Vergenoeg Mining Company (Pty) Ltd.

Pipeline & WRD EIA Report

Locality: Rust de Winter

Departmental Ref No. Gaut: 002/12-13/E0080

December 2013

SHANGONI
Management Services (Pty) Ltd

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Vergenoeg Mining Company (Pty) Ltd.

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Unit C8
Block @ Nature
472 Botterklapper Street
Pretoria

Office: (012) 807- 7036
Fax: (012) 807 1014

SHANGONI
Management Services (Pty) Ltd

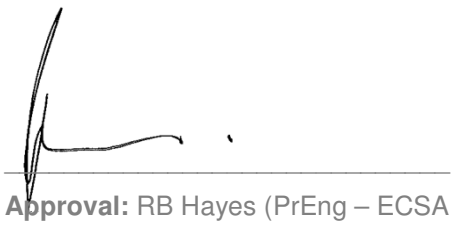
PROJECT DETAILS

Gauteng Department of Agriculture and Rural Development

Reference No.: Gaut: 002/12-13/E0080

Project Title:	Pipeline and Waste Rock Dump EIA
Applicant:	Vergenoeg Mining Company (Pty) Ltd.
Project Number:	VER-EIA-01-06-11
Compiled by:	Lee-Anne Fellowes
Date:	December 2013
Location:	Portion 4 and the Remaining extent of the farm Kromdraai 209 JR, Rust de Winter)

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.

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.

Ozone

Ozone is formed from the reaction of NOx and reactive hydrocarbons (HCs) in the presence of sunlight.

Particulate Matter (PM)

Also particle pollution is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small; they can only be detected using an electron microscope. Particle pollution includes "inhalable coarse particles," with diameters larger than 2.5 micrometers and smaller than 10 micrometers and "fine particles," with diameters that are 2.5 micrometers and smaller.

Permeability:

The capacity of a porous soil, sediment or rock (primary or secondary porosity) to transmit water; it is a measure of the relative ease of flow under unequal pressure.

Porosity:

It is the percentage of the bulk volume of a soil of rock that is occupied by interstices, whether isolated or connected.

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.

Storativity:

The volume of groundwater an aquifer releases or takes into storage per unit surface area of aquifer per unit change in head.

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.

Transmissivity:

The transmissivity is a measure of how much water can be transmitted horizontally, such as to a pumping well. It is the rate at which groundwater is transmitted through a unit width of an aquifer under a unit hydraulic gradient. Values are given in m^3/d through a vertical section of an aquifer 1m wide and extending the full saturated thickness of an aquifer under unit hydraulic gradient.

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

BID:	Background Information Document
CRR:	Comments Response Report
GDARD:	Gauteng Department of Agriculture and Rural Development
DWA:	Department of Water Affairs
EAP:	Environmental Assessment Practitioner
ECA:	Environmental Conservation Act of 1989
EIA:	Environmental Impact Assessment
EIR:	Environmental Impact Report
EMP:	Environmental Management Programme
ESR:	Environmental Scoping Report
GN:	Government Notice
I&AP:	Interested and Affected Party
LOM:	Life of Mine
NEMA:	National Environmental Management Act, Act 107 of 1998 as amended
R:	Regulation
S&EIR:	Scoping and Environmental Impact Reporting
TSF:	Tailings storage facility
VMC:	Vergenoeg Mining Company (Pty) Ltd.
WRD:	Waste Rock Dump

EXECUTIVE SUMMARY

The purpose of this document is to supply the Gauteng Department of Agriculture and Rural Development (GDARD) with the requested information pertaining to the National Environmental Management Act (NEMA), as amended, and Regulation 28 of the Environmental Impact Assessment Regulations, 2010. Contained in this document is a detailed investigation of the activity and site-specific potential impacts associated with the proposed new tailings and return water pipelines, as well as the waste rock dump area on the property of Vergenoeg Mine. The final outcome aims to identify significant impacts and mitigation measures to minimise adverse impacts that the proposed activities may have on the environment.

Vergenoeg mine is situated approximately 75 km North West of Bela Bela and 85 km north of Pretoria on the border of Limpopo Province. Vergenoeg Mine is the surface right holder of Portions 2, 3, 4 and the Remaining Extent of the Farm Kromdraai 209 JR, which recently formed part of the City of Tshwane Metropolitan Municipality, Metsweding District, Gauteng Province. Vergenoeg mine holds the mining license for the Remaining Extent of the farm Kromdraai 209 JR under license number: ML 6/97.

With the Life of Mine (LOM) expected to be more than 125 years the mine must make the necessary provisions to ensure that operations can continue for the duration of the expected lifetime of the resource. The mine is reaching the maximum capacity for its tailings and waste rock facilities. For this reason, Vergenoeg mine is in the process of expanding the current infrastructure to accommodate future mining waste requirements. The expansion activities will include new tailings - and return water pipelines from the plant to the existing new tailings storage facility number 5 as well as a demarcated area of approximately 75 hectares next to the mining operations that will be cleared for waste rock and marginal ore with a maximum capacity of 28 million tons / 11 million m^3.

The application for environmental authorisation of these activities entails conducting a Scoping 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 given the opportunity to comment and raise concerns 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.

During the development of the project, there were many alternatives considered to find the most appropriate route for the tailings and return water pipelines (same route) that complies with the engineering requirements, which have low environmental impact and are within the development budget. After due consideration of at least five main routes with additional three crossing alternatives, the most favourable route is chosen to convey tailings across the valley floor at the upper reach of the

return water dam where there is no functional wetland. This location of the crossing will allow effective control and isolation of spillages within the affected drainage catchment. Once the valley is crossed, the route will follow the valley by gradually cutting the contour lines to obtain a minimum of 2% gradient.

The location of the proposed new waste rock dump area is chosen to be close to the mining activities. This approach is more feasible to reduce operational costs as well as concentrating mining impacts to a smaller footprint. Potential significant impacts related to the waste rock dump were identified as additional dust generation impacting on air quality and the potential impact of leachate on surface and groundwater. An air quality impact assessment of the waste rock dump indicated that the major source of dust generation from the activity is limited to the hauling of waste rock, which can be adequately mitigated with continued dust suppression of access roads. As for the leachate, a geo-chemical characterisation was done on the two major sources of waste rock. The worst case scenario of acid rain resulted in limited leachate of salts, while there is no risk of acid forming leachate. Paddocks are proposed to intercept surface runoff water for evaporation.

It was found that with continued mitigation and monitoring, it is possible to adequately reduce the environmental impacts of significant risks. The environmental management plan accompanying this document outlines the mitigation measures required to comply with the recommendation for construction.

1. INTRODUCTION

This Environmental Impact Assessment report forms part of an application for environmental authorisation for the proposed tailings - and return water pipelines and waste rock dump mining activities on portion 4 and the remaining extent of the farm Kromdraai 209 JR, near Rust de Winter. The application process is undertaken on behalf of the applicant, Vergenoeg Mining Company (Pty) Ltd, by Shangoni Management Services (Pty) Ltd. Shangoni was appointed, as independent environmental practitioner, to assist the applicant in complying 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, Gauteng Department of Agriculture and Rural Development (GDARD). The Department subsequently registered the project (Ref No. Gaut: 002/12-13/E0080) and the formal Scoping and Environmental Impact Reporting (S&EIR) process was thereby initiated.

1.1 Applicant

Name of Applicant	Vergenoeg Mining Company (Pty) Ltd
Postal Address	Private Bag X2 Montana Park 0159
Responsible person	Hennie Terblanche
Telephone No.	(012) 723-7000
Fax No.	(012) 723-0045
Farm name and portion on which the activities take place	Portion 4 and the Remaining Extent of the Farm Kromdraai 209 JR, Gauteng Province.
Co-ordinates of operation	25° 15’ 30”S 28° 34’ 25”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	leeanne@shangoni.co.za / wilda@shangoni.co.za

1.2.1 Project Team

Jan Nel – Project Director

Jan has been actively involved or the past 16 years in environmental management within the mining industry, providing assistance with EMP Compliance, Environmental Impact Assessments (EIA). Financial Provision Calculations, Closure Plans, Rehabilitation Plans, Environmental Management Programme Reports (EMP) and EMP Performance Assessments. He is further experienced in environmental management through third party certification audits as well as Environmental Management System (EMS) implementation and has in excess of 8000 audit hours to date. Jan is also the vice chairman of TC 207 in South Africa.

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 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). Wilda is part of the ISO 14001 implementation and environmental auditing team at Shangoni.

Lee-Anne Fellowes – Environmental Practitioner

Lee-Anne has a B-tech degree in Nature Conservation at the Tshwane University of Technology and holds a National Diploma in Nature Conservation. She gained valuable experience in the conservation and the environmental field through her employment at Gauteng's Department of Agriculture, Conservation and Environment. Her areas of expertise include flora monitoring, bio-diversity and conservation plans, Environmental Impact Assessments (EIA), identification of alien invasive species and eradication programmes. Lee-Anne has 7 years experience at Shangoni Management Services as project lead to EIA's and EMP.

1.3 Current situation

Vergenoeg Mine is currently depositing tailings within the existing Tailings Storage Facilities Number 3 and 4, located next to the pit and plant on the western side. The lowest wall of the tailings facilities is the designated area where waste rock is deposited, which acts as a buttress increasing the stability of the tailings facility. These facilities have a limited remaining lifespan and alternative strategies for tailings deposition are required. Preferably, a good management strategy will be to change over to the new tailings facility before the current tailings storage facilities reach maximum capacity. The remaining capacity at the current tailings facilities can be used for standby in an event where pumping to the new facility is interrupted (e.g. equipment failure, maintenance requirements or emergency situations).

1.4 Proposed activities

The expansion of proposed mining operation includes the following main activities:

- Tailings - and return water pipelines,
- Electricity supply (power line), and
- Waste Rock Dump.

1.4.1 Pipeline

Vergenoeg Mining Company (VMC) proposes to construct a pipeline to link the plant with the newly constructed Tailings Storage Facility Number. 5. The system will comprise of a collection of three pipes (two of 150mm for tailings and one of 200mm diameter for return water) and between 1.2 and 3 kilometres in length depending on the final route. Associated infrastructure includes a service road, power lines and pump houses on both sides of the pipeline. Mitigation measures in an event of power outages or spillages also needs to be considered as part of the design.

An estimated 226m^3/hr of tailings (92 tons/hr of solids and 202 t/hr water) will be pumped to the Tailings Storage Facility Number 5. Water recovery design considers the wet season, with a recovery of approximately 70%, that will be conveyed back to the plant. As inspection and maintenance on the line must be done, vegetation clearance will be required. Refer to **Appendix G5**.

The mine initially identified four (4) alternative routes for the pipeline and power line. A site selection study was conducted by Shangoni Management Services (attached to **Appendix G1** of this document) to determine the most feasible route for the pipeline. Three categories were identified to assess the feasibility of each site: environmental risk, economic feasibility and engineering requirements. There was only one feasible route complying with engineering demands for which a more detailed investigation was undertaken. Three (3) possible alternative options were suggested to cross the Rhenosterspruit.

Main engineering constraints dictating the alternatives are that the pipe must be between 2% and 6% gradient and it cannot have sharp 90° bends. Infrastructure required to overcome these constraints rendered the possibility of crossing over of the dam wall impractical, expensive and dangerous. The preferred route will cross the valley within the upper footprint of the return water dam, continuing west along the spruit and gradually maintaining the required 2% slope upward. Refer to Chapter 6 for more detailed discussions on the route alternatives.

1.4.2 Electricity supply

A new 6.2 kV transmission line of approximately 3 kilometres will supply pumps and lights at the new tailings storage facility with electricity. The 3 phase transmission line will be connected to the mine's existing substation and follow the same route as the pipelines. Overhead lines will be suspended with impregnated wooden poles. Base pins will be used in the case of the preferred alternative to suspend the power lines crossing over the wetland area. Bulk electricity is supplied to the mine from Eskom's Rust de Winter substation. Electricity supply to Tailings Storage Facility Number 5 (TSF5) will serve pumps and lighting.

A sump pump within the seepage collection pond will pump seepage back to the Tailings Storage Facility No. 5 from where a floatable barge pump will pump water into a balancing tank before pumping back to the return water dam (Red Dam). There will also be an option to pump directly from the seepage collection pond to the balancing tank. Recovered water will be pumped along the proposed pipeline for re-use in the Plant. Pumps will be secured within an enclosed building to reduce mechanical noise and vibrations to the surrounding environment.

1.4.3 Waste Rock Dump

An area of approximately 75 hectares was identified next to the current operational tailings facilities to be used for the disposal of waste rock as well as stockpiling of marginal non-ore. The facility is designed for a maximum capacity of 28 million tons / 11 million m^3. An ecological assessment, attached in **Appendix G4**, was done by Pachnoda Consulting cc for the proposed waste rock dump (WRD) area.

A detailed management plan is attached as appendix H that describes the operations of the WRD area. Figure 1 indicates the layout of the planned WRD stockpiling at the identified area. The main strategy will be to start depositing adjacent to the tailings facilities and from there move outward as the WRD size increases. The capacity of the proposed WRD should serve the mine for the next 25 years.

A waste rock characterisation assessment was conducted and samples were taken from the two main waste streams found on the mine. Acid based accounting was used and the worst-case scenario applied. The two samples were sent to WaterLab (Pty) Ltd for analysis. The results showed that rock

type iii are non-acid forming (Total S (%) <0.25% and NP: AP ratio 1:3 or greater). Refer to **Appendix G8** for further detail on the obtained results.

