream channel - East	14.0	19
Total		72.4	100



2.1.12.2 Fountain

A fountain is situated on Portion 24 of the farm Nooitgedacht. The fountain feeds an unnamed tributary of the Loopspruit. Fountains play an important role in supplying water to surface water resources in the area and are therefore essential to the existence of the sensitive ecological systems associated with these water resources.



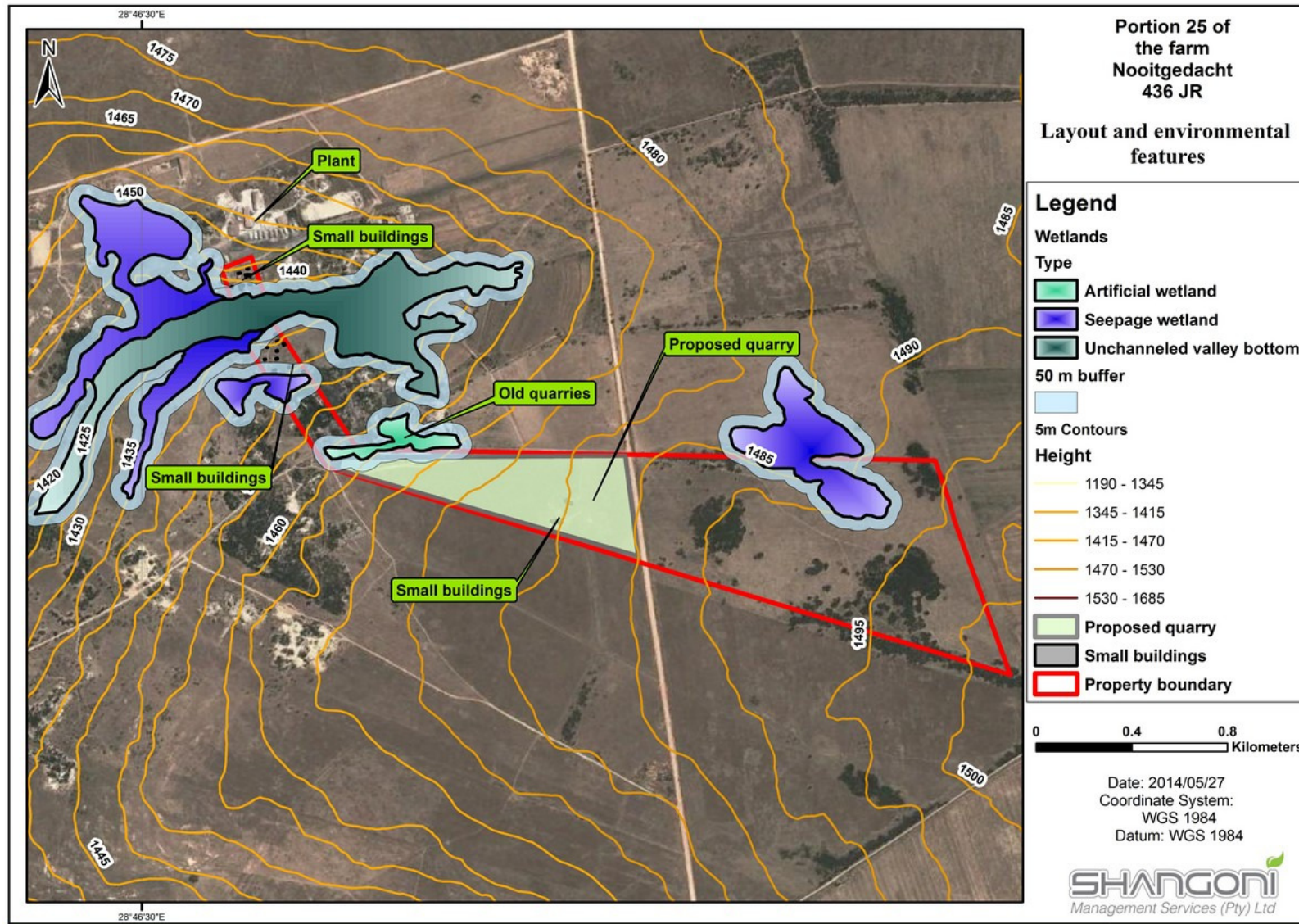


Figure 14: Map indicating mining activities and all environmental features

2.1.13 Sites of archaeological and cultural interest

The following information was extracted from a report titled “*Cultural Heritage Resources Impact Assessment for a Proposed Mining Licence on the farm Nooitgedacht 436 JR Portion 25*”, compiled by African Heritage Consultants CC.

The physical investigation of Portion 25 of Nooitgedacht revealed that most of the land has been previously intensively ploughed and planted, especially during the Second World War period when worldwide “dry-land” cultivation were undertaken to produce food for the “war-effort”. During “the Apartheid era” these planting practices were ceased as the general area was incorporated into what was then known as KwaNdebele, or the “homeland” of the Ndebele people. However the case may be, if any heritage estate were present on portion 25, it would have been destroyed during the years that the land was ploughed.

The investigation of the property revealed the possible existence of some form of “accommodation” on the eastern border of the property, but the “footprint” of this is so small that no chance exists to retrieve any logical information from that site. Located in the central portion of the property are modern homesteads that at present have no “heritage value”. Even so the “footprint” of the proposed new mine will have no impact thereon.

On the central southern border of the proposed mining “footprint” there occurs a “modern” cemetery containing some 15 graves. During the site visit it was observed that the cemetery is still visited and cared for by family. This, apart from its protection by the “Human Tissues” Act, is an important factor to be considered by both the mining company as well as from a “heritage” point of view.

Apart from the cemetery, there exist no heritage impediments for the proposed new mine.

2.1.14 Visual aspects

The proposed site is not visible from any residential areas in the vicinity as it is far removed from any such areas. No tourist routes are known to exist within visual range of the proposed site.

2.2 Socio-economic aspects

Sections 2.2.1 – 2.2.8 were compiled using information from the following documents:

- Thembisile Hani Local Municipality Final IDP Document 2011-2016
- 2012/2013 Integrated Development Plan Final Nkangala District Municipality
- Ecca Holdings Pty Ltd: Refractory Minerals Mine Social and Labour Plan, dated 2013-2017.



2.2.1 Population density, growth and location

The total population of the NDM was 1 226 500 in 2007 while THLM had approximately 278 518 according to the 2007 (StatSA 2007). The composition of the THLM indicates that 47.8% of population are males over the whole age spectrum. There is an increase distortion in gender composition in the age groups ranging between 15 and 45, where there are noticeably less males. This is indicative of males relocating to nearby Gauteng owing to better employment opportunities. The District’s population makes up 33.6% of Mpumalanga Province’s population. NDM’s share of the Mpumalanga population increased from 30.3% in 2001 to 33.7% in 2007. The black population formed the bulk of the district’s population with 90.9%, followed by the White population with 7.8%. Refer to Table 18 below for details of the population according to gender and race within the THLM.

Table 19: Population groups and gender

THLM		
Asian Group	Male	Female
Black	132 682	145 158
Coloured	266	269
Indian	116	0
White	9	88
Total	133 033	145 485

(Source: THLM IDP)

2.2.2 Major economic activities and sources of employment

The agricultural sector is an important economic activity in the Nkangala district. Mining and extensive farming predominantly occurs in the southern regions of the district. Extensive cattle and game farming is also promoted in the northern regions. Natural resources make a significant and direct contribution to the district economy.

The economic base of THLM’s local economy is dominated by community services, trade (formal & informal, with the latter performing higher than the former) and manufacturing. The remaining sectors are all relatively small. Agriculture has a high potential and needs to be nurtured. So is eco-tourism encompassed with rehabilitation of dilapidating tourist destinations and formation of a tourist belt.

The major economic activities within the Midvaal local municipality can be divided into primary, secondary and tertiary sectors. The main activities in the different sectors have been set out in Table 19 below.

Table 20: Sectoral contribution to regional GVA (constant prices), 2009

Sector Analysis		
Primary Sector	NDM	THLM
Agriculture	1.9%	0.7%



Sector Analysis		
Primary Sector	NDM	THLM
Mining	29.7%	4.3%
Secondary Sector		
Manufacturing	12.2%	6.3%
Electricity	8.9%	3.1%
Construction	2.1%	2.9%
Tertiary Sector		
Trade	8.9%	27.7%
Transport	8.8%	9.5%
Finance	13.5%	6.5%
Community services	14.0%	39.0%
Total	100%	100%

(Source: NDM IDP)

2.2.3 Unemployment estimate for the area

THLM is characterised by high levels of unemployment and poverty. Employment status for the population in the economically active group (15 to 65 years old) is as follows, about 36% of males and 24% females were employed in 2007. The higher percentage of unemployment among men compared to females in 2007 is a function of a higher percentage of females in the economically inactive group compared to males

2.2.4 Housing

There are several incidences of informal settlement in the Thembisile Hani Local Municipality area. This represents areas that have been informally/illegally developed, but which have not been formalised yet. In 2004 there was a total of 64 469 housing units of which 52 032 were classified as formal, and 12 437 as informal. This number increased by 17 119 units from 2001 to 2009, of which about 8062 units represented informal residential expansion, and 5731 units comprised informal infill development. The total estimated number of dwelling units in Thembisile Hani (2009) is about 81 588 units of which 54 934 are formal, and about 26 000 units informal.

2.2.5 Water supply

Thembisile Hani Local Municipality mainly depends on other Water Service Authorities for bulk water supply, since this municipality does not have its own source of water. Approximately 65 MI/day is supplied from various sources: 25 MI/day by Kungwini Local Municipality, 10 MI/day by Dr J S Moroka Local Municipality and 30 MI/day by Rand Water.



The potable water supply required by the mine is supplied by a borehole situated on the property on portion 22 of the farm Nooitgedacht 436JR. This water is used for domestic purposes. It is the responsibility of Ecca Samrec to ensure that the water quality is fit for domestic use.

2.2.6 Power supply

The area is mostly well served with electricity with more than 95% of the community having access to electricity. Eskom is the service provider (license holder) for house connections while the Thembisile Hani Local Municipality is responsible for street lighting and public lighting.



3. APPLICABLE LEGISLATION AND GUIDELINES

Title of legislation, policy or guideline	Aim of legislation, policy or guideline
The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)	To establish a Constitution with a Bill of Rights for the RSA.
Development Facilitation Act, 1995 (Act 67 of 1995)	To provide for planning and development.
Environment Conservation Act, 1989 (Act 73 of 1989)	To control environment conservation.
National Environmental Management Act, 1998 (Act 107 Of 1998).	To provide for the integrated management of the environment.
Promotion of Access to Information Act, 2000 , (Act No 2 of 2000 as amended)	To give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights, and to provide for matters connected therewith.
National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004)	To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development, to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government, for specific air quality measures, and for matters incidental thereto.
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)	To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998, the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from bio prospecting involving indigenous biological resources, the establishment and functions of a South African Biodiversity Institute, and for matters connected therewith.
National Environmental Management: Waste Act, 2008 (Act 59 of 2008).	To reform the law regulating waste management in order to protect health and the environment by providing for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.
National Environmental Management Waste Amendment Act (NEMWAA)(Act 26 of 2014)	To reform the law regulating waste management in order to protect health and the environment by providing for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.
Government Notice (GN) 926, dated November 2013 under the National Environmental Management: Waste Act (Act No 59 of 2008)	National Norms and Standards for the storage of waste.



Title of legislation, policy or guideline	Aim of legislation, policy or guideline
Environmental Impact Assessment Regulations, 2010 (Government Gazette No. 33306 of 18 June 2010)	Regulations pertaining to environmental impact assessments.
National Water Act (NWA) (Act 36 of 1998) and the GN704, dated June 1999	To control water management aspects.
National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003 as amended)	To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes, for the establishment of a national register of all national, provincial and local protected areas, for the management of those areas in accordance with national norms and standards, for intergovernmental co-operation and public consultation in matters concerning protected areas, and for matters in connection therewith.
Natural Heritage Resources Act, 1999 (Act 25 of 1999)	This legislation aims to promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed to future generations.
Conservation of the Agricultural Resources Act, 1983 (Act 43 of 1989)	To provide control over the utilization of the natural resources of the Republic in order to promote the conservation of soil, the water sources and the vegetation and the combating of weeds and invader plants, and for matters connected therewith.
Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)	To make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources and to provide for matters connected therewith.
Mineral and Petroleum Resources Development Regulations, 2004 (No. R527 of 23 April 2004, GG 26275)	
Mine Health and Safety Act, 1996 (Act 26 of 1996)	To promote employee health and safety.
Health Act, 1977 (Act 63 of 1977)	To promote public health.
Mpumalanga Nature Conservation Act, 1998 (Act 10 of 1998)	To control nature conservation.
Various by-laws of the Thembisile Hani Local Municipality	To regulate land use with the Thembisile Hani Local Municipality area.
Integrated Development Plan of Thembisile Hani Local Municipality	Broad spatial framework guidelines for the Thembisile Hani Local Municipality
Spatial Development Framework for the Thembisile Hani Local Municipality.	Spatially based policy guidelines whereby changes, needs and growth in the region can be managed to benefit the whole community.



3.1 National Environmental Management Act (Act 107 of 1998)

In terms of chapter 5 of the National Environmental Management Act 1998, as amended, and the Government Notice R543 published in Government Gazette 33306 of 18 June 2010, for the following listed activities R544, R545 and R546, and Section 21 of the National Water Act, 1998 (Act 36 of 1998) published in the Government Gazette No. 20119 on 4 June 1999 under Government Notice GN 704, an Environmental Impact Assessment is triggered. Refer to Table 20 for the proposed listed activities.

Table 21: Proposed listed activities

No and date of notice	Activity no	Description
R544, Listing Notice 1 of 18 June 2010	23(ii)	<p>Listed activity</p> <p><i>The transformation of undeveloped, vacant or derelict land to residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1hectare but less than 20 hectares.</i></p> <p>Project description</p> <p>Disturbance of more than 20 hectares of land for the establishment of a clay quarry.</p>
R545, Listing Notice 2 of 18 June 2010	5	<p>Listed activity</p> <p><i>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 the Notice No. 544 of 2010 or included in the list of waste management activities published in terms of the section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.</i></p> <p>Project description</p> <p><u>The following proposed project activities will require a licensing in terms of the National Water Act no 36 of 1998:</u></p> <ul style="list-style-type: none"> The proposed Nooitgedacht quarry will be situated within 500 meters of wetland area. Water abstracted from the proposed Nooitgedacht quarry will be stored in an old inactive quarry (Quarry 2). Quarry 2 is situated within 500 meters of a wetland area (Central Bushveld Group 3).



No and date of notice	Activity no	Description
		<ul style="list-style-type: none"> Quarry 2 is an old mined out quarry situated on Portion 24 and Portion 25 of the farm Nooitgedacht. Water from the proposed quarry will be pumped to Quarry 2 for disposal. An average quantity of 2690 m³ /month of water will be pumped from the Nooitgedacht quarry into Quarry 2. Water will be pumped from the proposed quarry for the safe continuation of mining activities. An average of 2 690 m³ of water per month will be abstracted.

3.2 National Water Act (Act 36 of 1998)

This section provides information in support of the Water Use License Application (hereafter referred to as the WULA) in terms of Chapter 4 of the National Water Act (Act 36 of 1998), for the relevant water uses under Section 21 of the said Act.

The following activities constituting water uses under Section 21 of the NWA (Act No 36 of 1998) form part of the WULA. Refer to Table 21 below.

Table 22: Water use activities applied for

Relevant section	Activity description
Section 21 (c) Section 21(i)	<p><u>Water Use Activity</u> Impeding or diverting the flow of water in a watercourse and Section 21(i) of the NWA: altering the bed, banks, course or characteristics of a watercourse.</p> <p><u>Project description</u> The proposed Nooitgedacht quarry will be situated within 500 meters of wetland area.</p> <p>Water abstracted from the proposed Nooitgedacht quarry will be stored in an old inactive quarry (Quarry 2). Quarry 2 is situated within 500 meters of a wetland area (Central Bushveld Group 3).</p>
Section 21(g)	<p><u>Water Use Activity</u> Disposing of waste in a manner which may detrimentally impact on a water resource.</p> <p><u>Project description</u> Quarry 2 is an old mined out quarry situated on Portion 24 and Portion 25 of the farm Nooitgedacht. Water from the proposed quarry will be pumped to Quarry 2 for disposal. An average quantity of 2690 m³ /month of water will be pumped from the Nooitgedacht quarry into Quarry 2.</p>



Relevant section	Activity description
Section 21(j)	<p><u>Water Use Activity</u> Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.</p> <p><u>Project description</u> Water will be pumped from the proposed quarry for the safe continuation of mining activities. An average of 2 690 m³ of water per month will be abstracted.</p>



4 PUBLIC PARTICIPATION PROCESS

4.1 Introduction

A Public Participation Process (PPP) is a requirement in terms of the 2010 EIA Regulations of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and it forms an integral part of any EIA process.

This section provides information pertaining to the PPP that was conducted by Shangoni Management Services during this particular assessment.

The purpose of this process is to gather information from the community and relevant Stakeholders that could ultimately affect the decision-making process concerning the Construction, Operational and Closure Phases of the proposed project. The community and public have been identified as I&APs and have been given the opportunity to participate in this process. Their comments, whether positive or negative, will influence the decision of the Authorities and the developer's final actions.

4.2 Objectives of the PPP

The PPP has the following objectives:

- To inform I&APs as well as all Stakeholders of the proposed development;
- To provide an opportunity for I&APs and Stakeholders to raise environmental issues or concerns and make suggestions;
- To promote transparency and an understanding of the project and its consequences; and
- To serve as a structure for liaison and communication with I&APs and Stakeholders.

To summarise, the objective of the on-going PPP is to promote openness and transparency concerning the proposed wastewater treatment works for the duration of the project. The process should by no means be regarded as a vehicle to temper opposition or objections. Any conclusions agreed upon must be socially, financially and technically acceptable and feasible in order to meet the requirements of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), and the vision of Ecca Holdings.

4.3 The guidelines followed for the PPP

The PPP for this project was conducted by Shangoni Management Services and undertaken strictly according to the guidelines in terms of the National Environmental Management Act (NEMA), No. 107 of 1998, Chapter 6:



4.4 Public participation process

- (1) This regulation only applies in instances where adherence to the provisions of this regulation is specifically required.
- (2) The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by-
 - (a) fixing a notice board at a place conspicuous to the public at the boundary or on the fence of -
 - (i) the site where the activity to which the application relates is or is to be undertaken; and
 - (ii) any alternative site mentioned in the application;
 - (b) giving written notice to -
 - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
 - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
 - (v) the municipality which has jurisdiction in the area;
 - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vii) any other party as required by the competent authority;
 - (c) placing an advertisement in –
 - (i) one local newspaper; or
 - (ii) any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
 - (d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in sub regulation (c) (ii); and
 - (e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to
 - (i) illiteracy;
 - (ii) disability;
 - (iii) or any other disadvantage.
- (3) A notice, notice board or advertisement referred to in sub regulation (2) must
 - (a) give details of the application which is subjected to public participation; and
 - (b) state-



- (i) that the application has been submitted to the competent authority in terms of these Regulations, as the case may be;
 - (ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
 - (iii) the nature and location of the activity to which the application relates;
 - (iv) where further information on the application or activity can be obtained; and
 - (vi) the manner in which and the person to whom representations in respect of the application may be made.
- (4) A notice board referred to in sub regulation (2) must-
- (a) be of a size at least 60cm by 42cm; and
 - (b) display the required information in lettering and in a format as may be determined by the competent authority.
- (5) Where deviation from sub regulation (2) may be appropriate, the person conducting the public participation process may deviate from the requirements of that sub regulation to the extent and in the manner as may be agreed to by the competent authority.
- (6) Where a basic assessment report, scoping report or environmental impact assessment report as contemplated in regulations 22, 28 and 31 respectively is amended because it has been rejected or because of a request for additional information by the competent authority, and such amended report contains new information, the amended basic assessment report, scoping report or environmental impact assessment report must be subjected to the processes contemplated in regulations 21, 27 and 31, as the case may be, on the understanding that the application form need not be resubmitted.
- (7) When complying with this regulation, the person conducting, the public participation process must ensure that-
- (a) information containing all relevant facts in respect of the application is made available to potential interested and affected parties; and
 - (b) participation by potential interested and affected parties is facilitated in such a manner that all potential interested and affected parties are provided with a reasonable opportunity to comment on the application.
- (8) Unless justified by exceptional circumstances, as agreed to by the competent authority, the applicant and EAP managing the environmental assessment process must refrain from conducting any public participation process during the period of 15 December to 2 January.



4.5 Public participation process followed

The following PPP was conducted for the proposed clay quarry mining activities:

- Identification of key Interested and Affected Parties (all adjacent landowners);
- Identification of key stakeholders;
- Informing the key stakeholders of the process by means of correspondence;
- Placement of a press notice in the StreekNuus, informing the public of the process;
- Placement of site notices at the site;
- Correspondence with I&APs and stakeholders and the addressing of their comments;
- The draft scoping report was submitted to stakeholders and made available electronically for registered I&APs for commenting;
- Comments received on the draft scoping report was incorporated into the final scoping report which was submitted to MDEDET together with the plan of study; and
- Comments received from MDEDET are incorporated into this EIA report.

4.5.1 Identification & registration of I&APs on a database

Through networking and advertising, I&APs were registered on a database. Shangoni ensured that individuals or organisations from an institutional as well as a geographical point of view were identified.

Geographically, Shangoni focused on nearby or adjacent landowners, communities and structures that represents them. Institutionally, the focus was on those organisations or individuals that may influence policies and decisions or make a contribution to the project. Not all of these organisations were necessarily in the direct project sphere of impact.

4.5.2 Information to I&APs

The interested and affected parties which included the adjacent land owners as well as certain Organs of State were informed of the project via newspaper advertisements, notice boards and registered notification letters. A period of 30 days were allowed for any person who feels that he or she is a interested and affected party to register as such.

4.5.3 Notification of key stakeholders and adjacent land owners

Refer to Table 22 below for a list of identified stakeholders and Table 23 for list of identified adjacent landowners.

Table 23: Stakeholders identified

Name	Farm/Association	Postal Address	Contact Details
Ms. Nelisiwe Sithole	Department of Agriculture, Rural	Private Bag X11219	Tel:013 766 6067/6068 Fax:013 766 8429



Name	Farm/Association	Postal Address	Contact Details
	Development and Land Administration	Nelspruit 1200	Email: sitholenl@mpg.gov.za
Mr. Stemmer Mnindwa Ndala	Department of Agriculture, Rural Development and Land Administration	Private Bag X11219 Nelspruit 1200	Tel:013 766 6067/6068 Fax:013 766 8429 Email: ndalasm@mpg.gov.za
Madi Moloto	Department of Water Affairs	Private Bag X10580 Bronkhorstspuit 1020	Tel: 013 932 2061/ Cell: 082 887 4332 Email: molotom@dwa.gov.za Fax:013 932 2071
Mr Mathe Boetie	Nkangala District Municipality	PO Box 437 Middelburg 1050	Tel: 013 249 2134 Cell: 082 072 9790 Email: matheb@nkangaladm.org.za
Mr. Phillip Hine	South African Heritage Resources Agency (SAHRA)	PO Box 4637 Cape Town 8000	Tel:021 462 4502 Fax: 021 462 4509 Email: phine@sahra.org.za
Mr T. Sindane	Thembisile Hani local municipality	Private Bag X4041 Mpumalanga 0458	Cell: 082 765 1577 Fax: 013 665 6060 Email: okamageba2@gmail.com
Ms Dineo Tswai Ms Okwethu Fakude	Department of Economic Development Environmental and Tourism	CnrRosmead and Ryan Street Klipfontein Witbank 1035	Tel: 013 692 5806
Ms Annamie Duvenage	Bronkhorstspuit and Wilge River Conservation Association	P O Box 691 Bronkhorstspuit 1020	Cell: 082 466 2384 Email: kobus.wach74@ymail.com



Table 24: Adjacent landowners identified

Name	Organisation/Farm	Postal Address	Contact details
G. Venter		Po Box 549 Bronkhortspruit 1020	078 637 3195
Johanna Mtsweni	Mine ptn 25	Po Box 248 Bronkhortspruit 1020	082 758 2899
Petros Mtsweni	Mine ptn 25	Po Box 248 Bronkhortspruit 1020	082 758 2899
Geelboy Moeti	Mine ptn 25	Po Box 248 Bronkhortspruit 1020	071 2977188
Sitembreere Johannes Nghodela	Nooitgedacht ptn 152	Po Box 0454 Bronkhortspruit 1020	084 371 4456

4.5.4 Information to stakeholders

The stakeholders and adjacent landowners received a notification letter, attached to the letter was a background information document (BID) that was accompanied by a map. This information pack was sent via registered mail on the 28th of May 2013 and via email to some of the stakeholders. Refer to Figure 16 for a copy of the BID sent, Figure 17 and 18 for proof of the BID sent via post, and Figure 19 for proof of BID sent via e-mail.

4.5.5 Registering stakeholders

A contact database was opened for all registered interested and affected parties. The register includes the name of the I&AP, Postal Address, Physical Address, E-mail, Tel, Cell and Fax numbers as well as designation and the company name.

4.5.6 Press Notices

Newspaper advertisements were placed in the Streeknuus on the 31st of May 2013. Refer to Figure 20 for proof of the advertisement.

4.5.7 Placement of public notices

Ten Notice boards were placed in and around the project site at strategic location to be as visible as possible. Refer to Figure 21 for a copy of site notice and to Table 24 for site notices placement areas.



NOTICE OF APPLICATION FOR ENVIRONMENTAL IMPACT ASSESSMENT, MINING RIGHT AND WATER USE LICENSE

Notice is hereby given that an application for environmental authorisation in terms of the Environmental Management Act (EMA) of 2002, Regulations of 2013 (regulations in terms of chapter 5 of the National Environmental Management Act, no 107 of 1989, as amended (NEMA) has been lodged with the Mpumalanga Department of Economic Development, Environment and Tourism (DEDET), an application for a mining right in terms of the Mineral Resources Development Act, no 28 of 2002 (MRDA) has been lodged with the Mpumalanga Department of Mineral Resources (DMR), and an application for a water use license (WULA) in terms of section 31 of the National Water Act no 36 of 1998 (NWA) has been lodged with the Mpumalanga Department of Water Affairs (DWA).

LOCATION OF PROPOSED ACTIVITIES
Portion 25 of farm Nooitgedacht 436 JR, refers to the locality map below.

Mining Right Ref No
MP 325/1/22/2460 MR

EIA Ref No
17/25JN-248

DESCRIPTION OF PROPOSED PROJECT
The project will consist of the construction of an open pit for mining of the mineral refractory and ceramic clays. The proposed mining method is shallow open-pit mining. This will result in transformation of the proposed site to mining use. Topsoil, where available, shall be removed by bow scraper and shall be stored separately. Blasted overburden shall be removed by bulldozers and employed as backfill immediately after blasting of the clay. It shall be removed by loader and transported by truck to the sorting area. Cribbing and sorting shall be done manually, where after the mine product shall be transported to the downstream stockpile area some 2km away. Where it is necessary two benches of 2-3m high shall be

mined in the clay horizon. Water shall be extracted from the pit for the safe mining of the refractory and this activity shall require a water use license application.

EIA ACTIVITIES APPLIED FOR
The activity requires an application subject to a Scoping and EIA Process as required by sections 25 to 35 of GMR, 543 of the EIA Regulations of 2010.

398, 166, 2049	The construction of the underground road or elevated road to residential, industrial or commercial, recreational, urban area and where the total area to be transformed is bigger than 1 ha but less than 5 ha.
398, 166, 2049	The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of the Environmental Management Act, no 107 of 1989, as amended.
398, 166, 2049	The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of the Environmental Management Act, no 107 of 1989, as amended.



PROJECT NAME
The establishment of an open pit for mining of refractory and ceramic clays on portion 25 of the farm Nooitgedacht 436 JR, Mpumalanga

APPLICANT NAME
Ecce Holdings (Pty) Ltd

emissions, pollution or effluent and which is not 544 of 2010 or included in the list of waste management activities published in terms of the Environmental Management Act no 59 of 2006 (NEMWA) in which case that Act will apply.
--

EXPECTED WATER USE ACTIVITIES APPLIED FOR
The following activities constituting water uses under section 21 of the NWA no 36 of 1996 and will form part of the WULA.

Section 21(a)	Spring water from a water resource.
Section 21(b)	Storage of clean water.
Section 21(c)	Disposal of waste in a manner which does not constitute an unnecessary impact on a water resource.
Section 21(d)	Removing, discharging or disposing of water in a manner which does not constitute an unnecessary impact on the safety of people.

SCOPE OF PROJECT
The EIA process will include:

- Submission of EIA application forms to DEDET (completed in interest and Affected Parties (I&APs).
- Submission of scoping report to DEDET following consultation with I&APs.
- Completion and submission of an EIA report and Environmental Management Plan (EMP) to DEDET following consultation with I&APs.

The mining right application will include:

- Submission of mining right application forms to DMR.
- Submission of scoping data of application acceptance completed.
- Completion of an EMP to be submitted to DMR on or before 3rd of July.

The WULA process will include:

- Submission and submission of license forms to DWA.
- Consultation with I&APs.
- Completion and submission of an INVULA technical report to DWA.

All three applications will include the required consultation process which will be undertaken combined for all three processes.

KEY DATES FOR CONSULTATION PROCESS

The project will be advertised in the StarWeek Newspaper on the 25th May 2013, followed by comments period which will end on the 28th June 2013. A report addressing all comments and concerns will be compiled and attached as an addendum to the EMPS.