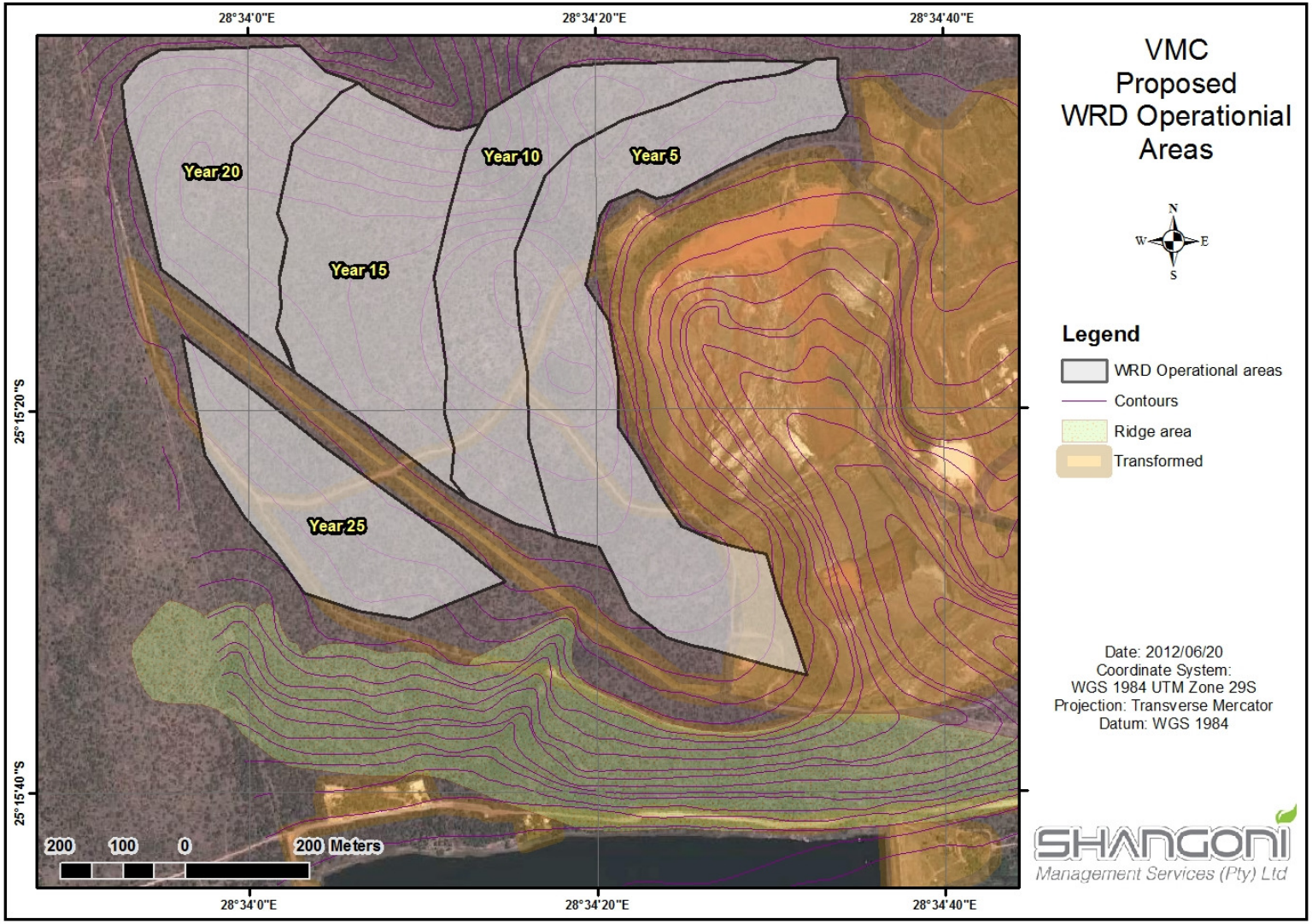


Figure 1: WRD Operational Area in 5-year intervals

Waste rock and marginal ores will be deposited on separate piles at the designated area. Mitigation measures to minimise negative impacts should include the following:

- Clearing of vegetation will be minimised to the footprint required for current operations to limit the extent of the impact and prevent unnecessary erosion.
- Surface water control berms will be designed to divert all runoff water towards Tailings storage facilities 3 and 4 to become part of the affected water system. These berms will periodically be moved to maintain a buffer of at least 10 metres from the toe of the WRD. Temporal intervals to extend the berm will depend on the expansion rate of the WRD. The design of the berms must effectively separate clean and affected runoff water, and should assist in preventing erosion. Minimising the runoff slope will decrease the velocity of runoff water and reduce the possibility for erosion.
- On the western and south-western side, evaporation paddocks must be constructed to prevent runoff water from exiting the mine's property.

The main power supply line for the mine runs through the middle of the proposed WRD area. Proper management is essential to ensure safe and effective operations. A servitude is present for the particular line and is regularly serviced to prevent tree and shrub encroachment. Only grass species are allowed to grow within the buffer of the servitude. The same management strategy will apply for the WRD activities. No waste rock or marginal ore may be dumped within the buffer zone of the power line. Slopes of the dump adjacent to the power line will be kept within the natural angle of repose. This slope will vary depending on the grain size and type of rock.

No waste rock is allowed to be deposited onto the defined ridge area to the south of the proposed pit. Delineation has been done on a combination of the characteristics of a ridge as described in the departmental ridges guideline policy (GDARD, 2001), as well as field observations. Details of the ridge area can be found in Section 2.1.13 of this document.

1.5 Proposed Locality

The proposed project location is on Portion 4 and the Remaining Extent of the farm Kromdraai 209 JR. This site is situated within the existing mine property at the northern border of Gauteng. The mine is located approximately 7 km south of Rust de Winter towards Moloto. The site locality map is given below as Figure 2.

Table 1: Direction and distance to the nearest town

Direction	Distance from site	Closest town
NE	7 km	Rust de Winter
W	30 km	Pienaars River
S	25 km	Moloto

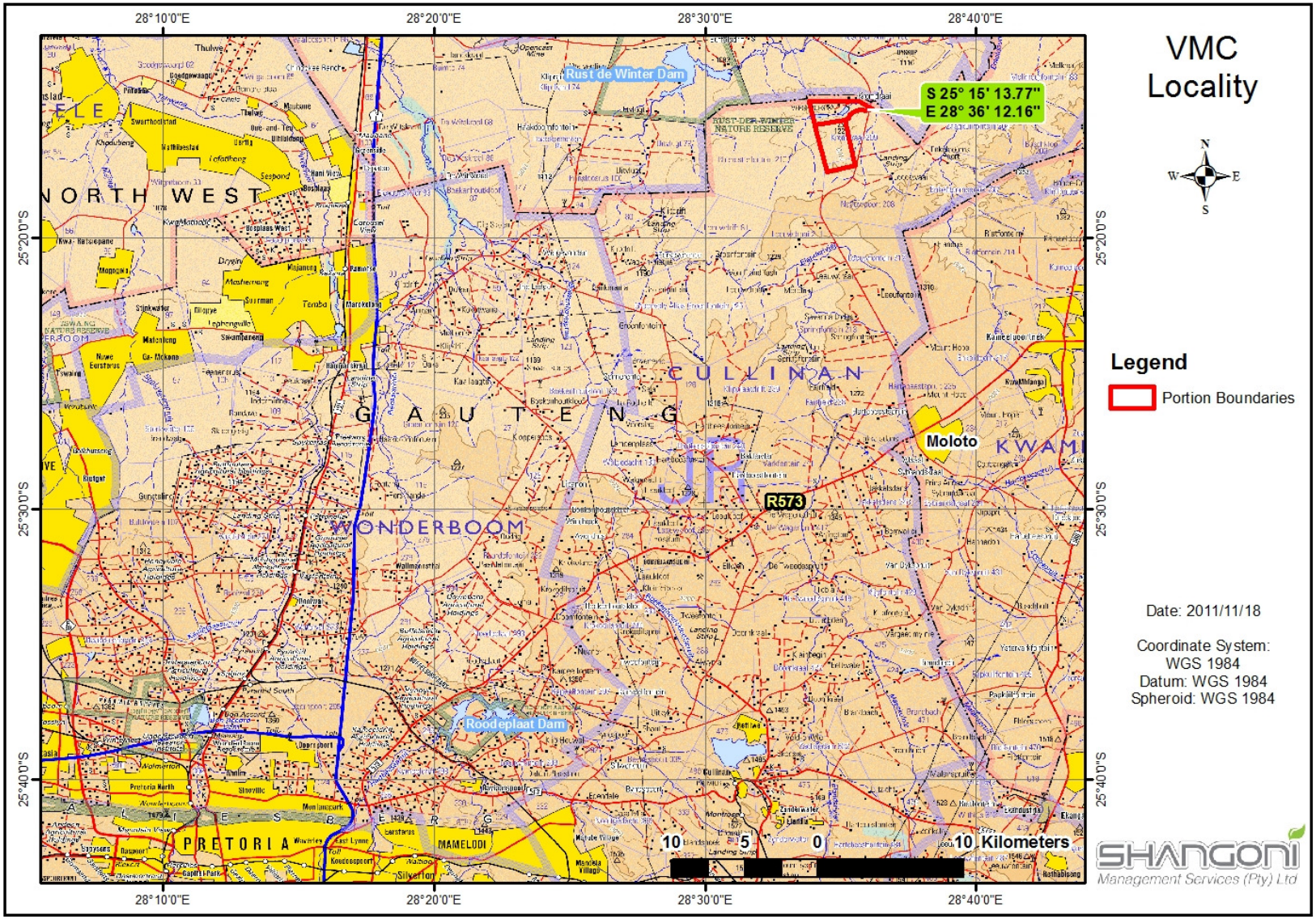


Figure 2: Site locality map

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. Refer to the site locality map in Figure 2 above for an indication of the location and boundaries of the study area.

2.1 Biophysical aspects affected

2.1.1 Geology

The geology of the Vergenoeg ore body has been fully described in Handbook II of the Geological Survey called "Fluorspar Deposits of the Republics of South Africa and Bophuthatswana" by I.T. Crocker, J.E.J. Martin and A.P.G. Söhnge. A detailed report by I.T. Crocker titled: "*The Vergenoeg Province: Volcanogenic Fluorite-Hematite Ore Deposits in Rhyolitic Pyroclastics on Kromdraai 209 JR and Naauwpoort 208 JR., Transvaal South Africa*" further describes the geology. This report contains an analysis of sections through the ore body and borehole logs as well as a plan showing surface geology.

The Vergenoeg ore body was formed approximately 1 950 million years ago when a violent gas-vapour eruption occurred through the 3 000 – 4 000 m thick older Rooiberg Felsites of the Bushveld Complex. The ore body itself occupies the volcanic vent and has the typical mushroom shape tapering sharply to two feeder vents. It closely resembles a carbonatite or kimberlite type eruption. The fluorite-haematite type of ore is derived from the Bushveld granite having formed because of special conditions of crystallization of the latter, which led to the formation of late mineralising fluids.

The Bushveld granite typically occurs at the base of the Rooiberg felsite while the pyroclastic volcanic rocks to which the Vergenoeg ore body is genetically related occur on top of the uppermost Rooiberg felsite unit. The pyroclastics consist of tuffs and agglomerates and are composed of ejected felsite fragments and hematitic tuffs. The hematitic tuffs form fairly high-grade lenticular iron ore bodies.

The Vergenoeg ore body consists essentially of fluorite-hematite ore at surface. This represents a gossanous oxidation zone capping a fluorite-siderite-magnetite ore, which is found at subsurface levels within the vent and represents the original rock type. The shape of the ore body has been defined by geophysical methods, in particular a gravity survey and drilling.

The overburden soil is very shallow or non-existent. Where it is present, it consists of a sandy hill wash.

Mining operations are located entirely within the oxidation zone and the ore displays textures typical of a gossans, e.g. colloidal (water precipitated) hematite ore formed by repeated hydration-

dehydration of iron oxide in the presence of oxygenated ground water. Both magnetite and siderite are converted to hematite in the presence of oxygenated ground water in the surface-weathering zone. Mineralogical fluorite-hematite makes up over 95% of the composition of the ore body in the oxidised zone and fluorite-siderite-magnetite in the unoxidised ore.

Two high-grade metspar plugs are present within the ore body and numerous metspar veins radiate from these. The plugs have sharp contacts with the lower grade massive ore. Several high-grade iron ore deposits also occur and some have been mined on behalf of Dunswart Steel/Iscor.

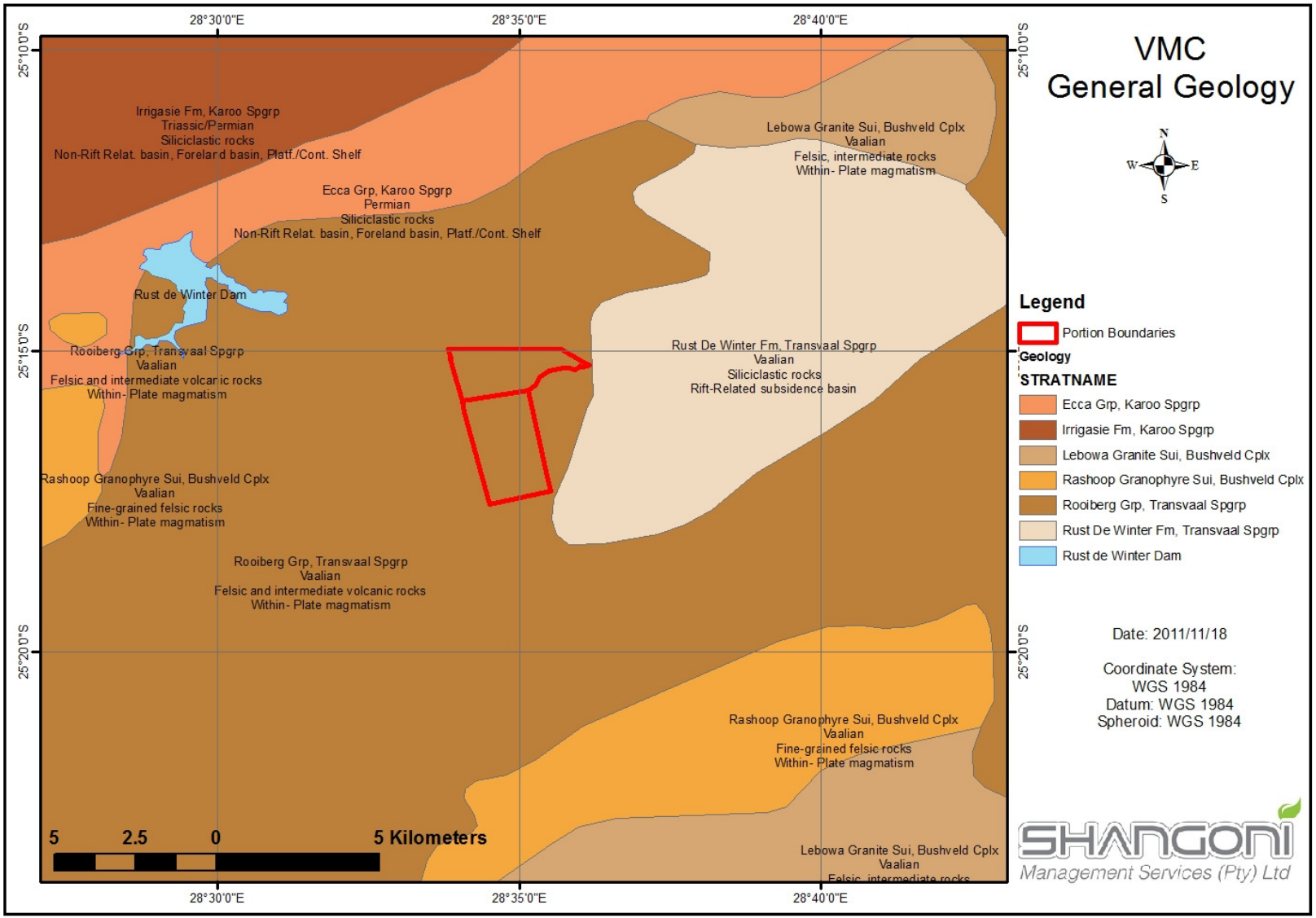


Figure 3: Regional Geology

Sections 2.1.2 to 2.1.3 were sourced from the (EMP, 2008).

2.1.2 Climate

The climate is semi-arid and hot for most of the year. In winter, the nights are cold but the days are bracing at about 23°C. The annual rainfall mainly consists of afternoon thunderstorms, averaging at approximately 610 mm.

The rainy season range from about November to March, with peak precipitation in December. About 50 to 80 rainy days per year may be expected. Hail is about half as (or less) frequent than on the Highveld (Region H).

Average daily maximum temperatures are about 32°C in January and 22°C in July; extremes are of the order of 42°C and 31°C respectively. Average daily minima are about 18°C in January and 4°C in July, whilst extremes can reach 8°C and – 7°C respectively. Days are often very oppressive in summer, whereas winter nights can occasionally be decidedly cold. Frost occurs on the average during the months June to August.

Winds are mainly light to moderate and blow from the north-easterly sector except for short periods during thunderstorms or weather changes when they have a southerly component.

2.1.2.1 Rainfall

The rainy season lasts from about November to March, the peak of the rainy season falling in December. About 50 to 80 rain days per year may be expected. Hail is about half as (or less) frequent than on the Highveld (Region H). The rainfall is somewhat unreliable and in approximately 12% of all years, rather severe drought conditions occur.

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 2010.

Table 2: Average monthly precipitation

Month	Average (mm)
1	117.9
2	83.3
3	75.4
4	45.6
5	12.3
6	5.2
7	1.5

Month	Average (mm)
8	6.4
9	14.2
10	62.4
11	99.9
12	107.3
Total	635.0

Maximum-recorded storm events are summarised in Table 3 below.

Table 3: Maximum recorded storm events

Month	1 hour rainfall (mm) Roodeplaat	24 hour rainfall (mm) Rust de Winter	24 hour rainfall (mm) Roodeplaat
1	47,8	87,5	83,5
2	34,4	82,0	48,0
3	34,0	125,7	83,2
4	39,8	67,0	68,0
5	18,7	38,0	37,4
6	6,5	23,0	37,2
7	3,1	35,5	6,0
8	7,2	37,0	13,0
9	80,7	42,0	31,0
10	31,2	77,5	80,1
11	30,2	71,5	80,7
12	39,4	93,0	70,0

Table 4: Forecast extreme 24 Hour storm rainfalls (Roodeplaat)

Month	1:50 year storm event (mm)	1:100 year storm event (mm)
1	111.6	126.4
2	58.1	65.7
3	66.8	75.5
4	95.3	110.4
5	36.2	41.2
6	25.0	29.2
7	6.0	7.0
8	12.2	14.3
9	36.0	41.6
10	102.4	116.9

Month	1:50 year storm event (mm)	1:100 year storm event (mm)
11	81.3	91.1
12	90.0	101.4

2.1.2.2 Temperatures

Average daily maximum temperatures are 32°C in January and 22°C in July; extremes are of the order of 42°C and 31°C respectively. Average daily minimum for the area ranges from 18°C in January to 4°C in July, whilst extremes can reach 8°C and -7°C respectively. Days are often very oppressive in summer, whereas winter nights can occasionally be decidedly cold. Frost occurs on the average during the months June to August.

2.1.2.3 Mean monthly evaporation

Evaporation figures for the area fluctuate between a minimum of 98mm in June and a maximum of 225mm per year in December. The average total evaporation per year is 2,024mm per year. Refer to Table 5 for the free water surface evaporation figures.

Table 5: S-pan evaporation in mm for the period 1967 to 2011

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Free surface	216	189	184	145	122	98	106	137	183	213	205	225

Source: (EMP, 2008)

2.1.3 Topography

The major feature in the area is the deep valley of the Kromdraaispruit running west to east that forms the southern border of the Remaining Extent of the farm Kromdraai 209 JR. Two smaller valleys branch out of this major valley in a north-westerly direction, thus separating the hill containing the ore body from the range of hills on both sides. The hills are steep sided and very rocky while the valleys are narrow, thus making the area unsuitable for farming or even grazing. To a large extent, the rocky nature of the ground prevents erosion. The vertical height from the valley floor to the top of the ore deposit is approximately 100 metres.

South of the major valley of the Kromdraaispruit is Portion 4 of the farm Kromdraai 209 JR. A general drainage forms to the east of the property. There is a poorly defined drainage channel along the floor of the valley, and the average slopes are 1:10 along the valley and 1:2.4 on the side slopes. Figure 4 shows the 5-metre contours and provide an indication of the topography for the area.

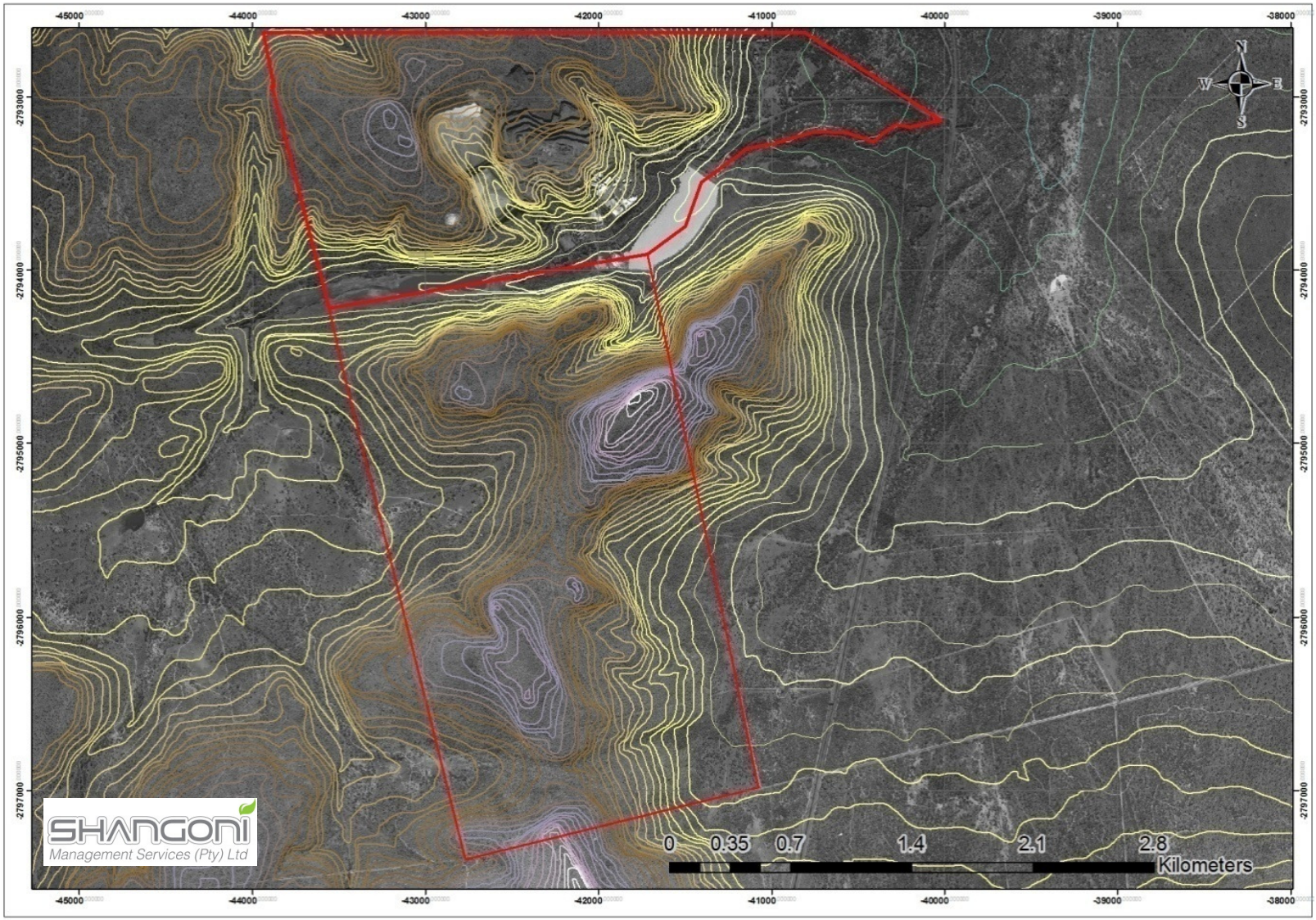


Figure 4: Topography of the Vergenoeg mine

2.1.4 Vegetation

2.1.4.1 Regional vegetation description

Vergenoeg mine is located within the mixed Bushveld region that forms part of the Savannah Biome. Prominent occurrence of trees and graminoids can be found that is influenced by fire and grazing (Van Rooyen & Breedenkamp, 1998).

2.1.4.2 Site specific vegetation

The hills and plains around the mine are covered with the hardy grass and shrub trees of the mixed Bushveld type.

Pachnoda Consulting cc conducted an ecological assessment on the alternative routes for the pipelines as well as the area identified for the proposed Waste Rock Dump (refer also to **Appendix G3** & **4**).

A total number of 235 plant species (including 66 trees and 43 grass species) were identified in four distinct vegetation communities:

- Pennisetum setaceum Community
- Tribulusterrestris - Panicum maximum Community
- Combretum apiculatum - Dichrostachys cinerea Community
- Pouzolziamixta – Croton gratissimus Community

SVcb 13 Loskop Mountain Bushveld vegetation can be described as low mountains and ridges with open tree savannah on lower-lying areas dominated by *Burkea africana* and a denser broad-leaved tree savannah on lower slopes and midslopes with prominent *Diplorhynchus condylocarpon, Combretum apiculatum* and *Acacia caffra.* Herbaceous layer is dominated by grasses.

Important taxa include the following:

Table 5: Tall trees

Tall trees:
Acacia burkei

Table 6: Small Trees

Small trees:	
Acacia caffra	*Ochnapulcra*
Burkea africana	*Protea caffra*
Combretum apiculatum	*Pseudolachnostylis maproneifolia*
Combretum zeyheri	*Terminalia sericea*

Croton gratissimus	*Brachylaena rotundata*
Faurea saligna	*Combretum molle*
Heteropyxis natalensis	*Pappea capensis*
Strychnos cocculoides	

- Important and irreplaceable areas;
- Non-perennial rivers,
- Ridge (Class 1).

Table 7: Tall shrubs

Tall Shrubs	
Diplorhynchus condylocarpon	*Elephantorrhiza burkei*
Mundulea sericea	*Grewia flava*
Psydrax livida	*Vitex rehmannii*

Table 8: Low Shrubs

Low Shrubs:
Searsia zeyheri

Table 9: Succulent Shrub

Succulent Shrubs:
Aloe castanea

Table 10: Graminoids

Graminoids:	
Aristida transvaalensis	*Loudetia simplex*
Tranchypogon spicatus *Enneapogon pretoriensis*	*Digitaria eriantha* subsp.*eriantha* *Hereropogon contortus*
Setarias phacelata	*Tristachya biseriata*

Table 11: Herb

Herb:
Xerophyta retinervis

Endemic taxa include the following:

Table 12: Endemic taxa

Geophytic herb:	*Gladiolus pole-evansii*
Succulent herb:	*Haworthiakoel maniorum*

The Geographical Information System (GIS) evaluation on the site revealed the following:

Table 13: Red listed plants

Red listed plant metapopulation	*(Eulophiacoddi),Frithiahumilis*

Table 14: Orange listed plants

Orange plant historical location	*Elaeodendron transvaalense,* *Myrothamnus flabellifolius*

Table 15: Protected plant species recorded from the study site

Species	Status on study site	Vegetation Unit
Adenia glauca	Localised.	A. castanea– C. viridus shrubland
Aloe castanea	Localized - high densities	A. castanea– C. viridus shrubland
Aloe marlothii	Localised.	C. gratissimus – S. sphacelata rocky bushveld
Xerophyta retinervis	Widespread.	Widespread, occurring on almost all the terrestrial vegetation units.
Xerophyta viscosa	Localised.	A. castanea– C. viridus shrubland

Table 16: A list of medicinal species observed on the study site (according to Van Wyk et al., 1997; Pooley, 1998). Important (heavily utilized) species are highlighted in grey.