INVITATION TO PARTICIPATE

Should you wish to be included in the register of I&APs or comment on this application, please submit your name, contact information, and interest in the matter in writing to the address below no later than 28 June 2013.

ENVIRONMENTAL ASSESSMENT PRACTITIONERS

Shanconi Management Services (Pty) Ltd
PO Box 74728, Lynnwood Ridge, Pretoria, 0040
Contact Person: Ms Monique Mokhele
Tel: (012) 807 7036, Cell: 079 832 4930, Fax: (012) 807 1074, Favo to E-mail: 086 619 7659.
E-mail: kshandani@shanconi.co.za. For online participation go to www.shanconi.co.za and click on Public Participation.

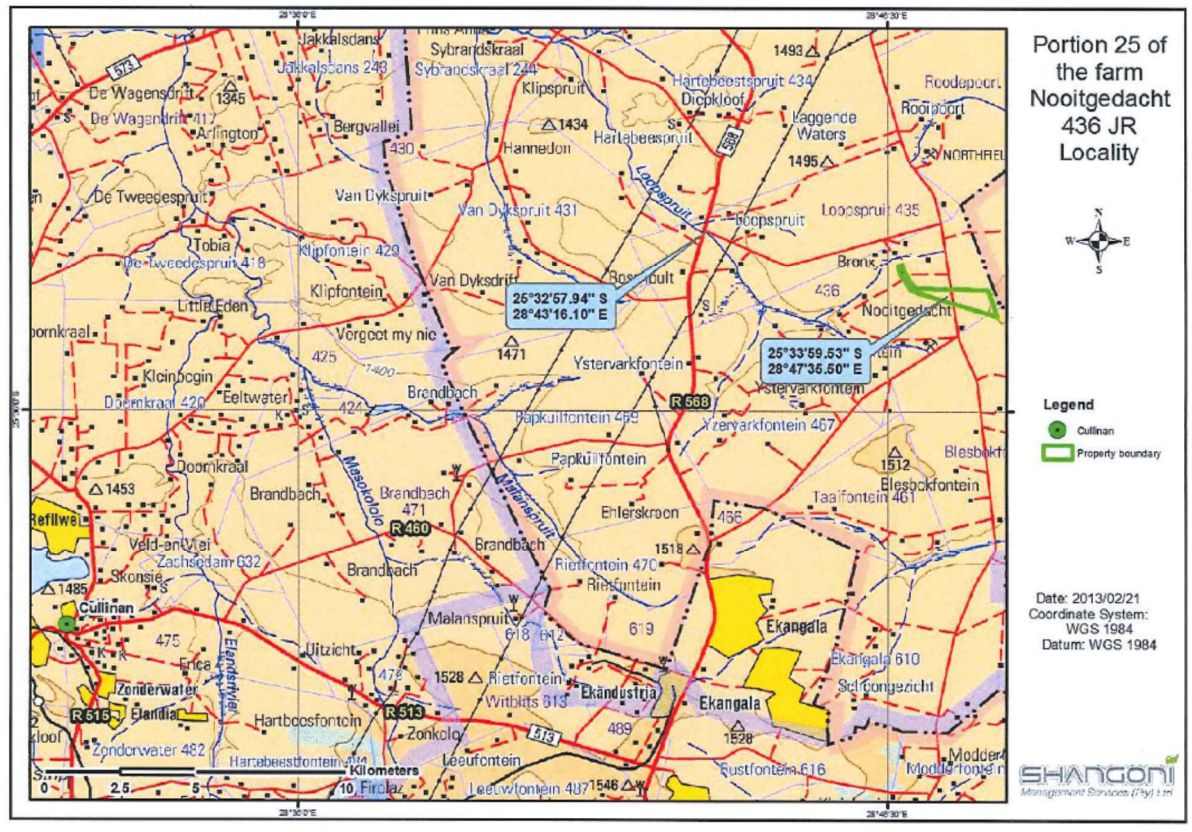


Figure 15: Background information document

List of REGISTERED LETTERS
Lys van GEREGISTREERDE BRIEWE
 (with an insurance option/met 'n versekeringsopsie)

Full tracking and tracing/Volledige volg en spoor



Name and address of sender:
 Naam en adres van afsender: Shangoni Management Services (Pty) Ltd
PO Box 74720 Lynnwood Ridge 0040

Enquiries/Navrae
 Toll-free number
 Tolvry nommer
0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-kliëntafskrif
1	PO Box 549 Bronchoesterspruit 1020 Ci. Venter					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 769 320 706 ZA CUSTOMER COPY 301028R
2	PO BOX 248 Bronchoesterspruit 1020 Jananna Mtsweni					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 769 320 697 ZA CUSTOMER COPY 301028R
3	PO BOX 248 Bronchoesterspruit 1020 Mr. Petros Mtsweni					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 769 320 723 ZA CUSTOMER COPY 301028R
4	PO BOX 248 Bronchoesterspruit 1020 Mr. Geelboy Mooki					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 630 031 396 ZA CUSTOMER COPY 301028R
5	PO. BOX 0451 Bronchoesterspruit 1020 Mr. Johannes Ngodela					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 630 031 382 ZA CUSTOMER COPY 301028R
6	Netudza Fene PO BOX 1391 KwaMahlangu 1022 Nobengweni John Mahlangu					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 769 320 745 ZA CUSTOMER COPY 301028R
7	Dept of Economic Dev, Environmental and Tourism Corner Rosemead & Lynn Street Upperton Witbank 1035 Ms. Dineo Tsuani					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 769 320 737 ZA CUSTOMER COPY 301028R
8	Membelle Hani Local Municipality Private bag 14041 Mamelangi 0458 Mr. M. S. Sindane					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 769 320 710 ZA CUSTOMER COPY 301028R
9	Nkangaki District Municipality PO BOX 487 Middelburg 1050 Mr. Mathe Buene					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 769 320 516 ZA CUSTOMER COPY 301028R
10	SAHRA: Archaeology Department PO Box 4367 Cape Town 8002					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 769 320 520 ZA CUSTOMER COPY 301028R
Number of letters posted Getal briewe gepos		Total Totaal	R	R	R	R

Signature of client
 Handtekening van kliënt _____

Signature of accepting officer
 Handtekening van aanneembeampte _____

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R 2000,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.



701248

Figure 16: Proof of BID sent via post

List of REGISTERED LETTERS
Lys van GEREGISTREERDE BRIEWE
 (with an insurance option/met 'n versekeringsopsie)



Full tracking and tracing/Volledige volg en spoor

Name and address of sender:
 Naam en adres van afsender: Shangoni Management Services
(P.T.) Ltd., P.O. Box 74726, Lynnwood
Ridge 2040

Enquiries/Navrae
 Toll-free number
 Tolvry nommer
0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-kliëntafskrif
1	<u>DARDLA: Ms Melissa Simole</u> <u>Private Bag 211219, Halfway, 1200.</u>					REGISTERED LETTER <small>(with a domestic insurance option)</small> <small>Postnet 0800 111 502</small> <small>RD 769 320 564 ZA</small> CUSTOMER COPY 301028R
2						
3						
4						
5						
6						
7						
8						
9						
10						
Number of letters posted Getal briewe gepos		Total	R	R	R	R

Signature of client
 Handtekening van kliënt _____
 Signature of accepting officer
 Handtekening van aanneembeampte _____

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R 2000,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.



701248

Figure 17: Proof of BID sent via post



Khosi

From: Khosi [khosi@shangoni.co.za]
Sent: 28 May 2013 11:45 AM
To: 'malobam@dwa.gov.za'
Cc: 'moletem@dwa.gov.za'
Subject: NOTICE OF APPLICATION FOR ENVIRONMENTAL IMPACT ASSESSMENT AUTHORITY, MINING RIGHT AND WATER USE LICENSE
Attachments: Background information document.docx

Department of Water Affairs

Attention: Mr/Ms M. Maloba

NOTICE OF APPLICATION FOR ENVIRONMENTAL IMPACT ASSESSMENT AUTHORITY, MINING RIGHT AND WATER USE LICENSE

Notice is hereby given that an application for environmental authorisation in terms of the EIA Regulations of 2010 (Regulations in terms of Chapter 5 of the National Environmental Management Act of no 107 of 1998, as amended) has been lodged with the Mpumalanga Department of Economic Development, Environment and Tourism: an application for a mining right in terms of the section 22 of the Mineral and Petroleum Resources Development Act no 28 of 2000 has been lodged with the Department of Mineral Resources and an application for a water use license in terms of Section 21 of the National Water Act no 36 of 1998 has been lodged with the Department of Water Affairs. The activity requires an application subject to a Scoping and Environmental Impact Assessment Process as required by Sections 26 to 35 of Government Notice R. 543 of the EIA Regulations of December 2010.

Ref. Number: 17/2/SN-248

Applicant: Ecce Holdings (Pty) Ltd

Project Name: The establishment of an open pit for mining of refractory and ceramic clays on portion 25 of the farm Nooitgedacht 436JR, Mpumalanga

Project Location: Portion 25 of farm Nooitgedacht 436JR

Project Description: The project will entail construction of an open pit for mining of the minerals refractory and ceramic clays. The proposed mining method is shallow opencast mining. This will result in transformation of the proposed site to mining use. Topsoil, where available, shall be removed by bowl scraper and shall be stored separately. Blasted overburden shall be removed by bulldozer employing the rollover system in order to backfill the open pit left behind immediately. After blasting of the clay it shall be removed by loader and transported by truck to the sorting area. Cobbling and sorting shall be done manually where after the mine product shall be transported to the downdraft kiln stockpile area some 8km away. Where it is necessary two benches of 2-3m high shall be mined in the clay horizon. Water shall be extracted from the pit for the safe mining of the minerals and this activity shall require a water use license application.

1

Environmental impact assessment activities applied for

GN. No. R544 Listing Notice 1 of 18 June 2010	Activity no 23(ii)	The transformation of undeveloped, vacant or derelict land to residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1hectare but less than 20 hectares.
GN. No. R545, Listing Notice 2 of 18 June 2010	Activity no 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 the Notice No. 544 of 2010 or included in the list of waste management activities published in terms of the section 19 of the National Environmental Management: Waste Ac no 59 of 2008 in which case that Act will apply

In terms of section 21 water uses of the National Water Act (Act no 36 of 1998) the following water use activities will be applied for:

Water Activities applied for:

Section 21(a):	Taking water from a water resource.
Section 21(b):	Storage of clean water.
Section 21(g):	Disposing of waste in a manner which may detrimentally impact on a water resource.
Section 21(j):	Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people

Invitation to participate: Should you wish to be included in the register of Interested and Affected Parties or comment on this application, please submit your name, contact information, and interest in the matter in writing to the above address not later than 26 June 2013.

Environmental Assessment Practitioner:

Shangoni Management Services (Pty) Ltd.
 PO Box 74726, Lynnwood Ridge, Pretoria, 0040.
 Contact Person: Mrs Nomkhosi Molehlo
 Tel: (012) 807 7036, Cell: 079 892 4930, Fax: (012) 807 1014,
 E-mail: khosi@shangoni.co.za, For Online Participation go to www.shangoni.co.za and click on Public Participation.



Nomkhosi Molehlo

2

Figure 18: Proof of BID sent via email



school news/skolenuus

Dupie gladde bekke Lesedi's boys and girls club

DIE graad 4- en 6-leerlinge van Laerskool Du Preez van Wyk het op Maandag, 6 Mei die geleentheid gehad om in Engels te redeneer, met die graad 5- en 7-leerlinge wat Woensdag, 8 Mei

aan die beurt gekom het. Die toesprake was van hoogstaande gehalte en was vir almal in die gehoor stof tot nadenke. Baie geluk aan al die deelnemers – "You are the best!"

THE BEM/GEM Club at Lesedi Secondary School is a group of girls and boys education movement. The group has recently embarked on a recruiting drive aimed at mainly grade 8 and 9 learners.

Among the projects the group is involved in an anti bullying campaign, cleanliness, awareness of the negative implications of teenage pregnancies and substance abuse.



Die graad winners wat in Engels geredeneer het is (agter) Aldo Landsberg (graad 7), en (voor) Carlmari Enslin (graad 5), Chani Langenhoven (graad 4) en Jacques Lombard (graad 6).



The BEM/GEM group of Lesedi Secondary School.

Soccer boys shine

PARTICIPATING in the Mamelodi Sundowns Schools' sponsored football league; the Bronkhorstspuit Primary School U/13 Football Team won the Cluster League that was played against seven other primary schools.

This phase of the competition was played between April and August 2012. The boys in red and black proceeded to beat everyone and win the Gauteng North District's Mini-League that was played by three schools, each being winners in their cluster in Gauteng North (D1) on 31

October 2012. As Gauteng North District Champions, our boys continued to make our school, the District and the whole community of Bronkhorstspuit proud by emerging as the silver medallists in the regional finals that were hosted by Tshwane North District at Soshanguwe Giant Stadium on 30 November 2012. Early this year, a runner up prize money (cheque) of R10, 000 was presented to the school by Mamelodi Sundown's representative, Mr Ledwaba, for this achievement.



The Bronkhorstspuit Primary School U/13 Football Team.

NOTICE OF APPLICATION FOR ENVIRONMENTAL IMPACT ASSESSMENT AUTHORIZATION, MINING RIGHT AND WATER USE LICENSE

Notice is hereby given that an application for environmental authorisation in terms of the EIA Regulations of 2010 (Regulations in terms of Chapter 5 of the National Environmental Management Act of no 107 of 1998, as amended) has been lodged with the Mpumalanga Department of Economic Development, Environment and Tourism (DEDET); an application for a mining right in terms of the section 22 of the Mineral and Petroleum Resources Development Act no 28 of 2000 has been lodged with the Mpumalanga Department of Mineral Resources and an application for a water use license in terms of Section 21 of the National Water Act no 36 of 1998 has been lodged with the Mpumalanga Department of Water Affairs. The activity requires an application subject to a Scoping and Environmental Impact Assessment Process as required by Sections 26 to 35 of Government Notice R. 543 of the EIA Regulations of December 2010.

Applicant: Ecce Holdings (Pty) Ltd

Project Name: The establishment of an open pit for mining of refractory and ceramic clays on portion 25 of the farm Nootgedacht 436JR, Mpumalanga

Project Location: Portion 25 of farm Nootgedacht 436JR

Mining right ref nr: MP 30/5/1/2/2/460 MR

Environmental impact assessment ref nr: 17/2/3N-248

Project Description

The project will entail construction of an open pit for mining of the minerals refractory and ceramic clays. The proposed mining method is shallow opencast mining. This will result in transformation of the proposed site to mining use. Topsoil, where available, shall be removed by bowl scraper and shall be stored separately. Blasted overburden shall be removed by bulldozer employing the rollover system in order to backfill the open pit left behind immediately. After blasting of the day it shall be removed by loader and transported by truck to the sorting area. Cobbing and sorting shall be done manually where after the mine product shall be transported to the downdraft kiln stockpile area some 6km away. Where it is necessary two benches of 2-3m high shall be mined in the clay horizon. Water shall be extracted from the pit for the safe mining of the minerals and this activity shall require a water use license application.

Water activities applied for:

- Section 21(a): Taking water from a water resource.
- Section 21(b): Storage of clean water.
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource.
- Section 21(j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

Environmental impact assessment activities applied for:

- GN. No. R544 Listing Notice 1 of 18 June 2010
- Activity no 23(ii)
- The transformation of undeveloped, vacant or derelict land to residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1hectare but less than 20 hectares.
- GN. No. R545, Listing Notice 2 of 18 June 2010
- Activity no 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 the Notice No. 544 of 2010 or included in the list of waste management activities published in terms of the section 19 of the National Environmental Management: Waste Act no 59 of 2008 in which case that Act will apply

Invitation to participate

Should you wish to be included in the register of Interested and Affected Parties or comment on this application, please submit your name, contact information, and interest in the matter **in writing** to the address below, not later than **29 June 2013**.

Environmental Assessment Practitioner

Shangoni Management Services (Pty) Ltd;
 PO Box 74726, Lynnwood Ridge, Pretoria, 0040;
 Contact Person: Ms Nomkhosi Mohlahlo;
 Tel: 012 807 7036, Cell: 079 892 4930, Fax: 012 807 1014, Fax to E-mail: 086 639 7956;
 E-mail: khosi@shangoni.co.za;
 For online participation go to www.shangoni.co.za and click on Public Participation.

Figure 19: Proof of advert placed



NOTICE OF APPLICATION FOR ENVIRONMENTAL IMPACT ASSESSMENT AUTHORISATION, MINING RIGHT AND WATER USE LICENSE

Notice is hereby given that an application for environmental authorisation in terms of the EIA Regulations of 2010 (Regulations in terms of Chapter 5 of the National Environmental Management Act of no 107 of 1998, as amended) has been lodged with the Mpumalanga Department of Economic Development, Environment and Tourism (DEDET); an application for a mining right in terms of the section 22 of the Mineral and Petroleum Resources Development Act no 28 of 2000 has been lodged with the Department of Mineral Resources and an application for a water use license in terms of Section 21 of the National Water Act no 36 of 1998 has been lodged with the Department of Water Affairs. The activity requires an application subject to a Scoping and Environmental Impact Assessment Process as required by Sections 26 to 35 of Government Notice R. 543 of the EIA Regulations of December 2010.

Applicant: Ecce Holdings (Pty) Ltd

Project Name: The establishment of an open pit for mining of refractory and ceramic clays on portion 25 of the farm Nooitgedacht 436JR, Mpumalanga

Project Location: Portion 25 of farm Nooitgedacht 436JR

Mining right ref nr: MP 30/5/1/2/2/460 MR

Environmental impact assessment ref nr: 17/2/3N-248

Project Description

The project will entail construction of an open pit for mining of the minerals refractory and ceramic clays. The proposed mining method is shallow opencast mining. This will result in transformation of the proposed site to mining use. Topsoil, where available, shall be removed by bowl scraper and shall be stored separately. Blasted overburden shall be removed by bulldozer employing the rollover system in order to backfill the open pit left behind immediately. After blasting of the clay it shall be removed by loader and transported by truck to the sorting area. Cobbing and sorting shall be done manually where after the mine product shall be transported to the downdraft kiln stockpile area some 6km away. Where it is necessary two benches of 2-3m high shall be mined in the clay horizon. Water shall be extracted from the pit for the safe mining of the minerals and this activity shall require a water use license application.

Water activities applied for:

Section 21(j):	Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people
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Environmental impact assessment activities applied for:

GN. No. R544 Listing Notice 1 of 18 June 2010	Activity no 23(ii)	The transformation of undeveloped, vacant or derelict land to residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1hectare but less than 20 hectares.
GN. No. R545, Listing Notice 2 of 18 June 2010	Activity no 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 the Notice No. 544 of 2010 or included in the list of waste management activities published in terms of the section 19 of the National Environmental Management: Waste Ac no 59 of 2008 in which case that Act will apply

Invitation to participate

Should you wish to be included in the register of Interested and Affected Parties or comment on this application, please submit your name, contact information, and interest in the matter **in writing** to the address below, not later than **29 June 2013**.

Environmental Assessment Practitioner

Shangoni Management Services (Pty) Ltd;
 PO Box 74726, Lynnwood Ridge, Pretoria, 0040;
 Contact Person: Ms Nomkhosi Mohlahlo;
 Tel: 012 807 7036, Cell: 079 892 4930, Fax: 012 807 1014, Fax to E-mail: 086 639 7956;
 E-mail: khosi@shangoni.co.za;
 For online participation go to www.shangoni.co.za and click on Public Participation.

Figure 20: Copy of site notice



Table 25: Areas where site notices were place

 <p>Photo 1: Bronkhorstspuit and Vlaklaagte T-junction</p>	 <p>Photo 2: community shop next to the mine</p>
 <p>Photo 3: MSB Transport R568</p>	 <p>Photo 4: Mine b gate</p>
 <p>Photo 5: Mine turn off</p>	 <p>Photo 6: New site turn off</p>





Photo 7: T-junction Nooitgedacht road and R568 (2 signs)

Photo 8: T-Junction R568 (2 signs)

4.5.8 Issuing I&APs and stakeholders with the Scoping report

The Draft Environmental Scoping Report (ESR) was sent to all registered Organs of State. The review period was from 24 August 2013 to 25 October 2013. The draft ESR was also available on the Shangoni website (www.shangoni.co.za) for review.

4.5.9 Details regarding the manner in which the issues raised were addressed

All questions raised within comments period were addressed. Refer to Table 25 below for all correspondence up to date.

Table 26: Comments and concerns from I&APs

Date	Comment	Response
29 May 2013	Ms Annamie Duvenage who is a representative of Bronkhorstspuit and Wilge River Conservation Association asked through Email that Bronkhorstspuit and Wilge River Conservation Association be registered as I&AP and that a BID with readable map indicating portions of the farm, all roads, waterways and wetlands be sent through.	In response Shangoni registered Wilge River Conservation Association as an I&AP. A notification letter was emailed through and in that email a background information document with a map was attached. This map did not indicate the wetland as per the wetland delineation study. The draft EAIR was subsequently made available to I&APs. The wetland delineation study as well as the wetland map were included in the mentioned report.
29 May 2013	Ms Annamie Duvenage who is a representative of Bronkhorstspuit and Wilge River Conservation Association asked the following questions through email: “Cobbing and sorting shall be done manually where after the mine product shall be transported to the downdraft kiln stockpile area some 6km away”	In response, Shangoni sent through an email answering all the questions that were posed by an I&AP and a DMR acceptance letter as well as a scoping report which was done in terms of the MPRDA.



Date	Comment	Response
	<p>Ms Annamie Duvenage: Please inform where this stockpile is? Is it on the same farm?</p>	<p>Shangoni responded: The material gets cobbled and sorted in the Quarry, the waste to be back filled and transported to the Down draught kilns 1km away. It is not stockpiled as the clay tends to weather down quickly. It gets packed immediately into the Kilns for processing / calcination. Refractory Minerals is located just next to Portion 25 on Portion 22 of Nooitgedacht.</p>
	<p>Ms Annamie Duvenage: Who is the buyer of the product?</p>	<p>Shangoni provided the following information: VEREENIGING REFRACTORIES (Pty) Ltd., Vereeniging VESUVIUS (Pty) Ltd., Olifantsfontein CALDERYS (Pty) Ltd., Vereeniging DUROCAST (Pty) Ltd., Vereeniging EKAN BASE MINERALS (Pty) Ltd., Springs</p>
	<p>Ms Annamie Duvenage: Is the product being processed at the stockpile area by whom?</p>	<p>Shangoni responded: Because of the weathering of the product, it is packed without delay into the Kilns.</p>
	<p>Please provide a copy of the acceptance letter from the DMR.</p>	<p>Shangoni attached the acceptance letter to the email.</p>
	<p>Ms Annamie Duvenage: Send copies of Scoping report and Draft EIA for our comments to be included please. Copies preferred electronically via mail.</p>	<p>Shangoni attached to the email a scoping report which has already been submitted to DMR. Shangoni also mentioned in the email that a Draft EIR was still being compiled (at that time). Additional note: This report is the final EIR. The draft EIR was made available for public comment prior to finalisation and submission.</p>
<p>04 June 2013</p>	<p>Ms Maloba Mokgadi sent through an email requesting to be included on the list of IAPs.</p>	<p>Shangoni responded through email: We have received your request to be included on the list of IAPs. Please note that you are already in our database of IAPs.</p>
<p>05 June 2013</p>	<p>Ms Annamie Duvenage who is a representative of Bronkhorstspuit and Wilge River Conservation Association asked the following questions through email: Does Refractory Minerals on Portion 22 belong to the applicant of MR on portion 25?</p>	<p>Shangoni responded through email which was sent through to an IAP on the 05th of June 2013: No, the applicant does not have a mining right on Portion 22 of the farm Nooitgedacht.</p>
	<p>Ms Annamie Duvenage: If not please provide details of company Refractory Minerals.</p>	<p>Shangoni provided the following details: ECCA PTY LTD, Refractory Minerals PO Box 8118 Centurion 0046, 012 643 5880</p>



Date	Comment	Response
	<p>Ms Annamie Duvenage: Please send the draft EIA when you are finished.</p> <p>EIA done without any comments or recommendations from I&AP's?</p>	<p>Shangoni responded: Please note, for this mining right application, three processes are followed. The first process is in terms of the Mineral and Petroleum Resources Development Act no 28 of 2002 (MPRDA), the second process in terms of the National Environmental Management Act no 107 of 1998 (NEMA) and thirdly, a water use licence (WULA) in terms of the National Water Act no 36 of 1998 (NWA). The Environmental Scoping Report (ESR) in terms of the MPRDA was submitted to Department of Mineral Resources (DMR) before the 30day expiration from acceptance of application (refer to Regulation 49(2) of the MPRDA). Due to this time constraint the public participation process (PPP) only commenced after the submission of the ESR to DMR. This ESR in terms of the MPRDA was send to you on 30 May 2013. Any comments from I&APs, organs of state, etc., will be included in the EMP in terms of the MPRDA, where after this EMP will be send to DMR. A draft ESR in terms of NEMA shall be circulated and send for your perusal following the PPP phase (which ends on the 28th of June). This ESR will include and address all the comments and concerns for I&APs, as well as your comments and concerns. The environmental impact assessment (EIA) report will only be compiled after the final ESR has been approved by DEDET. This EIA report will only be send to you after this approval and completion of the EIA report. Additional note: This is the final EIA report.</p>
	<p>Ms Annamie Duvenage: PPP will commence as soon as you have received the DEDET reference number" as answer to all questions regarding PPP in the scoping report:</p>	<p>Shangoni responded: This is included in the ESR in terms of the MPRDA because PPP only commenced after submission of the ESR to DMR. Any comments and concerns will be included in the ESR in terms of NEMA, as well as the EMP in terms of the MPRDA and the EIA in terms of NEMA.</p>
	<p>Ms Annamie Duvenage: When was the DEDET reference number received? And please provide copies of minutes of public participation meetings to date.</p>	<p>Shangoni responded: We received the EIA ref nr on the 23th of May 2013 and we commenced with the PPP for the whole project (this includes the process according to MPRDA, NEMA and NWA) on the 27th of May 2013. Ten site notices where put up at ten different locations in Bronkhorstspuit. The project was advertised in the local Newspaper (Streeknuus)</p>



Date	Comment	Response
		published on the 29 th of May 2013. Notification letters were sent out to adjacent landowners and Organs of State on the 27 th of May 2013 through registered mail. There will not be any public meetings.
	Ms Annamie Duvenage: So I presume no PPP has been done at all in the scoping phase of the project?	Shangoni responded (at that time): We are within the scoping phase in terms of NEMA and all concerns will be included in the documentation to follow to the relevant department.
	Ms Annamie Duvenage: Please provide background information as to why the application was first rejected by the DG and then accepted as stated in the Acceptance letter.	Shangoni responded: The mining right the Applicant applied for was for clay, at that same time another company had also made an application but for coal, DMR thought the Applicant had also applied for coal and they gave the coal company the first right to the mining right.

4.5.10 Review of the Environmental Impact Assessment Report

4.5.10.1 Public and Authority Review of the draft Environmental Impact Assessment report

The draft EIA report was made available to Departments, Organs of state and registered I&APs for public review and comment. A 60-day period was allowed for this review process. The report was also made available on Shangoni Management Services' website (www.shangoni.co.za). No comments were received on the draft EIA report.

4.5.10.2 Public and Authority Review of the draft Environmental Management Plan (EMP)

A draft EMP has been compiled for this project and submitted along with the EIA report to the relevant Departments, Organs of State and I&APs (refer to Appendix 4E). The EMP will prioritise management principles for the installation (construction), operational and decommissioning phases of the project. It contains all the mitigation and management measures to which the project proponent must adhere during the life cycle of the project. The mentioned EMP is attached hereto as Appendix 4F. No comments were received on the draft EMP.

4.5.11 Consultation sessions with surface rights owner and lessee

The Department of Rural Development owns the surface rights for Portion 25. This portion is rented out to a rural farmer (Mr Sitembrere Johannes Nghodela) for grazing. Ecca Holdings and Shangoni met with the Department of Rural Development to discuss the proposed project. Refer to Appendix 3E for the minutes of the meeting held.



Subsequent to the meeting with the Department of Rural Development, Ecca Holdings and Shangoni (as per the request of the Department of Rural Development) had a consultation session with Mr Sitembreere Johannes Nghodela (the lessee of Portion 25) in order to discuss the proposed project as well as future communication with regards to a change in lease agreement with him. Refer to Appendix 3E for the minutes of the meeting held.

4.5.12 Conclusions of the Public Participation Exercise

In conclusion, the Public Participation process followed was conducted in terms of the requirements as set out in the EIA Regulations, 2010. IAPs were notified of the proposed project by means of an advertisement and on-site notices and registered IAPs and stakeholders received notification letters. Opportunity was provided to IAPs to raise comments and concerns with regard to the proposed project from the on-set of the process (initial notification) as well as during the Scoping- and EIA phases when the reports were made available for public review. Comments received from IAPs have been incorporated into this EIA report.