Species Identified within Van Wyk*et al.* (1997) with medicinal value		
Species	**Parts used**	**Treatment**
Acacia karroo	Bark, leaves & gum	Stomach ailments such as diarrhoea and dysentery. Bark, gum & leaves used as an astringent for colds and conjunctivitis.
Dicoma anomala	Leaves	Used to treat fever.
Elephantorrhiza elephantina	Roots	Treatment of fever, ulcers, and to stop bleeding.
Elaeodendron transvaalense	Bark	Treatment of stomach aches, fever, pain & infections
Gomphocarpus fruticosus	Leaves	Treatment of headaches, tuberculosis and general body aches.
Helichrysum spp.	Leaves & stems	Treatment of coughs, colds, fever, infections and menstrual pain.
Heteropyxis natalensis	Leaves	Treatment of colds.
Sclerocarya birrea subsp. *caffra*	Bark and fruit	Treatment of various ailments, including malaria. Fruit rich in Vitamin C.
Terminalia sericea	Roots	An infusion is made to treat pneumonia and wounds.
Typha capensis	Rhizomes	Treatment of venereal diseases or during pregnancy to ensure an easy delivery.

Species Identified within Van Wyk*et al.* (1997) with medicinal value		
Species	**Parts used**	**Treatment**
Vernonia oligocephala	Leaves and twigs	Used to treat abdominal pain and colic.
Euclea undulata	Roots	Used as a remedy for headaches and toothaches.
Pellaea calomelanos	Leaves and rhizomes	Treatment of colds and asthma.
Xerophyta retinervis	Stems	Used to treat asthma.
Ziziphus mucronata	Roots, leaves and bark	Treatment of respiratory ailments.
Species Identified within Pooley (1998) to contain medicinal value		
Species	**Treatment**	
Aloe greatheadii	Treatment of burns and wounds.	
Commelina africana	Used for a wide variety of ailments including fevers, fits, heart complaints and bladder infections.	
Ledebouria spp.	Treatment of flu and backaches.	

Table 17: A list of weeds and invader plant species identified on the study site

Species	Vernacular Name	Type	Control Measure	Category
Cereus jamacaru	Queen-of –the-night	Weed	Urgent Eradication	1
Achyranthesa spera	Burrweed	Weed	Control	1
Opuntiaficus-indica	Prickly Pear	Weed	Eradicate	1
Lantana camara	Lantana	Weed	Eradicate	1
Solanum elaeagnifolium	Satansbos	Weed	Control	1
Solanum seaforthianum	Potato Creeper	Weed	Eradicate	1
Pennisetum setaceum	Fountain Grass	Weed	Control	1

Table 18: Ridge classes in Gauteng

Ridge class (percentage transformed	Percentage of Gauteng's transformed ridges included in class (area is hectares)	Ridges included in this class
Class 1 (0-5% transformed)	6% (2 048ha)	Suikerbosrand, Perdeberg, Witwatersberg and parts of the Magaliesberg range, Gatrant and Witwatersberg.
Class 2 (5-35% transformed)	48% (15 218ha)	Parts of the Magaliesberg range,

Ridge class (percentage transformed	Percentage of Gauteng's transformed ridges included in class (area is hectares)	Ridges included in this class
		World Heritage site, Klipriversberg, Bronberg, Daspoortrand, Kwaggasrand, Gatsrand and Skurweberg.
Class 3 935-65% transformed)	20% (6 560ha)	Northcliff, Roodepoort and Krugersdorp ridge, and parts of the Daspoortrand.
Class 4 (65-100% transformed)	26% (8260ha)	Melville koppies and Linksfield ridges.

Source: Conservation plan, Version 1

2.1.4.3 Endangered species

Red Data and Orange Listed species with known distribution patterns sympatric (QDS: 2528BC) to the study area are listed in the ecological assessment report by (Pachnoda Consulting, 2011) in **Appendix G3 & 4**. Although suitable habitat was observed on the study site, none was confirmed during the survey.

No threatened (pertaining to the IUCN categories "Endangered" or "Vulnerable") plant species were observed on or near the proposed activity site.

The "vulnerable" orchid *Eulophiacoddii* was not observed, although potential suitable habitat was observed from the *D. condylocarpon – B. burchellii* woodland. The known populations of *E. coddii* occur on soils of sedimentary origins, while those on the study site are of volcanic origin, thus exemplifying the apparent absence of this species on the study site.

Victor & Keith (2004) introduced the concept of an Orange List for plant taxa that warrant conservation measures but do not meet the IUCN criteria. These taxa include those species at risk of becoming threatened (all taxa currently considered "Near-threatened" or "Data Deficient") or considered to comprise of rare or declining populations.

No Orange listed plant species were observed on the proposed activity site.

Three plant species were observed and listed as protected under Schedule 11 of the Nature Conservation Ordinance of Transvaal (No 12 of 1983) during the survey.

Table 19: Protected plant species recorded on site (Niemand, 2011b)

Species	Status on site	Vegetation Unit
Aloe marlothii	Localised.	*C. apiculatum – S. sphacelata* woodland.
Stapelia gigantea	Localised.	*C. apiculatum – S. sphacelata* woodland.
Xerophyta retinervis	Widespread.	Widespread, occurring on almost all the terrestrial vegetation units.

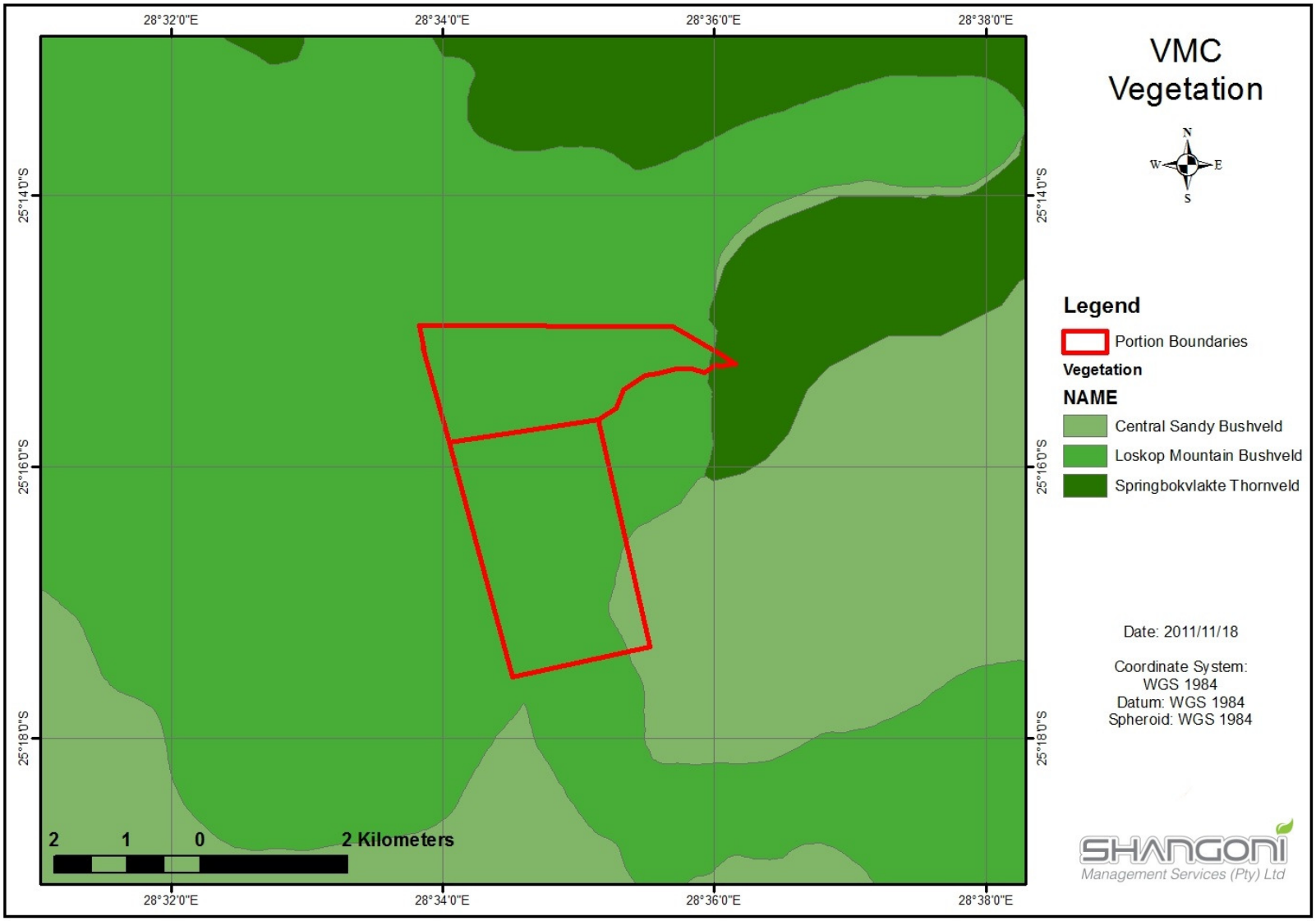


Figure 5: General vegetation around Vergenoeg Mine

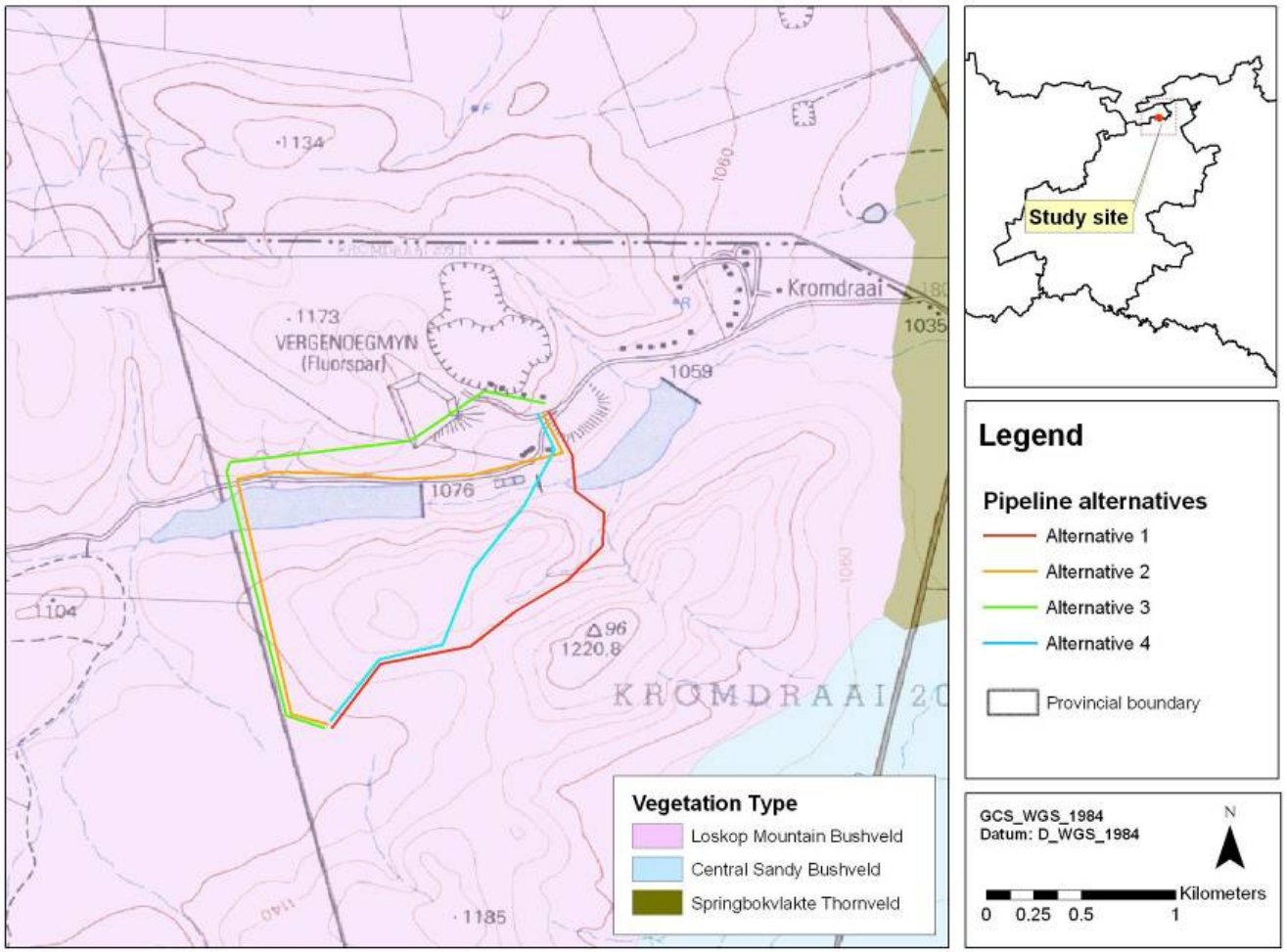


Figure 6: Vegetation at Vergenoeg Mine according to Pachnoda Consulting CC

2.1.4 Animal life

2.1.4.1 Commonly occurring species

Common species occurring naturally in the area were obtained from a survey of wildlife species in the Rust De Winter Dam Nature Reserve. Except for the more exotic species such as zebra, leopard, Crocodile and shield-nose snake, all the other species are found around the mine. Since the natural conditions around the mine have been preserved, and most of the animals are still found here, it will not take a great effort to re-establish the whole spectrum of species originally occurring here.

Table 20: An inventory of mammalian taxa observed from the different vegetation units during a site survey conducted on 21 & 23 April 2011 (Niemand, 2011a; Niemand, 2011b).

Scientific Name	Vernacular Name	Observation Indicators	Observed Habitat
Aepyceros melampus	Impala	Visual sightings, spoor & droppings	Very common and widespread – confined to flat areas dominated by *Combretum apiculatum* veld.
Aonyx capensis	Cape Clawless Otter	Droppings	Recorded from the edge of the upper dam.
Atilax paludinosus	Marsh Mongoose	Spoor & droppings	Confined to the wetland area linking the two dams.
Canis mesomelas	Black-backed Jackal	Spoor	Widespread –abundant from the southern part of the study area.
Cercopithecus pygerythrus	Vervet Monkey	Visual sightings	Widespread, but most prevalent near the wetland and impoundments.
Hystrix africaeaustralis	Cape Porcupine	Quills & diggings	Widespread.
Kobus ellipsiprymnus	Waterbuck	Visual sighting	Rare, probably introduced.
Leptailurus serval	Serval	Spoor	Localized, restricted to the wetland section in-between the two dams.
Lepus saxatilis	Shrub Hare	Droppings & Visual sightings	Widespread, all areas.
Mellivora capensis	Honey Badger	Visual sighting	Single observation of an adult flushed from rocky cover.
Mungos mungo	Banded Mongoose	Visual sightings	Observed near the upper dam.
Oreotragus oreotragus	Klipspringer	Visual sightings	Restricted to outcrops on the central part of the mine area south of the impoundments.
*Otomy s*sp.	Vlei Rat	Droppings	Common from the central wetland area (dominated by *Cyperus laevigatus*.) linking the two dams.