5. NEED AND DESIRABILITY FOR THE ACTIVITY

Portion 25 of the farm Nooitgedacht 436JR is mainly exploited for chamotte but can also be sold as flint clay. Chamotte is an ingredient in the production of monolithic refractories for example: castables, gunning, ramming, mortars, plasters and refractory bricks. Flint is used in water purification. The carbonaceous clay, from Portion 25 of the farm Nooitgedacht 436JR, is calcinised (removes the carbon) to produce chamotte

5.1 Domestic Market

Chamotte is an ingredient used in the production of monolithic refractories for example: castables, gunning, ramming, mortars, plasters and refractory bricks

5.2 Benefits to Community

The proposed mine will benefit the local community in job creation during the construction and operational phase and in improving the economy of the area. Reference can be made to the Social and Labour Plan, dated 2013-2017(refer to attached Appendix 4A).



6 CONSIDERATION OF ALTERNATIVES

Assessments of alternatives are conducted to assist in comparing various attributes in a project to ultimately weigh benefits and constraints in the selection of the most feasible option. The most critical comparison is evaluating any proposed project against the No-Go option. The alternatives assessment then considers alternatives to project site selection for the proposed development and alternatives to activities or technological options or methods.

The impact of the development alternative versus the No-Go option was evaluated in terms of whether it has a positive, negative or no impact. In this instance, the impact is not evaluated in terms of significance but rather whether or not it will arise. Positive impacts are assigned a value of 1, no impact a value of 0, and a negative impact a value of -1.

By adding all of the attribute scores for each alternative, a suitability score is derived which indicates the preferred alternative. A total positive score indicates the project benefits outweigh the potential negative impacts, while a total negative score indicates the project environmental costs outweigh the potential benefits. Essentially, the highest scoring alternative is then carried forward for full impact evaluation. Without adding significance to the impacts, it is not a conclusive comparison but provides a simplified scenario of impacts associated with a No-Go option.

6.1 No-go Option

The potential impacts of the preferred project option on environmental and socio-economic attributes, identified during the assessment phase, are evaluated against the potential impact of the no-go option on the same attributes. The summary of this assessment is provided hereafter.

Attribute	Development Option	No-go Option
Physical environment		
Air Pollution	-1	0
Noise Pollution	-1	0
Water Quality	-1	0
Water Quantity	-1	0
Visual Aesthetics	-1	0
Biophysical environment		
Fauna and Flora	-1	0
Sensitive Environments	-1	0
Social environment		
Traffic during construction	0	0



Attribute	Development Option	No-go Option
Impact on property values	0	0
Safety and security	1	-1
National and regional economy	1	-1
Infrastructure development	1	-1
Community sustainability	1	-1
Total	-3	-4

The *no go* option assumes that the activity does not go ahead, implying the continuation of the current situation. No jobs associated with the mining activities would be created, without positive impacts on the regional economy of the Bronkhorstspruit area. Furthermore, the development will improve the safety of the area through better control and management and improved security within area (existing Quarry 2 poses security risks).

6.2 Alternative quarry sites

Alternative quarry sites were not considered, as the quarry will be located where the ore reserve occurs.

6.3 Alternative mining methods

Underground mining methods were considered. However, due to the shallow methods employed generally for clay mining, opencast mining is the only option.



7. ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Aims of Environmental Impact Assessment

Potential environmental impacts (biophysical) associated with the proposed quarry have been identified. All potentially significant impacts have been further investigated and assessed during this Environmental Impact Assessment (EIA) phase of the project. Mitigation measures will be proposed, where required, and these will be contained in the Environmental Management Plan (EMP) attached to (Appendix 4E) of this EIA report.

The EIA phase aims to adequately investigate and address all potentially significant environmental concerns in order to provide the Mpumalanga Department of Economic Development Tourism and Travel (MDEDET) with sufficient information to make an informed decision regarding the proposed project.

The following outlines the proposed approach to undertaking the EIA phase of the project, in order to fulfil the requirements of the EIA Regulations (2010) and the objectives of environmental management and development best practice, to ensure transparency and to allow an informed decision regarding the proposed project.

7.1.1 Application for Authorisation

An application for environmental authorisation is in progress in terms of the EIA Regulations of 2010 (Regulations in terms of chapter 5 of the National Environmental Management Act 1998, as amended).

7.1.2 Environmental Impact Assessment

The EIA aims to achieve the following:

- To provide a detailed assessment of the biophysical environments affected by the proposed project;
- To assess impacts on the study area in terms of environmental criteria;
- To identify and recommend appropriate mitigation measures for potentially significant environmental impacts; and
- To undertake a fully inclusive public participation process to ensure that I&APs issues and concerns are recorded and addressed.

The EIA report addresses the following:

- A detailed description of the proposed project and recommended development site;
- Detailed assessment of the impacts identified which are determined to be potentially significant;
- Recommendations regarding the mitigation of significant impacts; and
- To meet the requirements and to comply with the necessary legislation and Acts.



All applicable and available specialist studies are considered in the identification and characterisation of potential aspects with associated impacts.

7.1.3 Authorisation

On receipt of the authorisation (positive or negative) for the project, I&AP's on the project database will be informed of this environmental authorisation and its associated terms and conditions by registered post.

7.2 Environmental Impact Assessment Procedure

All activities that are related to the proposed clay quarry that could have an impact on the environment are identified. Impacts are often not only confined within the direct scope of the proposed activity and can accumulate as a network of indirect impacts on the surrounding area.

Different impacts are associated with the construction, operational and decommissioning phases of the proposed activities. The severity is determined by the probability and the magnitude of the impact. Cumulative impacts for the proposed clay quarry are discussed in section 7.3.1.4.

The following methodology was used to determine the severity of the impacts:

Step 1: Determine the PROBABILITY of the impact by calculating the average between the Frequency of the Aspect and the Availability of a pathway to the receptor (refer to Table 26 below).

Step 2: Determine the MAGNITUDE of the impact by calculating the average of the factors below (refer to Table 27).

Step 3: The SEVERITY is determined by plotting the averages as obtained for Probability and Magnitude (refer to Table 28 below).

The environmental risk assessment below has been conducted as per activity and environmental aspect (unwanted event) that could result in an environmental impact.

Mitigation measures are included in the risk assessment table (refer to Table 29). A comparison of the significance of the impact before and after the proposed mitigation measure is done. Furthermore, an indication is given regarding the applicability of the activity to the various project phases.

An Environmental Management Programme (EMP) is attached to this EIA report as Appendix 4E. The EMP contains detail with regards to the environmental objectives, mitigation measures to prevent, mitigate or control the environmental impacts identified, responsibility and timeframes.



Table 27: Determine the PROBABILITY of the impact by calculating the average between the Frequency of the Aspect and the Availability of a pathway to the receptor

FREQUENCY OF ASPECT / UNWANTED EVENT	SCORE	AVAILABILITY OF PATHWAY FROM THE SOURCE TO THE RECEPTOR	SCORE	AVAILABILITY OF RECEPTOR	SCORE
Never known to have happened, but may happen	1	A pathway to allow for the impact to occur is never available	1	The receptor is never available	1
Known to happen in industry	2	A pathway to allow for the impact to occur is almost never available	2	The receptor is almost never available	2
< once a year	3	A pathway to allow for the impact to occur is sometimes available	3	The receptor is sometimes available	3
Once per year to up to once per month	4	A pathway to allow for the impact to occur is almost always available	4	The receptor is almost always available	4
Once a month - Continuous	5	A pathway to allow for the impact to occur is always available	5	The receptor is always available	5

Table 28: Determine the MAGNITUDE of the impact by calculating the average of the factors below

SOURCE						RECEPTOR					
Duration of impact	Score	Extent	Score	Volume / Quantity / Intensity	Score	Toxicity / Destruction Effect	Score	Reversibility	Score	Sensitivity of environmental component	Score
Lasting days to a month	1	Effect limited to the site. (metres);	1	Very small quantities / volumes / intensity (e.g. < 50L or < 1Ha)	1	Non toxic (e.g. water) / Very low potential to create damage or destruction to the environment	1	Bio-physical and/or social functions and/or processes will remain unaltered.	1	Current environmental component(s) are largely disturbed from the natural state. Receptor of low significance / sensitivity	1
Lasting 1 month to 1 year	2	Effect limited to the activity and its immediate surroundings. (tens of metres)	2	Small quantities / volumes / intensity (e.g. 50L to 210L or 1Ha to 5Ha)	2	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	2	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	2	Current environmental component(s) are moderately disturbed from the natural state. No environmentally sensitive components.	2
Lasting 1 – 5 years	3	Impacts on extended area beyond site boundary (hundreds of metres)	3	Moderate quantities / volumes / intensity (e.g. > 210 L < 5000L or 5 – 8Ha)	3	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	3	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	3	Current environmental component(s) are a mix of disturbed and undisturbed areas. Area with some environmental sensitivity (scarce / valuable environment etc.).	3
Lasting 5 years to Life of Organisation	4	Impact on local scale / adjacent sites (km's)	4	Very large quantities / volumes / intensity (e.g. 5000 L – 10 000L or 8Ha– 12Ha)	4	Toxic (e.g. diesel & Sodium Hydroxide)	4	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible	4	Current environmental component(s) are in a natural state. Environmentally sensitive environment / receptor (endangered species / habitats etc.).	4
Beyond life of Organisation / Permanent impacts	5	Extends widely (nationally or globally)	5	Very large quantities / volumes / intensity (e.g. > 10 000 L or > 12Ha)	5	Highly toxic (e.g. arsenic or TCE)	5	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	5	Current environmental component(s) are in a pristine natural state. Highly Sensitive area (endangered species, wetlands, protected habitats etc.)	5



Table 29: Environmental Risk Matrix

ENVIRONMENTAL IMPACT RATING / PRIORITY					
	MAGNITUDE				
PROBABILITY	1 Minor	2 Low	3 Medium	4 High	5 Major
5 Almost Certain	Low	Medium	High	High	High
4 Likely	Low	Medium	High	High	High
3 Possible	Low	Medium	Medium	High	High
2 Unlikely	Low	Low	Medium	Medium	High
1 Rare	Low	Low	Low	Medium	Medium



7.3 Description of Environmental Impacts

The aim of this section of this EIA report is to provide information regarding the potential environmental impacts associated with the proposed activities. In order to provide background information and a framework for the environmental risk assessment, a description of the different phases of the project is provided below. Refer to Table 29 for the impacts associated with the proposed clay quarry.

The construction phase includes the removal of topsoil, vegetation and overburden for quarry preparation. Topsoil, where available, shall be removed by bowl scraper and stored separately. Berms shall be constructed around the quarry site. As part of the quarry operations, the temporary overburden dump and temporary topsoil dump will be constructed within the vicinity of the quarry. Continued backfilling and rehabilitation will take place as the quarry develops towards the east and therefore the dumps will be moved as the quarry develops. The dumps will be located within the quarry footprint and surface runoff will be diverted away by means of the proposed berms.

The operational phase includes the mining of the ore, including drilling and blasting. After blasting of the clay, it shall be removed by loader and transported by truck to the sorting area. Cobbing and sorting will be done manually where after the mine product shall be transported to the downdraft kiln stockpile area located 6km away from the proposed site. Where necessary, two benches (2-3m high) will be mined in the clay horizon. Water that accumulates in the proposed quarry shall be pumped out to Quarry 2 that exist on portion 24 of the farm Nooitgedacht 436 JR. This water will be pumped out for the safe continuation of mining activities. An average of 2 690 m3 of water per month will be abstracted. The quarry shall be concurrently backfilled.

The decommissioning phase will include the final backfilling of the quarry, and reshaping of the final. This will include replacement of topsoil and re-vegetation.

Table 30: Environmental risk assessment for the proposed clay quarry and associated infrastructure

Impact per phase ⁴	Risk rating (before mitigation) ⁵			Environmental objective ⁷	Mitigatory action plan ⁸	Timeframe ⁹	Responsibility ¹⁰	Risk rating (after mitigation) ⁵			
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Activity ² : Design and planning of the proposed open quarry.											
Aspect ³ : Potential inadequate planning and design											
Planning and design phase	Impacts on the <u>environment</u> that could potentially have been avoided.	4	3	H	To effectively plan and design the quarry and associated infrastructure taking the on-site environment into consideration.	Site selection for the proposed activities must include consideration of the following: <ul style="list-style-type: none"> Sloping / gradient factors. Contractor requirements and communication. Design and construction requirements for spillage control, storm water management and erosion control measures. Environmental legal requirements. Water reticulation system (water balance). Access to and from the proposed site. The location of nearby drainage systems, watercourses and sensitive landscapes. The habitats of fauna and flora species. Potential protected plant and tree species. Available water supplies. Fire protection services and their reaction times. Security and general service facilities in the area. Future expansions (if applicable). General housekeeping practices. Existing mine procedures, Government Authority requirements and permit conditions. Heritage or archaeological resources on-site. 	<ul style="list-style-type: none"> During planning phase 	<ul style="list-style-type: none"> Mine manager Surveyor 	3	2	M

Impact per phase ⁴	Risk rating (before mitigation) ⁵			Environmental objective ⁷	Mitigatory action plan ⁸	Timeframe ⁹	Responsibility ¹⁰	Risk rating (after mitigation) ⁵			
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
					<ul style="list-style-type: none"> Soil types, availability and land capability. Surface water quality (pre-project status) and possible impacts that would result from proposed activities. <p><i>The above listed information must be recorded before the construction at the site commences and should be used for future monitoring purposes.</i></p>						
Planning of activities within the <u>wetland</u> buffer zone. Damage or destruction to the wetland. The wetland on site is in a good condition, with high species diversity. Since the wetland is a peatland the wetland is also of a rare type. In addition all wetlands are considered to be of conservation importance. The wetlands on site can therefore be considered to be of high conservation importance.	3	4	H	To prevent damage to the wetland	<ul style="list-style-type: none"> No mining shall take place within 32m of the artificial wetland area (old quarry) or within 500m of the natural wetlands. The wetland and its buffer zones shall be incorporated into an open space system with an applicable management plan. Install a monitoring network of small diameter, shallow monitoring piezometers, or wells in and adjacent to the wetland to monitor the hydrology of the wetland. These wells or piezometers must be monitored to measure the impacts on the aquifers that feed the wetland, be they shallow or deep. 			2	3	M	
Activities ² : Site Preparation: Clearance of topsoil and vegetation for the construction of the quarry. Topsoil stockpiling. Replacement of topsoil and re-vegetation of topsoil.											
Aspect ³ : Disturbance of soil due to clearance of topsoil and vegetation. Incorrect stockpiling of topsoil. Incorrect or inadequate replacement of topsoil and re-vegetation of topsoil.											
Construction to decommissioning phase	Loss of <u>topsoil</u> .	4	3	H	<ul style="list-style-type: none"> To conserve topsoil resources. To prevent soil loss and erosion. To prevent siltation of water resources. To investigate the possible post-mining land use and set objectives for rehabilitation and closure. 	<ul style="list-style-type: none"> During the soil stripping operations all material that are suitable for supporting plant growth shall be removed. The stripping of topsoil shall occur between 50m to 100m ahead of the active mining face at all times to avoid the loss of soil and contamination of soil that will impact on the rehabilitation practices and re-vegetation. The topsoil stripped shall be stored (only temporarily) for future use in rehabilitation. A surface plan indicating areas where topsoil stripping took place and existing stockpiles shall be updated annually. Topsoil stockpiles shall not exceed 1.5m. Topsoil stockpiles shall be stored as far as possible from the wetland on a flat as possible slope to minimise erosion of the stored soil due to overland flow. 	<ul style="list-style-type: none"> Ongoing form soil stripping until after rehabilitation. Weekly erosion monitoring Weekly monitoring of rehabilitation adequacy Topsoil stockpiles inspections on regular basis. 	<ul style="list-style-type: none"> Mine manager Surveyor 	3	2	M
	Potential impact on <u>topsoil</u> fertility due to compaction.	3	3	M					2	2	L
	Loss of <u>land capability</u> .	3	3	M					3	2	M
	Potential <u>soil erosion</u> and <u>surface water</u> siltation can take place due to exposed surfaces leading to an increase in suspended solids concentration in runoff water towards the <u>wetland</u> . Covering a significant part of a wetland in 50mm of sediment drops the wetland PES category, as a whole, one class, and must be avoided at all costs.	3	4	H					2	2	L
	Loss of <u>natural vegetation / biodiversity</u> , leading to potential destruction of natural habitats. Steep slopes and / or newly constructed mining areas may become a barrier / trap to small mammals and reptiles that could lead to temporary	4	3	H					<ul style="list-style-type: none"> To minimise the area of disturbance and avoid disturbance of sensitive habitats. 	<ul style="list-style-type: none"> In order to minimise compaction of stockpiles the stockpiles shall be kept loose, preferable by end-tipping, and to prevent internal compaction. Grassing shall take place if topsoil is stored for more than 3 months. However, this is not likely to occur. No waste shall be disposed of at the stockpiled areas. 	3



Impact per phase ⁴	Risk rating (before mitigation) ⁵			Environmental objective ⁷	Mitigatory action plan ⁸	Timeframe ⁹	Responsibility ¹⁰	Risk rating (after mitigation) ⁵		
	Probability	Magnitude	Severity					Probability	Magnitude	Severity
fragmentation of populations and temporarily isolate populations.				<ul style="list-style-type: none"> To prevent disturbance of sensitive animal habitats. 	<ul style="list-style-type: none"> The stockpiled topsoil shall be replaced on the previously mined area to ensure concurrent rehabilitation of the mining operation. The fertility of the topsoil shall be improved during rehabilitation as per rehabilitation plan. 					
Potential die-back of <u>plants</u> replanted as part of rehabilitation.	3	3	M					2	2	L
Removal of threatened and protected <u>species</u> in <u>wetland</u> . Orchids are present in the wetlands and are protected by Mpumalanga. It is possible that other protected species are also present.	3	4	H	<ul style="list-style-type: none"> To preserve threatened species in wetland. 	<ul style="list-style-type: none"> Replacement of soils shall be conducted, where practicable, in the drier winter months when rainfall is at its lowest and soils are driest to minimise compaction of the soils. Placement of topsoils and revegetation shall be done as per the rehabilitation plan. 			2	2	L
<u>Invasive plant</u> establishment. With the disturbance of areas, it is possible that declared alien and or invasive plants may establish themselves, if not controlled properly. The establishment of alien invasive species may lead to the following: <ul style="list-style-type: none"> Displacement of indigenous vegetation, Change in plant species composition, Change in vegetation composition and structure, Competition for sunlight and living space between indigenous and alien species, as well as for water and minerals. 	3	3	M					2	2	L
Potential damage to <u>graves</u> occurring on site. According to the 1 st phase heritage impact assessment conducted on the proposed site, apart from the cemetery, there exist no heritage impediments for the proposed new mine (refer to Appendix 4D).	1	3	L	<ul style="list-style-type: none"> To conserve heritage resources. 	<ul style="list-style-type: none"> Regular inspections shall be conducted to identify erosion. Erosion can be quantified by insertion of marked stakes into the rehabilitated profile and recording the rate at which the stakes are uncovered. Remedial actions such as the replanting or repair of erosion channels will be undertaken as and when necessary. Erosion control measures include the identification of erosion gullies, covering with sub-surface soil and the revegetation of the area. Erosion prevention measures (e.g. grass, cement or rock) should be in place at all concentration points. These areas include roads, stormwater canals, berms and other infrastructure that may increase surface run-off. Erosion of access roads should be addressed by implementing energy dissipaters to drain surface run-off away from the roads into the adjacent veld areas. In the event of significant erosion of the stored topsoil a stormwater system shall be implemented. Special care must be taken to ensure that sediment rich stormwater does not enter the wetland and riparian areas. Mechanisms must be in place to prevent erosion and to dissipate water energy. Special considerations for quarry operations <ul style="list-style-type: none"> The size of un-rehabilitated areas that produce contaminated run-off should be minimised. The development of the quarries should be planned to promote maximum diversion of clean water. The run-off diversion measures may therefore need to be moved as the mine develops. Rehabilitation should be planned to promote free drainage and to minimise or eliminate ponding of stormwater. Ongoing rehabilitation as mining operations progress is required. Vegetation clearing shall be restricted to the minimum in areas where the quarry is to be established. All areas of natural, indigenous vegetation shall be identified and mapped. Plant cover (especially grass) shall be maintained. Stripping shall only occur where soils are to be disturbed and when an end-use for the stripped soil has been identified. The natural vegetation in the wetland area shall be regarded as sensitive shall not be disturbed. 			1	2	L



Impact per phase ⁴		Risk rating (before mitigation) ⁵			Environmental objective ⁷	Mitigatory action plan ⁸	Timeframe ⁹	Responsibility ¹⁰	Risk rating (after mitigation) ⁵			
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
						<ul style="list-style-type: none"> Mining activities shall not extent into the respective 32m and 500m buffer zone of the wetland area. All wetland areas and the wetland buffer must be designated as no-go. No activity such as temporary housing and temporary ablution facilities may take place within the wetland areas or buffers. The no-go areas must be fenced and clearly indicated as such. An alien invasive vegetation eradication programme shall be developed and effectively implemented Monitoring of the effectiveness of removal of alien invasive species shall be conducted on a continuous basis. <p>Mitigation measures as proposed during the 1st phase heritage impact assessment include:</p> <ul style="list-style-type: none"> The first possibility is the relocation of the grave to a facility that can be negotiated with the families of the deceased. Secondly the grave site may be left in place with a “protected Zone” of at least thirty meters in all directions surrounding the cemetery. This “protected Zone” must be supplied with a guaranteed “access” route as negotiated with the families of the deceased. A Heritage Resources procedure with instructions in the case heritage resources are found on-site shall be developed. Reference shall be made to the applicable legislative requirements (e.g. permit applications). An awareness campaign on the above-mentioned instructions shall be implemented. Refer to Section 9 for the rehabilitation plan. 						
Activities ² : Excavation of material from the proposed Nooitgedacht clay quarry (open quarry mining activities)												
Aspect ³ : Removal of ore.												
Operational phase	The open quarry mining activities shall affect the <u>geology</u> of the area through the removal of the geological structure. The removal of geology is of a permanent nature.	5	2	M	To prevent unnecessary loss of geology.	<ul style="list-style-type: none"> Mining shall take place according to the mining plan. Disturbed land shall be properly backfill and compacted as part of concurrent rehabilitation. Activities shall concentrate in and around the quarry. 	<ul style="list-style-type: none"> Ongoing during mining activities. 	<ul style="list-style-type: none"> Mine manager 	5	2	M	
Activities ² : Excavation of material from the proposed Nooitgedacht clay quarry (open quarry mining activities)												
Aspect ³ : Change in topography. This aspect will be increased due to incorrect sloping of the quarry during rehabilitation.												
Operational phase	The removal of geology will increase fracturing of the rock material and thus the flow characteristics of the aquifer. This could result in a decrease in <u>groundwater quantity</u> due to the changed flow characteristics of the aquifer.	4	3	H	To prevent/reduce the change in groundwater quantity	<ul style="list-style-type: none"> Water balance shall be implemented and regularly updated to identify possible areas of water loss. Groundwater quantity shall be monitored on a frequent basis to identify any impacts of the mining operation on the aquifer. Water emanating from the mine area, must enter large vegetated bioswales, outside the buffer area down-slope of the quarries. This shall be done to ensure water infiltration into the soil to feed the wetland with subsurface water and not surface water. 	<ul style="list-style-type: none"> Ongoing during mining activities until after rehabilitation Regular update of water balance Frequent groundwater quantity monitoring Quarterly surface water quality monitoring 	<ul style="list-style-type: none"> Mine manager 	4	3	H	
	Mining activities may potentially alter the sub-surface water flow in the catchment and may therefore alter the wetness and flow regimes in the <u>wetland</u> . The impact	3	4	H	To prevent damage to the wetland				2	3	M	



Impact per phase ⁴		Risk rating (before mitigation) ⁵			Environmental objective ⁷	Mitigatory action plan ⁸	Timeframe ⁹	Responsibility ¹⁰	Risk rating (after mitigation) ⁵		
		Probability	Magnitude	Severity					Probability	Magnitude	Severity
	will be more severe should blasting practices be used. In addition, any activity that requires draining the old mining quarry on site may also potentially have an impact on the wetness of the wetland. The quarry may drain water out of the wetland.					<ul style="list-style-type: none"> A proposed berm should be constructed upstream of the previous and proposed quarry operations of portions 24 and 25 of the farm Nooitgedacht. The berm will divert and prevent clean run-off from flowing into the operations thereby minimising dewatering requirements of the quarries. The encouragement of vegetation growth on the berm will ensure minimal erosion during flood events. 	<ul style="list-style-type: none"> Quarterly groundwater quality monitoring 				
Operational phase to after closure	Ponding of water entering the quarry may occur in the form of rainwater and storm water runoff. The change in topography results in a change in <u>surface water flow patterns</u> . Water is pumped from the Nooitgedacht clay quarry into the adjacent quarry (Quarry 2). The water is sourced from surface water runoff within the Nooitgedacht clay quarry, as well as seepage.	3	4	H	To prevent/reduce the change in surface water flow patterns	<ul style="list-style-type: none"> The proposed berm should be maintained to ensure stability. Regular inspection will ensure that there are no cracks, which could cause leakage. The development of the quarry should be planned to promote maximum diversion of clean water. The berm may therefore need to be moved as the mine develops. Storm water generated on-site may not be focused on a specific area and directly released into the wetland area on site. It has to flow off the property and dispersed over a large area or the flow must be attenuated in another way, designed by the engineers, to not cause erosion at that specific location. It is necessary to ensure that all soil is stabilised and the sufficient erosion and sedimentation protection is in place. 			3	3	M
	<u>Surface and groundwater pollution</u> due to acidification from historical mining activities	3	4	H	To prevent/limit pollution of water resources	<ul style="list-style-type: none"> All channels and berms should be inspected and serviced regularly to ensure the design capacity and integrity is maintained. Storm water control measures should be kept clear of obstructions by objects as well as siltation especially where the velocity of the run-off is induced. 			3	4	H
Operational phase	Unauthorised access to the quarry area if security measures are not implemented could lead to a safety hazard to <u>surrounding communities or members of the public</u> .	3	3	M	To prevent dangers to the public	<ul style="list-style-type: none"> The capacity to rapidly pump water out of the quarries should be maintained. This will assist in minimising water quality deterioration due to long term retention of storm water in contact with materials that may cause a decrease in quality. 			2	2	L
	The total removal clay material will lead to a depression in the topography. The quarry is however not <u>visually</u> evident from the surrounding areas.	1	3	L	To minimise the visual impact as far as possible.	<ul style="list-style-type: none"> Clay shall be utilised to seal the historical coal mining areas to prevent oxidation. Surface water quality monitoring shall be developed and effectively implemented. The mine shall be fenced off to prevent unauthorised access. Visual impact shall be minimised through concurrent rehabilitation. Refer to Section 9 for the rehabilitation plan. 			1	3	L
Activities ² : Excavation of material from the proposed Nooitgedacht clay quarry (open quarry mining activities), storage of quarry water in adjacent quarry.											
Aspect ³ : Exposure of groundwater to geology											
Operational phase	The geo-hydrological study (Appendix 4C) pointed out that accumulated rain- or seepage water in Quarry 2 revealed acidic water with high AI exceeding permissible domestic use guidelines. The water within Quarry 2 is therefore a potential source of contamination of the <u>groundwater quality</u> of the area.	4	4	H	To prevent, cease, modify or control any act or process causing pollution	<ul style="list-style-type: none"> An extensive groundwater monitoring programme and regular geo-hydrological assessments shall be implemented to detect and quantify the impact of the proposed clay quarry on the groundwater qualities. Further management measures to control the impact on groundwater shall be investigated and implemented based on groundwater monitoring data. 	<ul style="list-style-type: none"> Ongoing during mining activities Quarterly groundwater quality monitoring 	<ul style="list-style-type: none"> Mine manager 	4	4	H
Activities ² : Excavation of material from the proposed Nooitgedacht clay quarry (open quarry mining activities)											
Aspect ³ : Potential discharge of contaminated water into the receiving environment.											
Operational phase	If contaminated water is discharged, or allowed to flow to the receiving	2	4	M	To prevent surface water pollution.	<ul style="list-style-type: none"> Affected run-off water should be controlled and not contaminate the natural clean habitat within the vicinity of the refractory plant and the quarry operations. 	<ul style="list-style-type: none"> Ongoing during mining activities 	<ul style="list-style-type: none"> Mine manager 	1	3	L