Scientific Name	Vernacular Name	Observation Indicators	Observed Habitat
Papio cyanocephalus ursinus	Savannah Baboon	Droppings & visual sightings	Widespread, although common on higher lying areas (summit of outcrops).
Parahyaena brunnea	Brown Hyena	Spoor & droppings	Fairly widespread – most active on the southern part of the mine area.
Paraxerus cepapi	Tree Squirrel	Visual sightings	Common from areas with good woody cover
Phacochoerus africanus	Common Warthog	Visual sightings & spoor	Widespread.
Potamochoerus larvatus	Bush pig	Spoor & diggings	Restricted to areas with dense cover.
Redunca fulvorufula	Mountain Reedbuck	Droppings & visual sightings	Fairly common – confined to the upper slopes of the numerous outcrops (mainly on the northern part of the mine area and proposed alignment).
Sylvicapra grimmia	Common Duiker	Spoor, droppings & visual sightings	Widespread, all areas – abundant.
Tragelaphus strepsiceros	Greater Kudu	Visual sightings, spoor & droppings	Very common and widespread.

Table 21: The typical bird species recorded from the study site (Niemand, 2011a; Niemand, 2011b)

Species	Average Abundance	Consistency	% Contribution
Dark-capped Bulbul	1.2	0.73	41.71
Cape Turtle Dove	0.4	0.28	11.34
Red-eyed Dove	0.3	0.28	7.74
Jameson's Firefinch	0.5	0.22	4.26
Cape White-eye	0.45	0.22	3.84
Black-backed Puffback	0.45	0.23	3.06
Neddicky	0.25	0.18	2.59
Southern Black Tit	0.4	0.17	2.24
Black-collared Barbet	0.3	0.17	2.15
Yellow-fronted Canary	0.65	0.17	2.02

2.1.4.2 Endangered or rare species

The following endangered or rare species occur on the mine:

2.1.5 Soils

- Red listed reptile habitats (African Rock Python),
- Red listed invertebrate habitat (*Branchionopus pretoriae),*
- Red listed invertebrate habitat *(Metisella bicolour).*
-
-

A detailed report by I.T. Crocker titled: "*The Vergenoeg Province: Volcanogenic Fluorite-Hematite Ore Deposits in Rhyolitic Pyroclastics on Kromdraai 209 JR and Naauwpoort 208 JR., Transvaal South Africa*" describes the soils.

The area consists of Red-soils (ferruginous) with high base status. The fluorite ore is present in a near vertical kidney shaped extinct volcanic pipe with surrounding spill over remnants of the pipe on the surface. Very little topsoil is present especially on the steeper slopes and ridge towards the valley.

The volcanic rock outcrop extends over the entire hilltop. No overburden is mined since the ore body is exposed to the surface. The result is very limited soil cover that can be removed and stored for later use. No soil plan has therefore been prepared. Refer to figure 7 for the soils of the study area.

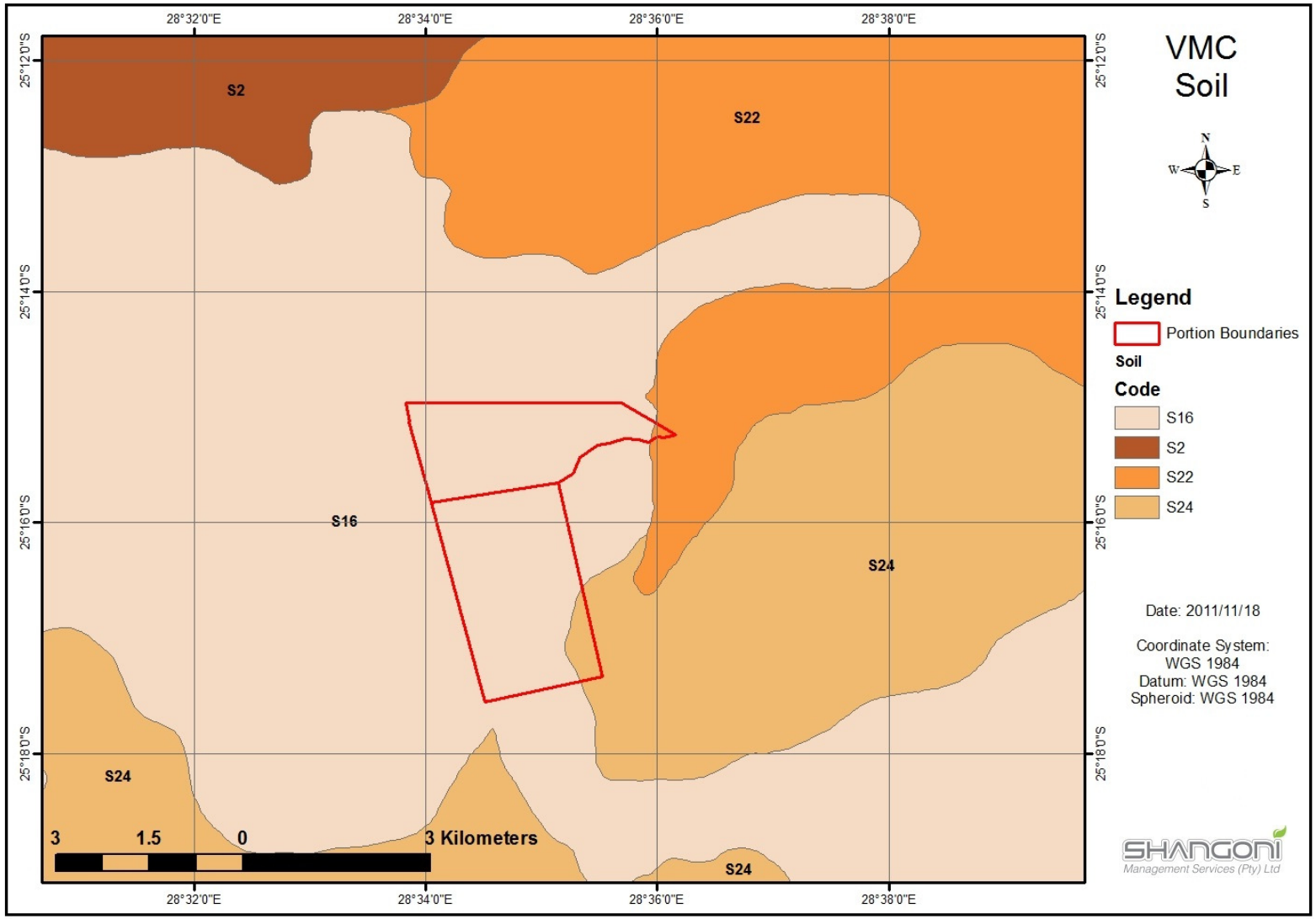


Figure 7: Soils at the Vergenoeg Mine (AGIS, 2011)

Soil codes used in Figure 7 are described with the following features:

S2 - Freely drained, structure less soils
- Favourable physical properties
- May have restricted soil depth, excessive drainage, high erodibility, low natural fertility

S16 - Non soil land classes
- May be water-intake areas
- Restricted land use options

S22 - Association of Classes 17 and 18: Structureless soils and clays
- May have favourable physical properties or high natural fertility
- Restricted depth, imperfect drainage, wetness, high swell-shrink potential, plastic, sticky.

S24 - Association of Classes 17 and 20: Structureless and poorly drained soils
- May have favourable physical properties; relative wetness favourable in dry areas; may sustain wetland vegetation
- Low base status, restricted depth, imperfect to poor drainage, excessive wetness, high erodibility.

2.1.6 Surface water

The mining operation is located in the Olifants catchment, in the quaternary catchment B31D as shown in Figure 8 below. Surface water draining from the site mostly takes place in the form of overland flow collecting in a non-perennial stream, the Rhenosterspruit (also known as the Kromdraaispruit). Water from this stream subsequently flows in to the Enkeldoringspruit and Elands River.

There is no constant flow of water so the quantity of surface water is determined solely by rainfall in the 42 km^2 catchment area of the watercourse. This brings forth a typical characterisation of non-perennial tributaries with extreme fluctuating surface water levels.

In the past 40 years, both dams on the mining property have only been full on two occasions, in 1978 and 1996. The fresh water dam was completely empty in the period April 1986 until January 1991 except for a short period in April 1988 when an inflow of 16 500 m^3 occurred. On 14 February 1996 after heavy rains in the upstream catchments, the fresh water dam was filled by an inflow peaking at 240 000 m^3/h and the fuse plug spillway was eroded away. This has since been repaired. The total flood inflow up to the time that the fuse plug operated is estimated at 1,88 million m^3. Seepage through the dam wall is estimated at approximately 22 m^3/h. The third dam safety inspection report done in 2009 indicated that the stability of the wall is still intact and only maintenance was required to improve the operating valves of the dam (Lloyd, 2009).

Flood peaks and volumes for recurrence intervals of 1:20, 1:50 and 1:100 years and the regional maximum flood are given in Table 22. The results are based on the Rational Method and storm

rainfall for the station Kalkheuwel (550612). (Shangoni Management Services, Stormwater management plan, 2013).

Table 22: Flood peaks and volumes

Recurrence intervals	Flood peaks m^3/s	Volumes *106 m^3
1:20	216	1,4
1:50	278	1,8
1:100	339	2,2
Regional Maximum Flood; QRMP	632	8,2

Source: (Storm water management plan, 2013)

Wetlands

There are wetland areas within the valley bottom and on the banks of the clean water diversion dam. AGES (2011) classified the wetland areas as a valley bottom system that forms a tributary of the Elands River. The overall present ecological state of the wetland is assessed as a category D, which implies a largely modified wetland system. The ecological importance and sensitivity is considered as high. The wetland assessment is attached as **Appendix G9**.

2.1.6.1 Mean Annual Runoff (MAR)

The Mean Annual Runoff (MAR) for the catchment area (approximately 42 km^2) was calculated as 94 704 m^3 per annum, over an 11 year period for which data was available. Table 23 presents the recorded run-off into the Rhenosterspruit.

Table 23: Recorded run-off in the Rhenosterspruit

Year	Week	Low (m)	m^3	High (m)	m^3	Difference	Annual
1981	5	5.20	217280	6.35	330755	113475	
1981	43	5.07	205400	5.3	226420	21020	134495
1982	3	4.65	174640	4.85	188560	13920	13920
1983	1	2.60	63020	6	290400	227380	
1983	15	5.45	240130	5.55	249270	9140	
1983	44	3.90	124250	5.8	272120	147870	384390
1984	12	4.70	178120	5.2	217280	39160	39160
1985	3	2.40	55580	2.75	68600	13020	
1985	18	2.05	42560	2.3	51860	9300	
1985	44	1.50	28350	3.2	88200	59850	82170
1986	15	0.00	0	0	0	0	0
1987		0.00	0	0	0	0	0
1988	11	0.00	0	1.02	16500	0	16500
1989		0.00	0	0	0	0	0

Year	Week	Low (m)	m^3	High (m)	m^3	Difference	Annual
1990		0.00	0	0	0	0	0
1991	4	0.00	0	6.7	371110	371110	371110
1992	48	2.40	55580	3.7	122180	66600	
1993	47	2.00	40183	3.1	79400	39217	
1994	37	2.40	55580	4.8	183160	127580	
1995	50	3.20	81000	5	200000	119000	
1996	6	5.00	200000	17.6	2000000	1800000	
1997	49	3.90	124250	6.8	350000	225750	
Average MAR							**101 243**

Source: (Storm water management plan, 2013)

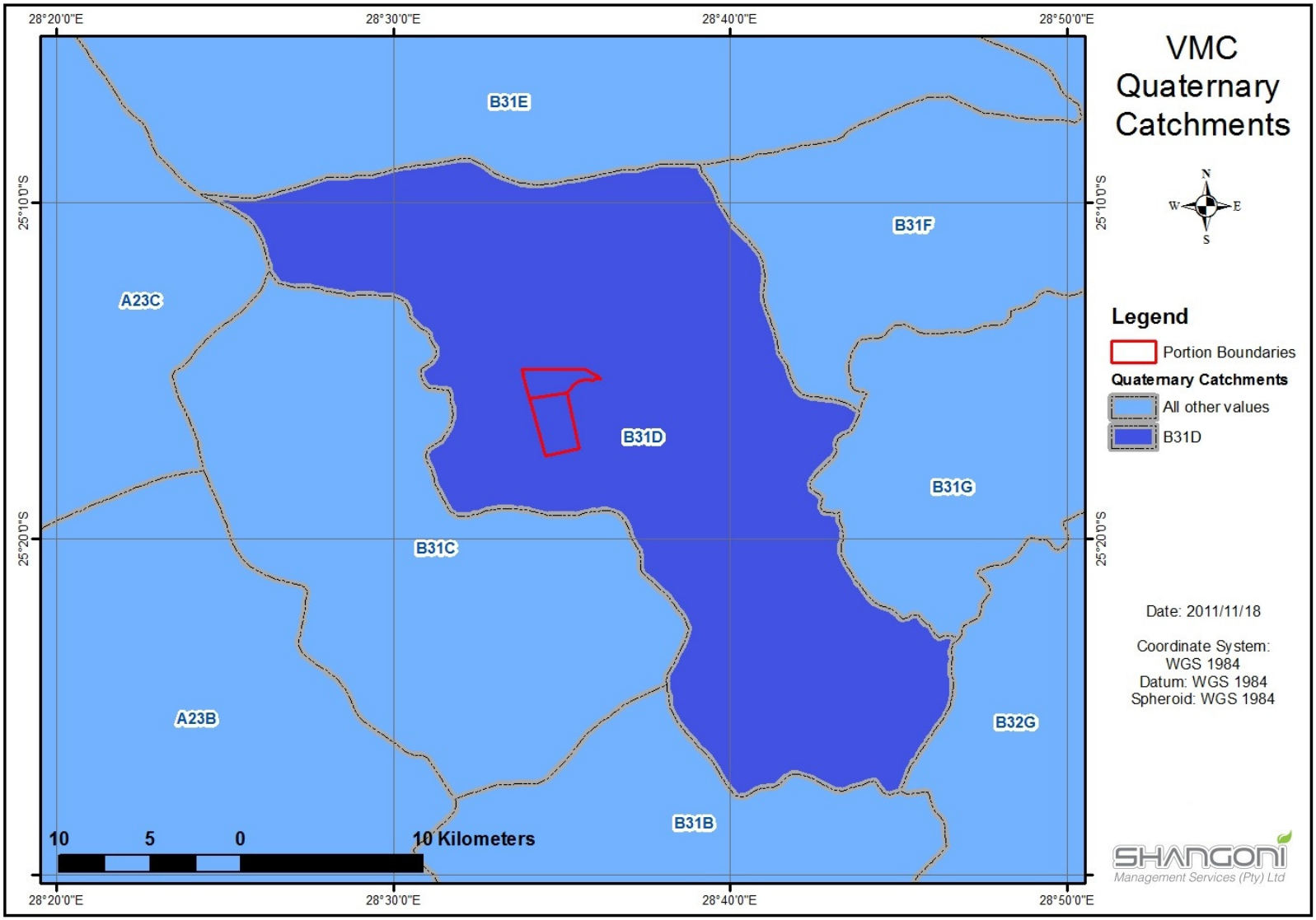


Figure 8: Quaternary catchments at Vergenoeg Mine

2.1.6.2 Surface water quality

Surface water is sampled and analysed in accordance with a quarterly monitoring programme. Analysis are done by SANAS accredited laboratories: Waterlab and Aquatico, and captured on in the mine's water quality database.