Impact per phase ⁴		Risk rating (before mitigation) ⁵			Environmental objective ⁷	Mitigatory action plan ⁸	Timeframe ⁹	Responsibility ¹⁰	Risk rating (after mitigation) ⁵		
		Probability	Magnitude	Severity					Probability	Magnitude	Severity
	environment, the <u>water quality</u> in the receiving environment would deteriorate. Downstream users and aquatic habitats would be negatively affected by such discharge, and the wetlands in downstream receiving areas would also be negatively impacted on.					<ul style="list-style-type: none"> No affected water from the quarry operations is allowed to spill into the clean water environment. This should be ensured through design as well as operational control measures. A surface and groundwater monitoring programme shall be implemented. Monitoring programme shall be reviewed on a regular basis by a competent person to identify areas of improvement and additional monitoring requirements. Biomonitoring of aquatic characteristics of a wetland shall be developed and implemented. Wetland monitoring programme will be developed as part of the closure plan. 	<ul style="list-style-type: none"> Quarterly surface water quality monitoring Quarterly groundwater quality monitoring 				
Activities ² : Excavation of material from the proposed Nooitgedacht clay quarry (open quarry mining activities)											
Aspect ³ : Deposition of overburden next to quarry temporarily before replacement.											
Operational phase	If contaminated water is discharged, or allowed to flow to the receiving environment, the <u>water quality</u> in the receiving environment would deteriorate. Downstream users and aquatic habitats would be negatively affected by such discharge, and the wetlands in downstream receiving areas would also be negatively impacted on.	2	4	M	To prevent surface water pollution.	<ul style="list-style-type: none"> No discharge of contaminated water from the mining area will be discharged to the receiving environment. Clean and dirty water separation will be encouraged and implemented. A berm should be constructed upstream of the proposed quarry operation of portions 25 of the farm Nooitgedacht. The berm will act as a safety berm and will also divert and prevent clean runoff from flowing into the operations thereby minimising dewatering requirements of the quarries. The encouragement of vegetation growth on the berm will ensure minimal erosion during flood events. The proposed berm should be maintained to ensure stability. Regular inspection will ensure that there are no cracks, which could cause leakage. Refer to Figure 11 of the storm water management plan for the storm water management around the quarry. 	<ul style="list-style-type: none"> Ongoing during mining activities Quarterly surface water quality monitoring Quarterly groundwater quality monitoring 	Mine manager	1	3	L
Activities ² : Dewatering of quarry for safe mining.											
Aspect ³ : Depletion of natural resource											
Operational phase	Dewatering may lead to <u>groundwater</u> reserve depletion. As identified by the geo-hydrological study a risk remain that water from the quarry will seep into adjacent aquifers. Dewatering will result in the development of a cone of depression around the quarry. The quarry will therefore act as a sink causing all groundwater to flow radially inwards towards it.	4	2	M	To minimise the loss of groundwater to the environment and users.	<ul style="list-style-type: none"> All water reuse opportunities and water saving initiatives shall be identified. The water balance shall be regularly updated and possible areas of water loss shall be identified. Proper environmental training and awareness shall take place to conserve resources. 	<ul style="list-style-type: none"> Regular monitoring of resource consumption Regular update of water balance 	Mine manager	4	2	M
	Loss of groundwater used by <u>community</u> .	4	2	M					4	2	M
	Although the system is now in equilibrium it is possible that pumping water from the quarry may also cause a drying out effect in the wetland.	3	4	H	To prevent damage to the wetland	<ul style="list-style-type: none"> This must be further investigated by a geohydrologist if any water extraction is going to take place as part of the mining activities. 	<ul style="list-style-type: none"> Ongoing during mining activities 	Mine manager	3	4	H
Activities ² : Dewatering of quarry for safe mining.											
Aspect ³ : Disposal of water form dewatering. Water from the quarry will be pumped to quarry 2 of the farm Nooitgedacht.											
Operational phase	Seepage at Quarry 2 may negatively affect the groundwater quality of the area. The	4	2	M	To minimise groundwater pollution.	<ul style="list-style-type: none"> Implement the groundwater monitoring programme for Refractory Minerals as described in Chapter 6 of the IWWMP. 	<ul style="list-style-type: none"> Regular monitoring of resource consumption 	Mine manager	4	2	M

Impact per phase ⁴		Risk rating (before mitigation) ⁵			Environmental objective ⁷	Mitigatory action plan ⁸	Timeframe ⁹	Responsibility ¹⁰	Risk rating (after mitigation) ⁵		
		Probability	Magnitude	Severity					Probability	Magnitude	Severity
	water stored in the quarry has high levels of Al and is acidic.					<ul style="list-style-type: none"> Undertake regular geohydrological studies to determine the impact of the activity on groundwater quality. Regular review of the monitoring programme by a competent person to identify areas of improvement and additional monitoring requirements. 	<ul style="list-style-type: none"> Regular update of water balance 				
Activities ² : Use of vehicles and machinery during construction, operational and decommissioning phase, for stripping and stockpiling activities, open quarry mining, maintenance and rehabilitation activities. Storage and handling of hazardous chemicals on site. Generation, storage and disposal of domestic and hazardous waste											
Aspects ³ : Potential spillages of hazardous material due to ineffective maintenance of vehicles and machinery and incorrect handling of hazardous substances and waste.											
Operational phase	Soil, surface water and groundwater pollution.	3	3	M		<ul style="list-style-type: none"> Vehicles and machineries shall be inspected and effectively maintained. Only properly trained personnel may work with the machinery. Contractors requested to undertake transporting on behalf of the proposed mine shall maintain, inspect and check vehicles for smoke on regular basis. Contractors shall be requested to provide evidence of proper maintenance on their vehicles. Implement spill handling procedure if spillage of hazardous materials occurs. Further ensure that such contaminated material arising from spill clean-up is disposed of as a hazardous waste. Implement a waste management procedure, detailing requirements for general and hazardous waste segregation, waste skip requirements and temporary storage requirements. The design of waste skips for temporary storage should include: containment to prevent seepage, covered to prevent water ingress, on hard surface and within a bunded area. Frequent collection of waste to prevent large accumulation on site. Hazardous and general waste will be disposed of at a waste site appropriately classified and appropriately licensed to receive such waste material. Hazardous waste will be handled by a registered waste disposal company. Safe disposal certificates will be obtained for all hazardous waste material disposals. These certificates will be obtained from the contractor responsible for the disposal of the hazardous waste (including waste oil) 	<ul style="list-style-type: none"> Ongoing during mining activities Quarterly surface water quality monitoring Quarterly groundwater quality monitoring 	Mine manager	2	2	L
Activities ² : Drilling and blasting, loading and hauling, transportation of ore, removal of topsoil, rehabilitation activities, and removal of vegetation and topsoil.											
Aspects ³ : Dust, emissions, noise and vibrations generation.											
Construction to decommissioning phase	Fall-out dust causing <u>air pollution</u> .	3	3	M	<ul style="list-style-type: none"> To ensure that the proposed mine remains compliant with air quality legislation. To prevent any impacts on the wetland. To limit public exposure to unacceptable risks. 	<ul style="list-style-type: none"> Removal of vegetation cover shall be kept to a minimum. Open areas shall be kept to a minimum. Temporary vegetation shall be established on the stockpiles, where possible, to prevent wind-blown erosion. Dust suppression on the main roads shall be conducted on daily basis. Strict speed limits shall be implemented. This includes speed signs on the proposed mine as well as the training of drivers. Trucks transporting light/ wind- dispersible materials shall be covered. 	<ul style="list-style-type: none"> Ongoing during mining activities Quarterly fall-out dust monitoring PM10 and PM2.5 monitoring to be determined Environmental noise monitoring to be determined Blasting and vibrations monitoring to be determined 	Mine manager	2	2	L
	Fall-out dust may impact the <u>wetland</u> area and vegetation within the wetland area.	2	4	M					2	3	M
	Particles causing respiratory risks to <u>humans</u> (PM10 and below)	3	3	M					2	2	L
	Emissions from construction vehicles may cause <u>air pollution</u> leading to an impact on the ozone. The major pollutants are SO ₂ , NO ₂ and CO ₂ .	3	3	M					2	2	L
	Potential generation of <u>environmental noise</u>	3	3	M					2	2	L



Impact per phase ⁴		Risk rating (before mitigation) ⁵			Environmental objective ⁷	Mitigatory action plan ⁸	Timeframe ⁹	Responsibility ¹⁰	Risk rating (after mitigation) ⁵			
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	Vibrations from blasting could lead to damage of <u>surface structures</u>	2	4	M		<ul style="list-style-type: none"> Vehicles and machinery shall be effectively maintained. Contractors requested to undertake transporting on behalf of the proposed mine shall maintain, inspect and check vehicles for smoke on regular basis. Machinery (where possible) shall be equipped with silencers. Construction activities shall only take place during the day hours Blasting shall be restricted to day light hours and weekdays. A “Danger – Blast Area – Keep Away” sign shall be placed at all required entrances to the blasting area. All persons within 500m from a blast shall be cleared and where necessary evacuation shall be conducted with all the required pre-blast negotiations. Water down shall take place to minimise dust generated. Only trained personnel shall guard unloaded explosives. Charging up shall take place under the direct supervision of a holder of a blasting certificate. Before actual charging up, hole plugs shall be removed and the area around the collar of the holes shall be cleaned. Holes shall be checked for any obstruction up to the desired depth and if any obstruction is found, the hole shall not be charged with explosives. Fire equipment shall be present and marked on site. A complaints register for the recording of complaints relating to dust, emissions, vibrations and noise shall be kept. The complaints register shall as a minimum, record the following: date when complaint was received, name of person who reported the complaint and when and how the concern was addressed. The proposed mine shall implement a plan to verify whether PM10 and PM2.5 monitoring is necessary. A dust monitoring procedure shall be developed and effectively implemented. An environmental noise monitoring programme shall be implemented. A blast management plan shall be implemented. Blast and vibration monitoring 				2	2	L
Activities ² : Use of chemical toilet												
Aspects ³ : Sewage disposal directly into the ground.												
Operational phase	Soil and groundwater pollution.	2	3	M	To prevent pollution of the environment.	<ul style="list-style-type: none"> Chemical toilets will be emptied on a regular basis and records kept of safe disposal. 	<ul style="list-style-type: none"> Ongoing during mining activities Quarterly surface water quality monitoring Quarterly groundwater quality monitoring 	<ul style="list-style-type: none"> Mine manager 	2	2	L	
Activities ² : Increase in human activity												



Impact per phase ⁴		Risk rating (before mitigation) ⁵			Environmental objective ⁷	Mitigatory action plan ⁸	Timeframe ⁹	Responsibility ¹⁰	Risk rating (after mitigation) ⁵		
		Probability	Magnitude	Severity					Probability	Magnitude	Severity
Aspects ³ : Poaching, killing, snaring of animals.											
Operational phase	Loss of animal life	2	3	M	To prevent loss of animal life	• Proposed mine staff shall not be allowed to hunt, trap, kill or disturb any animal species.	• Ongoing during mining activities	• Mine manager	1	3	L
Activities ² : Closure of mine											
Aspects ³ : Loss of income to community											
Closure phase	Impact on local economic development.	4	2	M	To meet requirements of SLP To discourage the increase in social problems in the area.	• Local economic development contributions and retraining principles in the SLP shall assist in the reduction of this effect.	• During closure	• HR manager	3	2	M
Activities ² : Closure of mine											
Aspects ³ : Inadequate backfilling of quarry leading to a final void.											
Closure phase	Potential impact on visual aspects.	2	3	M	To adequately backfill the quarry	• Management measures shall be contained within a rehabilitation plan. Refer to section 9.	• During closure	• Mine manager	1	2	L
	Due to rainwater falling into the quarry and water from the sidewalls seeping into the quarry, this amount of water leads to a decrease in surface water quantity being available.	2	2	L					1	2	L
	Loss of land use	2	3	M					1	2	L
Activities ² : Closure of mine											
Aspects ³ : Increased surface water run-off due or decrease water infiltration from soil compaction leading to siltation. Siltation can be increased by soil erosion.											
Closure phase	Surface water siltation could result in an increase in suspended solids concentration in run-off water and aquatic habitats further downstream.	2	3	M	To replant and rehabilitate disturbed land to a stable physical state.	• Management measures shall be contained within a rehabilitation plan. Refer to section 9.	• During closure	• Mine manager	1	2	L
	Disturbance of aquatic vegetation and animal life.	2	3	M	To protect watercourses and prevent alteration of these.				1	2	L
Activities ² : Closure of mine											
Aspects ³ : Inadequate or no application of fertiliser and/or organic material into the soil used for rehabilitation. Leaching of minerals due to incorrect application of fertilisers into topsoil used for rehabilitation of disturbed areas.											
Closure phase	Inhibiting the growth of vegetation.	2	3	M	To protect watercourses and prevent alteration of these habitats directly and indirectly through sedimentation and pollution.	• Management measures shall be contained within a rehabilitation plan. Refer to section 9.	• During closure	• Mine manager	1	2	L
	Groundwater pollution	2	3	M					1	2	L



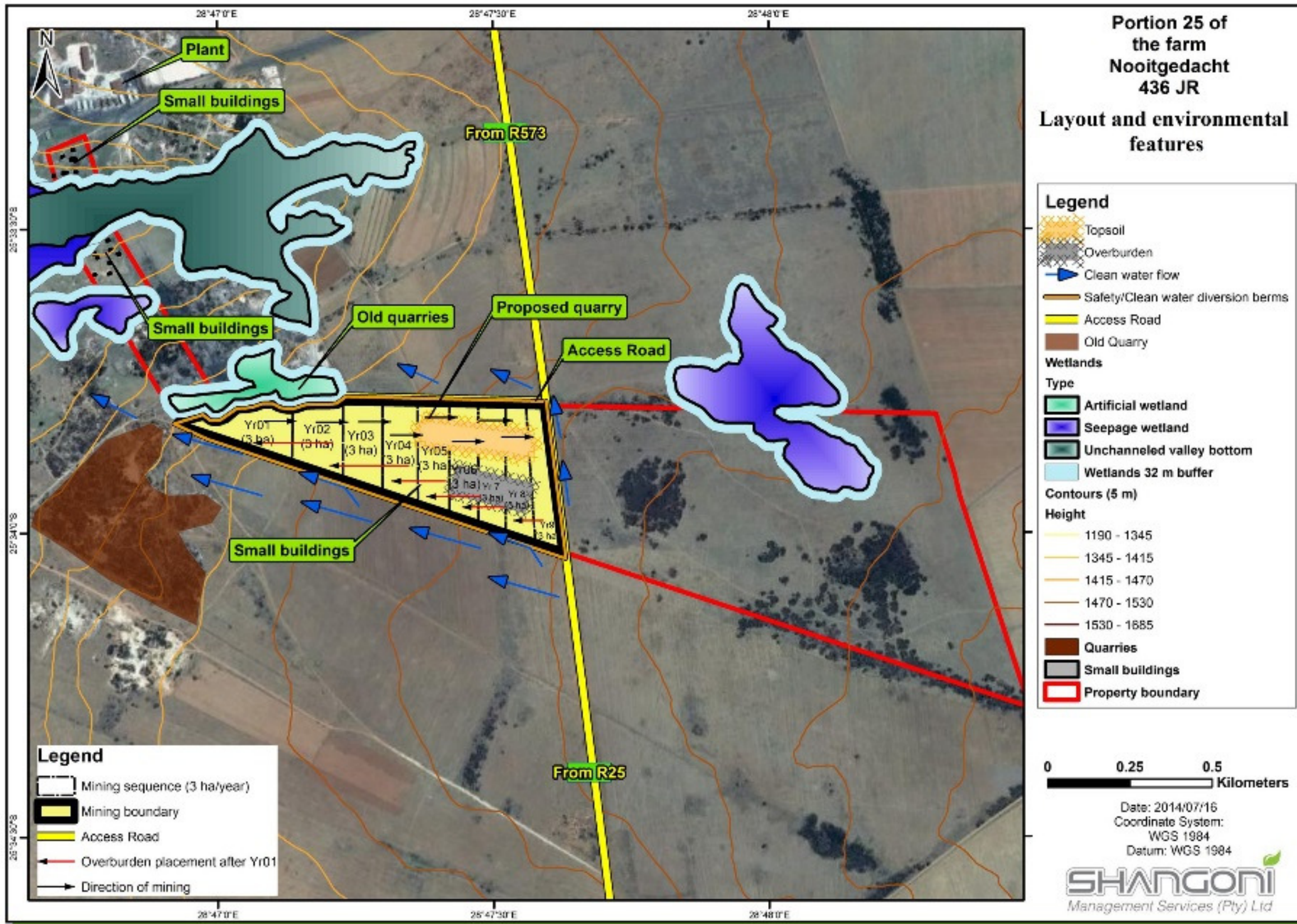


Figure 21: Layout plan of the proposed quarry on Portion 25 of Nooitgedacht and surrounding area

Refer to Section 8 below for a summary on the key findings related to the proposed clay quarry.