Shangoni Management Services (Pty) Ltd. provided the Vergenoeg mine with procedures on how to take ground- and surface water samples, and the preservation thereof. These procedures were only introduced and implemented in March 2011.Prior to this, data was gathered using unknown sampling methods, with a potential margin of error.

The quality of water samples are classified in two (2) categories, clean water and process (industrial) water. Different requirements and limitations are applicable depending on the water use. South African Water Quality Guidelines, Volume 1: Domestic Water Use (DWAF, 1996a) provides limits for various substances concerning health and aesthetic risks for potable water. All ground water samples are analysed according to domestic water use limits, as it is more difficult to contain and treat contaminated ground water. Water that is used in mining processes only is compared with limits set by Volume 3: Industrial Water Use of the South African Water Quality Guidelines (DWAF, 1996b).

For proper water quality monitoring, samples are taken of water upstream of the mine as well as downstream to determine the impact that the mine has on the water quality of the Rhenosterspruit water drainage system. Figure 9 and Figure 10 indicates the location of the monitoring points. These monitoring points are currently under review in collaboration with the mine and the DWA to optimise and improve the effectiveness of the water quality monitoring programme, as also recommended by the (Hydrogeology study, GCS 2010)).

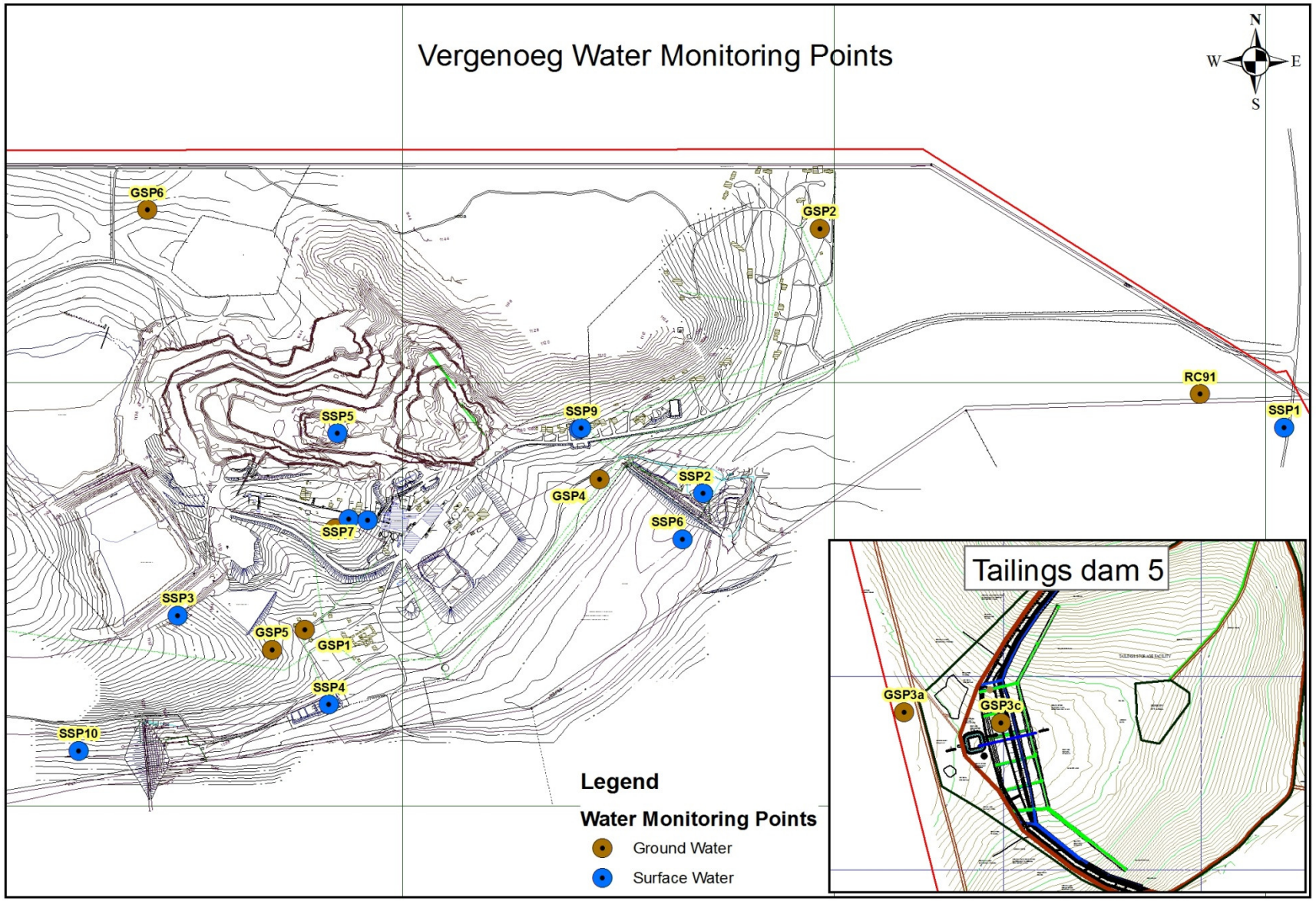


Figure 9: Surface and Ground water monitoring points

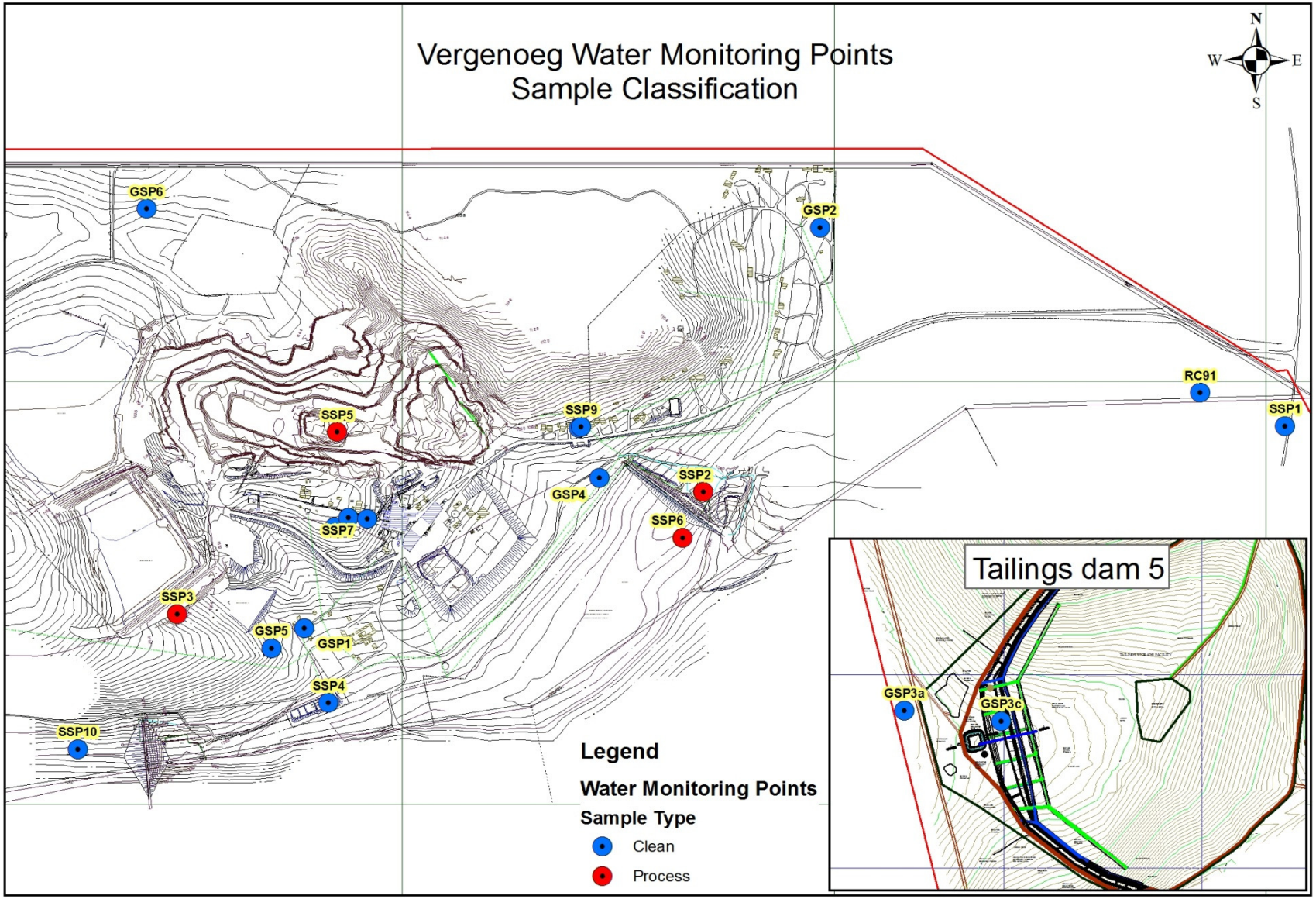


Figure 10: Clean and Process water monitoring points

Table 24: Surface water chemical qualities upstream and downstream of the mine

S SP1	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TDS	Comment
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l	mg/l	Below bridge at entrance turn-off
2012/01/05				11		103	17			3				7.7		79		
2012/02/17	24		0.148	12	77	77.6	18	0.612	8.1	3	0.416	211	0.5	7.9	4	82	600	
2012/03/30				15		112	19			27				7.6		107		
2012/05/05				15		121	20			4				7.8		126		
2012/06/04	16	292	0.334	14	114	128	28	1.48	8.3	4	0.369	266	0.2	8.1	42	145	798	
2012/07/05	0	296.88	-0.01	15.39	103.15	137.5	17.75	0.01	9.22	4.79	0.018	301.24	-0.057	8.66	65	179.68	809	
2012/08/07																		Dry stream river/no collection of water sample
2012/08/30																		Dry -No sample
2012/10/24				44.13		39.3	11.53			8.11		7.26	0.112	6.6		82.16		
2013/01/15				53		107	20.9			10		135		6.26		502		
2013/02/28	81.6			31.4	32.9	86.7	21.3	<0.003	9.56	6.13	1.06	115	0.294	7.28	2	253	30.9	
2013/04/05				23.7		47.5	4.16			4.08				7.02		134		
2013/04/25				26.4		53.6	11.3			4.63				6.99		160		
2013/06/10	11.6		0.792	29.8	11	63.9	16.7	<0.003	6.38	6.16	<0.001	105	<0.017	7.42	2	243	25.5	
2013/07/04				11.1		70.1	4.74			4				7.27		3.54		

S SP10	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	p	TDS	Comment
			mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l	mg/l	mg/l	Blue Dam
2012/01/05				8		16.8	**3.8**			3				8		<5			
2012/02/17	8		<0.100	9	17	17.5	**4**	0.276	8.3	3	0.178	20	0.5	7.9	<1.0	<5		154	
2012/03/30				8		7.7	**4**			3				7.7	19				
2012/05/05				9		18.8	**4.2**			3				8		<5			
2012/06/04	12	60	<0.100	8	19	18.8	**4.1**	0.321	8	3	0.032	20	0.2	8	1.6	<5		126	
2012/07/05	0.41	56.81	-0.01	8.93	17.17	18.37	3.65	-0.01	8.81	3.21	-0.001	22.9	-0.057	8.09	1	4.57		103	
2012/08/08				14		18.87	4.26			3.04		19.36		7.9		3.68			
2012/08/30	1.28	55.68	<0.006	9.35	18.29	19.31	4.06	<0.006	9.73	3.27	<0.001	32.42	0.073	8.37	11	4.53	<0.025	106	
2012/10/24				8.37		20.37	4.149			3.48		22.14	0.147	8.23		<0.132			
2013/01/15				10.4		22.5	4.37			3.44		23		8.25		4.67	8.74		
2013/02/28	162		<0.003	9.59	20.2	24	4.95	<0.003	7.47	3.47	<0.001	21.4	0.057	8.22	8	0.041	<0.008	57	101
2013/04/05				12.3		22.7	4.16			4.23				8.28		4.29			
2013/04/25				11.1		24.6	4.48			3.77				8.3		4.33			
2013/06/10	6.16		<0.003	12.2	24	26.3	5.63	<0.003	10.4	4.24	<0.001	36.3	0.043	8.17	<1	5.72	<0.008	78.7	146
2013/07/04				29.7		25	15			6.23				8.3		300			
2013/08/07				11.2		26.8	4.27			4				8.27		5.77			

Bacteriological monitoring is done for domestic water received from Rust de Winter dam, as well as the outlet from the oxidation ponds forming part of the process water circuit. Results from the domestic water (SSP9) and the oxidation ponds (SSP4) are tabled below.

Table 25: Surface water bacteriological qualities of the mine

S SP9	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TDS	p	Plate count	T coliform	Faecal coliform
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l	mg/l	mg/l			
2012/01/05				8		14.3	0.3			4				7.5		<5					
2012/02/17	8		0.344	9	16	15.4	0.3	0.668	4	4	0.036	14	0.8	7.2	<1.0	5	88		120000	0	0
2012/03/30				9		16.6	0.3			4				7.7		<5					
2012/05/05				9		16.8	0.3			4			0.5	7.6		6			7 000	0	0
2012/06/04	<5		56	8	16	16.2	0.3	0..298	4.2	4	0.033	15	0.3	7.7	<1.0	6	126		8 800	0	0
2012/07/05	1.84	58.41	0.03	12.89	18.03	19.39	0.68	0.04	5.42	4.98	0.052	19.76	<0.057	8.03	-1	10.43	107		410	<1	<1

S SP9	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TDS	p	Plate count	T coliform	Faecal coliform
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l	mg/l	mg/l			
2012/08/08				9.1		17.14	0.39			4.61		15.32	0.178	7.54		10.85			2	<1	<1
2012/08/30	2.98	58.97	0.013	14.87	21.21	21.68	1.485	<0.006	6.62	5.18	<0.001	21.26	0.348	7.71	3	13.85	120	<0.02 5	71	<1	<1
2012/10/24				7.7		17.66	0.37			7.38		16.83	0.361	7.57		0.52			0.049	66	<1
2013/01/15				9.23		17.8	0.604			4.35		11.5	<0.017	7.48		6.82					<1
2013/02/28	174		<0.003	15.2	23	26.1	2.01	<0.003	5.32	5.06	<0.001	15.6	0.445	7.84	1	9.65	50.6	107	<0.008	5230	<1
2013/04/05				12.4		17.9	0.279			5.69			0.72	7.6		4.8				5	<1
2013/06/10	4.16	52.2	<0.003	11.1	20.9	19.8	0.376	<0.003	4.37	5.62	<0.001	19	0.22	8.09	1	8.2	52.2	101	<0.008	18500	<1
2013/07/04				10.3		19.2	0.325			5.47			<0.017	7.74		7.08				300	<1
2013/08/07				10.3		20	0.432			5.37			0.473	7.74		7.4				6	<1

S SP4	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TDS	p	Plate count	T Coliform	Faecal Coliform
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l	mg/l	mg/l		/100ml	/100ml
2012/01/05				11		85	24			5			0.2	7.8		46				>2 400	0
2012/02/17																					
2012/03/30				23		105	24			11			0.5	7.6		62			750000	96 100	4 550
2012/05/05				13		89	23			6			0.5	7.6		84			4 800	210	2
2012/06/04	24		238	13	82	95.1	24	0.176	177	6	0.299	177	<0.2	7.5	4.4	89	566		120000	49 00	17
2012/07/05	8.06		0.09	13.31	71.59	82.2	9.15	0.04	8.24	5.63	0.002	173.5	<0.057	8.34	-1	72.1	479			4	1
2012/08/08				13.67		73.8	13.48			5.05		124.7	<0.057	7.63		57.64			>15000	9	3
2012/08/30	18.02	181.3	0.033	15	59.23	70.7	15.15	<0.006	9.87	5.77	0.318	136.3	0.079	7.54	34	60.07	410	0.853	>15000	110	11
2012/10/24				15.59		76.3	30.62			6.34		133.5	0.179	7.43		45.11			49		1200
2013/01/15				12.7		95	22.7			5.12		181	<0.017	7.67		53.8			14	227	19
2013/02/28		65.5	0.036	13.5	90.9	126	30.7	<0.003	12.1	5.86	0.532	225	0.055	8.26	4	65.5	295	620	120	1.06	1200
2013/04/05				19.9		112	3.76			7.69			0.295	7.94		111			3		54
2013/04/25				17.5		128	4.06			7.2			0.336	7.47		123			33		2100
2013/06/10	298	8.7	0.049	19.3	75.6	147	28.7	<0.003	10.4	8.36	0.115	308	0.063	7.7	4	209		838	39	0.129	300
2013/07/04				18.5		137	26.1			8.33			<0.017	7.79		213			58		480
2013/08/07				17.7		144	14			8.39			0.269	7.72		168			2200		27000

Process water qualities are measured where dewatering of the pit (SSP5) takes place, as well as water discharged from the plant into the return water dam (SSP6). Water from these monitoring points is within a close circuit and is measured according to the industrial water quality limits.

Table 26: Surface water process qualities of the mine

S SP5	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TDS	P
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l	mg/l	mg/l
2012/01/05																		
2012/02/17	796		76	209	55	239	7.1	21	5.1	36	11	109	2.7	3.1	2.8	1 380	2 288	
2012/03/30				145		183	83			27				3.3		851		
2012/05/05				108	49	132	70			18		55	0.3	3.7		643		<0.2
2012/06/04	372	<5	39	117	50	145	68	34	5.6	21	43	68	<0.2	3	6	690	1 286	
2012/07/05	20.07	-8.26	17.32	114.5	45.8	123.6	2.25	8.66	6.47	19.13	40.2	86.97	-0.057	3.79	14	476.42	752	
2012/08/08				114.3	48	126.6	3.503			23.88		104.34	<0.057	3.73		605.03		<0.025
2012/08/30	166.6	<8.26	27.158	115	45.57	127.8	3.856	4.546	7.11	18.95	42.2	106.53	<0.057	3.8	4	672.22	969	<0.025
2012/10/24				136.4	33.06	161.1	1.373			31.56		88.96	2.31	3.5		790.36		0.057
2013/01/15				119	33.1	146	47.6			26.2		80.4	0.611	3.51		778		4760
2013/02/28	3852		60.6	136	36.1	185	1.95	19.5	6.27	36.4	56.8	72.3	2.87	3.29	6	939	1232	0.008
3013/04/05				140	48	172	0.236			32.3		168	1.2	3.67		869		0.018
2013/04/25				148	38.3	185	2.17			31.2		124	5.88	3.64		933		<0.008
2013/06/10	396		54.5	132	51.3	175	4.04	1.97	4.82	32.1	70.3	125	0.878	3.81	<1	957	1307	<0.008

S SP6	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TDS	P
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l	mg/l	mg/l
2012/06/04	<5	2 200	87	361	198	544	303	25	25	7	16	1 287	0.2	9.5	14 626	374	3 108	
2012/07/05	0	2059	1.74	1.28	189	659	153.7	2.1	19.61	0.3	0.158	1500	-0.057	9.7	24726	403.39	3503	
2012/08/08				5.11	225.8	607	158			0.96		1549	<0.057	9.66		587.33		<0.025
2012/08/30		2062	0.572	2.51	45.57	627	166.6	24.35	20.45	1.09	0.248	1670	0.715	9.76	2950	696.17	4241	0.195
2012/10/24				7.25	109.5	735	2.159			2.92		1677	<0.057	10.87		113.25		
2013/01/15				6.58	218	606	142			1.27		1533	<0.017	9.74		691		
2013/02/28	0		0.353	3.26	359	631	119	2.7	26.5	0.27	<0.001	1488	<0.017	9.23	60355	1279	1339	4078

S SP6	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TDS	P
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l	mg/l	mg/l
2013/04/05				7.02	173	487	1.56			1.89		1341	0.247	9.42		800		
2013/04/25				3.46	177	525	53			0.82		1243	0.191	6.85		804		
2013/06/10	0		0.805	19.2	195		142	5.14	12.6	6.51	0.039	1399	<0.017	9.31	4870	831	1386	3437
2013/07/04				3.22	177	516	28.4			1.27		1350	<0.017	9.44		900		
2013/08/07				1.06	226	623	109			0.48		1640	<0.017	9.34		1076		

Surface water monitoring results:

The **Blue Dam (SSP10)** is sampled upstream from Vergenoeg and average quality of the dam reflects neutral, non-saline and soft to relatively soft water with high to elevated levels of fluoride (F). The dam is dominated by the sodium (Na) cation and to a lesser extent calcium (Ca), while the bicarbonate (HCO_3^-) anion and to a lesser extent the chloride (Cl) and sulphate (SO_4) anions is dominated on the anion side. The domination of the Na cation does indicate some anthropogenic influences. In addition, elevated F levels ranging between 3.65 mg/l and 3.95 mg/l may also be an indication of pollution in the dam.

SSP01 is sampled below the bridge at the entrance turn-off and is located downstream from Vergenoeg Mine. By comparing the upstream locality (SSP10) to the downstream locality an impact from Vergenoeg can be quantified. A similar quality profile exists for SSP01 compared to the upstream SS10. However, significant increases in terms of EC/TDS (total dissolved solids), Na, sulphate and F are apparent for the database period (based upon average results). SSP01 can be described as neutral to slightly alkaline, non-saline and soft to relatively soft with high to elevated levels of F, Na and SO_4. Based upon the high levels of F, the water is not suited for domestic or livestock watering use.

Based upon average results for the database period **SSP05 (Dewatering)** can be described as acidic, moderately saline and very hard with high to elevated levels of SO_4 and F. Given the acidic pH, the solubility of the metals aluminium (Al), iron (Fe) and manganese (Mn) is also extremely high. The profile is dominated by the Ca cation and the SO_4 anion. This water should be kept within the dirty water circuit and not allowed to be discharged or released since it would pose to be highly toxic to the environment and users thereof.

SSP06 (process water used in mining) is water received from the dewatering scheme and re-used in the process. The water quality profile is indicative of alkaline chemicals added in the process given its highly alkaline and saline nature. The average quality can be described as alkaline, saline and relatively hard with high to elevated levels of Na, carbonate (CO_3^{2-}) and F. At the high pH levels recorded (average = 9.4) metal species, especially Al, also tend to dissolve into solution; high to elevated concentrations of Al, Fe and Mn were subsequently recorded. This water should be kept within the dirty water circuit and not allowed to be discharged or released since it would pose to be highly toxic to the environment and users thereof.

SSP04 (oxidation pond) can be described as neutral, non-saline and soft with high to elevated levels of Na, SO_4 and F including total and feacal coliforms. Feacal coliform counts of up to 27 000 MPN/100 ml were recorded during the database period. The profile is dominated by the Na cation and the Cl and SO_4 anions.

SSP09 (drinking water) is drinking water utilised by the mine employees. The profile (based on average results) can be described as neutral, non-saline and soft to relatively soft with a Na-HCO_3^- (sodium bicarbonate) character. Occasional high F concentrations exceeding permissible domestic levels were recorded but the average F is well within acceptable drinking water quality guidelines. Although total coliforms are and total plate counts frequently recorded in the high ranges, this should not pose any health risks as *E.coli* was absent during the entire database period. This merely indicates a general hygienic quality of the water and that the disinfection protocol should be revised. The general quality based on average results is suitable for domestic use.

2.1.6.3 Surface water use

(1) On the farm Kromdraai – On the Remaining Extent of the farm on which the mine is situated, all surface water is contained in the two major dams in the valley. The mine receives its main clean water supply from the Rust de Winter dam. An approved Water Use License has been obtained for the water use activities taking place on the property of the mine.

Figure 11 indicates how much water is used daily for the various processes on the mine. Continuous review of the water uses on the mine is focused on water conservation to reduce wastage of clean water as well as optimising the reuse of process water.

(2) Upstream on the farm Rhenosterfontein – This farm is being run as a game farm as well as cattle. Surface water, when available, is being used for drinking purposes. Irrigation with borehole water is practised on a small scale.

(3) Downstream on the farm Rust de Winter –There has been no use of surface water from this source on any of the properties downstream as far as the confluence with the Enkeldoringspruit. About 5 km downstream irrigation agriculture is visible. (Hydrogeology study, GCS (2010)).