7.4 Cumulative impacts

Cumulative impacts refer to the situation where an activity may in itself not have a significant impact, but may become significant when added to the existing and potential impacts from similar or different activities in the area.

The cumulative impacts can be described as dust generated from blasting, transportation and excavation of ore, reduction in water quality and surface water yield, the occurrence of invader plants, change in topography and loss of soil and surface areas.

Table 31: Cumulative impacts

Activity	Surrounding activities	Aspect	Impact description
Construction of the quarry	Other mining activities and ineffective use of land for arable purposes	Incorrect replacement of soils	The possibility exists that erosion can occur after the replacement of topsoil on disturbed areas as well as from storm water run-off.
Establishment of the quarry	Establishment of an additional quarry.	Surface water ponding	The accumulation of rain water into the quarry minimises the surface water yield reduction in the catchment area.
Blasting, excavation and transportation of ore	Additional mining towards the north	Generation of dust	Air pollution
		Generation of noise	Using of trucks for transportation of ore to the processing area will increase noise impact of the surrounding area.
			Noise shall be generated by proposed mining activities such as blasting and use of equipment resulting in an increase noise impact to the surrounding area.
Visual impact	The mining area will be visible from the northern access roads (north of the plant). The impacts will be cumulative, as other mining operations have taken place in the surrounding area. The visibility of the mining areas from the surrounding areas could be of interest to passers-by.		
Disturbance of soil due to clearance of topsoil and vegetation	Disturbance of soil due to mining activities towards the north.	Establishment of alien invasive species	Alien and invasive species tend to establish in disturbed surface areas which will be abundant during opencast mining. Unless appropriately managed, it is likely that alien and invasive species will



Activity	Surrounding activities	Aspect	Impact description
			encroach into natural vegetation areas, and especially into areas that are newly disturbed or rehabilitated
Ore and topsoil removal	Agricultural activities	Siltation	Siltation of the wetland area
Ore and topsoil removal	Ore and topsoil removal from other mining activities	Removal of topsoil	Loss in land capability and land use areas



8 ENVIRONMENTAL IMPACT STATEMENT

8.1 Summary of key findings

Ecca holdings is proposing a clay quarry on portion 25 of the farm Nooitgedacht. It was found that the no-go option is not a viable consideration as the proposed activity will result in stimulation of the local economy. No jobs associated with the mining activities would be created, without positive impacts on the regional economy of the Bronkhorstspuit area.

The nature of the mining activity will result in the removal of the geological structures. The proposed open quarry mining activities will affect the geology of the area. The open quarry mining method will be utilised. Modifications to the topography will be caused as a result of the open quarry mining operations. Open quarry mining activities will increase fracturing of the rock material and thus the flow characteristics of the aquifer.

Visual impacts on surrounding land users would mostly be associated with dust generation by the construction vehicles during vegetation clearing and soil excavation.

According to AGIS, the general land capability of the farm Nooitgedacht in Mpumalanga is high potential arable land. The site contains a plant species called *Dichapetalum cymosum* commonly known as “Gifblaar”, which is a small prostrate shrub poison leaf occurring in the northern parts of Southern Africa. Grazing farmers in the area have however indicated that care is taken to ensure that cattle do not consume “Gifblaar”.

The construction of the clay quarry will result in a change in land use from agricultural to mining area.

Impacts on the wetland including destruction, siltation, removal of vegetation and change in surface water flow characteristics could be significant. The proposed quarries must at all times be 32m away from the artificial wetland (old quarry) and 500m away from the natural wetlands. Special care must be taken to ensure that sediment rich storm water does not enter the wetland and riparian areas.

The appropriate mitigation measures will assist in minimising the potential impacts on the surrounding environment during the mining operations. Rehabilitation will be conducted to limit possible erosion and promote the vegetation of the area with indigenous plants. If any of the preventative measures fail, concurrently remove the layer of sediment by hand, without using large equipment, taking care to not disturb the natural soil layer.



8.2 Comparative assessment of positive and negative implications of the proposed activity and alternatives

Chapter 6 contains a detailed investigation and assessment of the alternative options for the proposed Nooitgedacht clay quarry. The positive and negative implications of each alternative are also described in Table 29. A comparison is done below to assess the positive and negative implications of the proposed activities compared with the no-go alternative (current situation). This should provide a fundamental consideration of the feasibility of the project.

Table 32: Comparison of the proposed preferred activities and the no-go option

	Proposed clay quarry	No-go option (current situation)
Positive impacts	<ul style="list-style-type: none"> • Creation of employment opportunities during the construction and operational phases of the project. • Stimulation of the local economy. 	<ul style="list-style-type: none"> • No environmental impacts
Negative impacts	<ul style="list-style-type: none"> • Possible soil-, surface water- and/or groundwater contamination. • Vegetation loss for the footprint of the proposed mine. • Possible generation of dust. • Some geological strata will be permanently altered by proposed open quarry mining activities to be done by Ecce Holdings. • Wetland may be altered if management is not according to the wetland assessment and management measures as set out in this report • Surrounding landowners may be further impacted upon as a result of impacts listed above. 	<ul style="list-style-type: none"> • No job creation loss of jobs and economic contribution. • Increased poverty and associated social degradation in the region.

The preferred alternative activities will have environmental impacts which, through specialist recommendations, can be mitigated to be of low risk.



9 Rehabilitation

9.1 Closure objectives and actions

The following sections formalise the specific actions required and standards to be achieved when demolition and rehabilitation of infrastructure is to be conducted. The following are closure objectives for the proposed mine:

1. To remove any pollutants and waste from site.
2. To slope area and cover mining areas with sufficient soil in order to -sustain vegetation.
3. To achieve self-sustaining vegetation on mining area and remove alien vegetation.
4. To ensure that water pollution is contained on the proposed mine property, and that natural watercourses are not affected.
5. To ensure that the area is erosion resistant.
6. To ensure that there are species diversity.
7. To ensure that there are sufficient plant density and seed production for the effective re-vegetation and maintenance of the area.
8. To ensure that the fauna return to the area and successfully mate and breed.
9. To ensure that the air quality is of an acceptable level and that the level is maintained.
10. To ensure that the public is safe and satisfied with the end land-use and that is compatible with surrounding land.
11. To ensure that the area is maintenance free.
12. To ensure that natural ecological process return to normal.

9.2 Rehabilitation plan

9.2.1 Concurrent Rehabilitation

1. Ensure compliance to management measures associated with wetland during construction and operational phase. If any of the preventative measures fail, concurrently remove the layer of sediment by hand, without using large equipment, taking care to not disturb the natural soil layer.
2. The quarry will be concurrently backfilled during operational phase. The environmental preferred rehabilitation of the final void method is backfilling to create at least a self-draining surface, if reformation of original contours is not feasible. This option is generally not economically feasible. Nevertheless, considerations should be given to measures that can minimise the extent of the final void, which may include progressively placing overburden directly in the mined out section of the quarry.
3. In addition to rehabilitation of environmental and pollution control reasons, rehabilitation should include works to ensure public safety by removing or otherwise making safe any hazards, and by preventing access to hazardous areas. Prominent notice warning of the presence of potential hazards on a site should also be posted.
4. Regular reconciliation of overburden volumes removed in relation to the mining work programme must be done. Where possible, survey results should be used to correct bulking factors employed

in the original planning exercise, so that the conceptual planning can be improved and that overburden reshaping is also done to specification. Depending on the rate of quarry development, formal review should be done on a monthly, quarterly or annual basis.

5. All changes in the mining plan should be analysed from their effect on final landform design. Significant modifications to final landform will require modification to the EMP (and approval by the government).
6. At all times throughout the LoM, an assessment of the currently outstanding rehabilitation works and the associated costs should be maintained (and verified against the post mining conceptual land form).

9.2.2 Sloping of area

1. This sloping is for the areas where the quarry has been concurrently backfilled.
2. The general guideline is to regrade spoiled areas to approximate contours and to ensure that the rehabilitated topography links seamlessly to the surrounding topography. Paddocks will be implemented on these contours in the form of whale-back tops.
3. A bulldozer tends to create convex slopes when sloping an area. A concave slope is a more stable slope form; therefore it is advised to rather create concave slopes.
4. If needed, a network of drainage lines will be incorporated to the sloped areas. These drainage lines will ensure clean water run-off on the rehabilitated areas. Avoid impoundments on subsidence hollows which will cause water logging of the topsoil.

9.2.3 Final rehabilitation

Backfilling of quarry

See above for backfilling of quarry.

Final Sloping of Area and Ripping of Roads

1. The general guideline is to regrade spoiled areas to approximate contours and to ensure that the rehabilitated topography links seamlessly to the surrounding topography.
2. A bulldozer tends to create convex slopes when sloping an area. A concave slope is a more stable slope form; therefore it is advised to rather create concave slopes.
3. Slopes should further be contoured. Paddocks will be implemented on these contours in the form of whale-back tops.
4. The ripping of roads includes all haul roads on the mine rights area.
5. Where any soils have been compacted e.g. haul roads and access roads, soil will be ripped. Ripping is usually done by using a dozer with one or two ripper tines.
6. Ripping must penetrate through soil into the underlying overburden materials in order to ensure free drainage and to ensure root penetration.
7. Deep tillage must also take place to rip the subsoils as well as the topsoils. Successful subsoiling depends on shattering the compacted material. Wet soils will deform plastically without shattering.



Moisture content at the time of subsoiling should therefore be low, preferably nearer to the permanent wilting percentage than the field moisture capacity. Therefore subsoiling must take place in the dry season, which is summer.

8. Despite soils having been ripped, the soils resettle and remain excessively compact. Monitoring of soil strength and bulk density should be used to confirm the existence of this happening.
9. Most replaced soils is a mixture of topsoil and sub-surface soils which has a lower organic content. Soils treated with organic amendments, sawdust, etc, have a greater resilience to compaction.

9.2.4 Soil replacement

1. Once the final landform has been created, soil replacement can begin. Compaction is the most significant problem with replacement of soil. Compaction must be minimised by using the right equipment. Too heavy machinery must not be used to replace the soil. Rather use a dozer than a grader. Soils should also only be moved when it is dry to minimise soil compaction. Please note this may then lead to wind erosion or dust generation. Care must be taken to prevent wind blowing the placed topsoil away.
2. Provision should be made for the shrinkage, compaction or settlement of cover soil when calculating the amount of topsoil per area. Where any soils have been compacted, soil shall be ripped. Ripping is usually done by using a dozer with one or two ripper tines. Ripping must penetrate through soil into the underlying overburden materials in order to ensure free drainage and to ensure root penetration.
3. Deep tillage must also take place to rip the subsoils as well as the topsoils. Successful subsoiling depends on shattering the compacted material. Wet soils shall deform plastically without shattering. Moisture content at the time of subsoiling should therefore be low, preferably nearer to the permanent wilting percentage than the field moisture capacity. Therefore subsoiling must take place in the dry season, which is summer.
4. Despite soils having been ripped, the soils resettle and remain excessively compact. Monitoring of soil strength and bulk density should be used to confirm the existence of this happening.
5. Most replaced soils are a mixture of topsoil and sub-surface soils which have a lower organic content. Soils treated with organic amendments, sawdust, etc, have a greater resilience to compaction.

9.2.5 Re-vegetation

Seedbed preparation of bare soil

Some of the areas on the site have infestations of invader plant. It will not be able to prepare such areas with tractor-mounting implements for the planting of grass. The following steps need to be followed:

1. Break and loosen the soil crust with hand tools e.g. garden rakes for broadcast sowing.
2. Break and loosen the soil crust with sharp-pointed hoes or forks for row sowing.
3. In burned areas where wood ash is present, use the row-sowing method to ensure good soil-seed contact.



Seedbed preparation of weed infested soil

Many parts of the site, especially where rehabilitation has started, are covered with alien plants. If there is sufficient rain and warm temperatures after control of alien plants, dense pioneer broadleaf weed seedlings become established and cover the bare soil. In this case, it is necessary to use chemical alien control. The following must be considered:

1. It is recommended not to till this type of soil as it needs to be stabilized.
2. Control the alien plants with registered herbicides when the average plant height is 0.2 to 0.5m.
3. Sow grass seeds 10-14 days after spraying the weed seedlings.
4. Row sowing of grass seed. This will limit further soil disturbances.

Chemical, physical and biological status of replaced soils

1. The depth of the replaced soil should be assessed using a soil auger in a regular grid pattern. Augering should be done until spoil materials are intercepted.
2. Please note it is possible for error results. This may be due to original stony material, deep ripping that brought rocks to the top, etc. Therefore, measure these results against expected values and each other. Inspection of these holes will permit the identification of compact soil layers and the degree of disturbance of the soil-spoil interface.
3. Soil fertility sampling must also be done. Use a bucket auger of a “bicycle handlebar” auger for this.
4. Considering the results of the fertility sampling, chemicals, minerals and organics must be replaced in the soil.
5. Re-vegetation of indigenous plants must take place. It is proposed that the grab-a-grass dial method be used to choose vegetation to be used.
6. Alien vegetation shall be removed ongoing throughout re-vegetation.



10 CONCLUSION

Information has been provided to MDEDET and interested and affected parties during the Scoping Phase, the draft EIA Phase (in terms of NEMA), as well as part of the MPRDA process. Comments and concerns received have been included into this environmental impact assessment report. This document serves as the final EIA report.

Responsible mining and consultation with departments and I&APs throughout the construction and operational phases of the activities is promoted.

Impacts on the wetland including destruction, siltation, removal of vegetation and change in surface water flow characteristics could be significant. The proposed quarries must at all times be 32m away from the artificial wetland (old quarry) and 500m away from the natural wetlands. Special care must be taken to ensure that sediment rich storm water does not enter the wetland and riparian areas. Impacts on the loss of topsoil, natural vegetation and land use are could also be significant. Concurrent rehabilitation will mitigate these impacts. Mining activities could also significantly impact on the surface water and groundwater quality as well as loss of groundwater from dewatering and fracturing of rock. The impact on the surface water quality can be mitigated as described in Section 7.3.

Further management measures to control the impact on groundwater shall be investigated and implemented based on groundwater monitoring data. If the mine adhere to the management measures as set out in this report, mining may take place on Portion 25 of the farm Nooitgedacht.