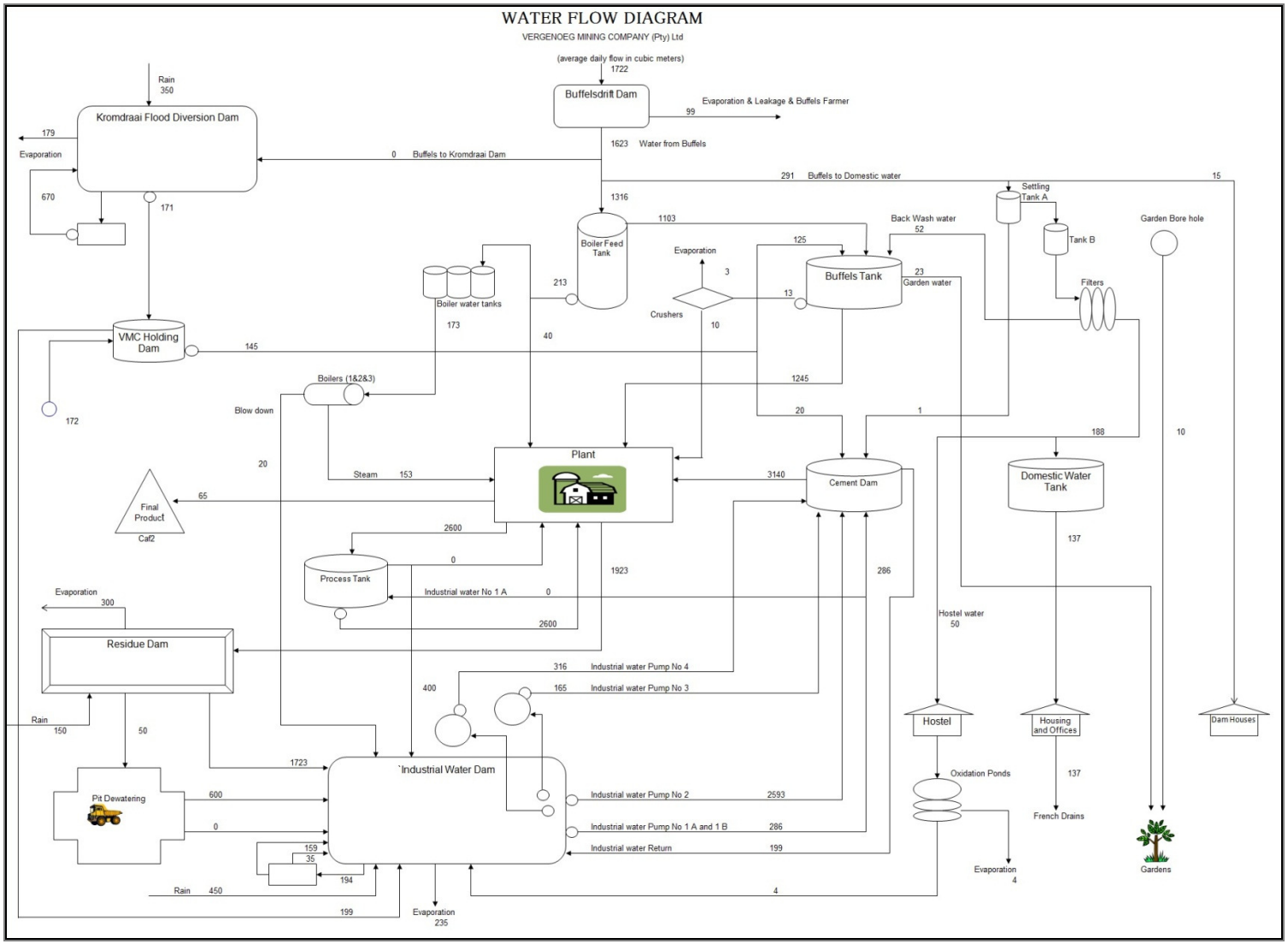


Figure 11: Simplified water balance for Vergenoeg Mine

2.1.7 Groundwater

The discussion on groundwater is based on the quantitative geohydrological information obtained from the approved (EMP, 2008) and the (Hydrogeology study, GCS (2010)).

2.1.7.1 Aquifer zones

2.1.7.1.1 Physical composition and description of the aquifers

Two different aquifer types occur in the area. These aquifers occur in large, pronounced and open fractures in the hard rock felsite; and secondary structures such as fractures along the contact zones between felsite and dykes of dolerite intrusions. Insignificant to small (less than $1m^3/h$), and large ($40m^3/h$) groundwater occur occurrences and groundwater movement are confined to these joints, fractures and cracks in the felsite formations and intrusions of dolerite and their weathered and fractured contact zones (the primary aquifer in the mining area). Such ground-water distribution and movement behaviour is described as fracture or fissure flow.

The dolerite intrusions, enclosing much of the mining area, provide impermeable sides (barriers) to groundwater flow. There is no hydraulic connection between the strata on either side of the barriers therefore the mine workings are located in an isolated compartment. Groundwater levels generally rise to levels higher than those at which water were encountered. This would indicate that groundwater occurs and moves in a semi-confined to confined fractured flow regime. The aquifers are therefore locally compartmentalized and are confined to a small catchment, limited in extent ($2km^2$) by surrounding impermeable dolerite. Insignificant fracturing across most of the area inhibits recharge and therefore, the long-term (5-year) sustainability of groundwater supplies from the aquifer without recharge.

There is a fault along the drainage course of the Rhenosterspruit. The new tailings storage facility south of the Rhenosterspruit is also enclosed by dykes of dolerite on either side. Most of the area is underlain by impermeable hard rock felsite with insignificant fracturing.

2.1.7.1.2 Aquifer classification

The aquifers underlying the area have been classified in accordance with the South African Aquifer System Management Classification, December 1995. The aquifers underlying the mining area can be classified as minor and possibly major aquifer systems across narrow sections of the hydro-geological regime where faulting and/or intrusion by dykes of dolerite are present. It is quite common in fractured rock environments where faulting and intrusion by dykes of dolerite have taken place, to have major and minor aquifers in close proximity to each other.

2.1.7.1.3 Boreholes and springs

Over the years, some 103 boreholes were drilled to depths varying between 60m and 160mbsl by the mine within the mining area and on adjacent properties. Recently, three deep, large diameter,

exploratory percussion boreholes were drilled with the primary aim of obtaining hydro-geological information pertaining to the geological formations and/or water-bearing strata (aquifers) directly beneath the site of the new tailings storage facility and to obtain samples of water from the underlying aquiferous strata if present. These boreholes were located such that they can be utilized for groundwater monitoring once the tailings storage facility is operational. There is only one private borehole water source in proximity to the mine (outside the mining area). There are no groundwater seeps and/or springs.

2.1.7.1.4 Aquifer balance

Groundwater levels

The depth to groundwater level is primarily determined by the type of aquifer and the hydraulic characteristics of the water-bearing formations and reflects piezometric levels in hard bedrock aquifers comprising fractured strata in felsites and contact zones between felsites and intrusions of dolerite. Groundwater levels reflect sub-compartmentalisation by these intrusives.

The regional saturated zone groundwater level varies between close to the surface at 0mbsl (artesian) close to the Rhenosterspruit to deep, below 58.2mbsl across higher lying areas. Groundwater levels inside the red dam (return water dam) are at higher elevations than the free water surface. The saturated zone extends from the groundwater level down to some 100mbsl, the depth beyond which water-bearing fractures are considered to be absent due to the characteristics of the felsite formation. The groundwater flow direction is predominantly from north to south towards the Rhenosterspruit, based on water level measurements and topographic information. The groundwater level gradient is large at approximately 10% in a downstream direction. Groundwater generally moves through joints, fractures and cracks in felsite due to the absence of large-scale fracturing/ faulting (preferential flow paths), which may restrict or limit groundwater movement. Large-scale fracturing may be present in the contact between felsite and vertical intrusions of dolerite (dykes). Nevertheless, the dolerite dykes enclosing the mining area will inhibit groundwater flow towards surface drainage features and compartmentalizes groundwater occurrences within the perimeters of the mining area.

Due to the relative low permeability of the underlying hard rock felsite across much of the mine area, coupled with the steepness of the terrain and therefore little recharge from percolating rain, groundwater levels are expected to fluctuate by less than 5m around the mean under steady-state conditions in the absence of groundwater abstraction and/or influx into mine workings. Flux in the aquiferous zones in the fractured felsite strata, coupled with the enclosure by impermeable dolerite confine groundwater flow as negligible subsurface flow, unlikely to drain far beyond the dyke downstream of the mining area.

2.1.7.1.5 Groundwater storage

The volume saturated aquifer material within the hydro geological regime; which is approximately 2km^2 in extent, or total catchments (in this instance almost equal to the volume of groundwater within the delineated zone which could interact with activities at the mine) is estimated to be approximately 750,000m^3.

2.1.7.1.6 Groundwater recharge

Recharge from natural rain is inhibited by unweathered hard rock felsite close to the surface. Recharge to the groundwater regime is generally expressed as a percentage of the mean annual precipitation (MAP) and also considers perennial steams and natural springs. There are no perennial streams and/or natural springs in the mine area. Recharge is unlikely to exceed 3% of MAP.

2.1.7.1.7 Groundwater discharge

Soils are dry and there are no indications at the surface that shallow groundwater discharge is taking place. Seeps have known to occur shortly after above average rains but they frequently dry up shortly after a rainy spell.

2.1.7.1.8 Aquifer hydraulic parameters

Transmissivity

The aquifers are mostly fractured in nature with a secondary porosity derived from cracks and fractures in the rock mass. Consequently, transmissivities are expected to be low to very low. Transmissivities, based on borehole test data, fall in the range between 0.1m^2/d and 100m^2/d where large-scale fracturing prevails in the contact zone between felsite and dolerite.

Storativity

Borehole discharge tests to quantify storativity have not been undertaken due to the absence of suitably located boreholes. However, based on the physical descriptors, the coefficient of storage is expected to fall in the range between 10-2 and 10-4 (between 0.01 and 0.0001m^3 of groundwater per m^3 of rock mass) for the saturated zone.

Permeability

Permeabilities of the soils and underlying rocks have been determined by in situ borehole tests. Permeabilities of unweathered and fractured felsite and dolerite vary between less than 0.01m/d (impervious) and 100m/d (pervious). Although the permeability of the rock mass is zero, the permeability of fractures zones and therefore preferential flow paths, may vary between 10m/d (low) and 100m/d (high). The average permeability of the aquifers is expected to be less than 1.0m/d.

Porosity

The porosity of the felsites is estimated at less than 1%.

Aquifer yields

The felsite aquifers are generally insignificant and yield negligible quantities of groundwater. General yields in the two aquifer types are as follows:

- Fractured felsite: 1m^3/h and 10m^3/h
- Felsite/dolerite contact zones: 5m^3/h and 40m^3/h.

2.1.8.4 Groundwater qualities

Groundwater chemical analysis is ongoing on the mine as required by the approved EMP and Water Use License. These results are presented in the tables below.

Table 27: Chemical analysis for groundwater

RC 91	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TALK	TDS	P (ortho phosphate)
			mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l		mg/l	mg/l
2012/01/05				13	78	103	13			4		209	0.2	6.9		71			<0.2
2012/02/17	24		0.973	16	78	104	14	38	6.4	4	3.19	220	0.5	6.7	97	106	312	666	
2012/03/30				12	77	105	14			4		202	0.2	6.8		95			<0.2
2012/05/05				14	86	105	13.8			5		195	0.5	7		108			<0.2
2012/06/04	64	280	1.07	15	86	107	17	34	6	5	2.98	205	<0.2	6.8	116	113		658	
2012/07/05	7.34	277.12	0.06	16.26	80.46	101.1	10.99	0.04	6.3	5.28	2.34	217.15	-0.057	8.06	91	106.24			
2012/08/08				15.76		103	12.67			6.23		259.77	<0.057	7.05		114.51			<0.25
2012/09/06	32.05	262.56	0.006	17.8	81.14	102.8	10.94	0.312	6.75	5.57	2.42	213.83	0.338	7.05	101	107.91		602	<0.025
2012/08/30																			
2012/10/24				17.93	65.06	120.3	18.4			6.12		220.76	0.195	6.96		239.96			0.049
2013/01/15				30.4	90.1	153				8.6		270	<0.017	6.57		568			86.7
2013/02/28	233		0.172	22.8	92.1	155	12.2	0.495	11.7	7.22	3.78	256	0.411	7.04	70	410	122	886	<0.008
2013/04/05				34.8	107	153	4.56			10.4		310	0.277	8.36		521			0.017
2013/04/25				27.5	96.2	155	2.4			8.5		290	0.264	7.87		541			<0.008
2013/06/10	26.6		<0.003	40.5	88.5	158	9.17	7.45	11.2	12.1	6.41	319	<0.017	6.82	53	581	148	1150	<0.008
2013/07/04				36.6	80.6	150	9.97			11.1		305	<0.017	6.89		580			<0.008

G SP2	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TALK	TDS	P (ortho phosphate)	Water level
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l		mg/l	mg/l	mbsl
2012/01/05				14	22	16.9	1.1			3		12	0.7	6.3		<5				7.3
2012/02/17	12		<0.100	9	27	14.4	0.9	0.049	3.7	3	<0.025	11	1.1	5.9	<1.0	<5	20	134		
2012/03/30				12	23	17.6	1.1			3		11	0.7	6.2		5				
2012/05/05				14	24	17.5	1			4		12	1	6.2		5				8
2012/06/04	28	64	0.107	19	19	20.3	1.6	1.37	4.9	4	0.109	10	0.6	6.6	7.6	6		142		8.3
2012/07/05	53.86	46.41	0.01	15.4	19.9	0	0.82	0.01	4.52	3.68	0.053	12.3	-0.057	7.43	4	4.48		89		8.3
2012/08/08				16.02	18.82	19.72	1.621			3.9		35	0.123	6.37		7.25			0.027	8.5

G SP2	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TALK	TDS	P (ortho phosphate)	Water level
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l		mg/l	mg/l	mbsl
2012/08/30	40.29	40.61	<0.006	16.1	20.3	17.3	0.944	<0.006	5.08	3.72	<0.001	12.4	1.18	6.13	14	5.46		90	<0.025	5.8
2013/01/15				37.2	4.17	27.8	3.27			6.8		6.16	<0.017	7.1		11.2			0.021	
2013/02/28	147		<0.003	33.2	3.96	30.1	3.38	<0.003	5.55	6.55	0.1	6.05	0.122	7.52	54	7.64	104	129	0.008	
2013/04/05				20.7	17.7	18.8	1.56			4.53		10.1	0.778	7.21		5.99			0.015	
2013/04/25				16.5	16.8	19.3	1.23			3.59		8.87	0.894	6.39		6.6			<0.008	
2013/06/10	14		<0.003	16.1	21.7	18.2	0.963	<0.003	3.86	3.82	<0.001	10.8	0.586	6.47	14	6.32	36	86	<0.008	
2013/07/04				17.8	17.4	18.1	1.02			4.08		11.1	0.471	7.92		5.15			0.012	
2013/08/07				16.1	18.9	18.7	1.12			3.88		10.2	0.782	6.46		6.33			0.016	

G SP3 a	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TALK	TDS	P (ortho phosphate)
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l		mg/l	
2012/01/05				18	29	25.5	3.6			5		23	0.2	6.5		11			
2012/02/17	8		0.727	18	26	25.1	3.8	1.31	4.9	5	2.53	22	0.5	6.5	37	11	80	236	
2012/03/30				17	22	25.1	3.9			5		20	0.8	6.6		8			
2012/05/05				10	11	12.7	2.2			3		10	0.9	6.4		<5			
2012/06/04	16	40	0.121	9	7	10.9	2.1	0.471	3	2	0.245	7	0.5	6	7.6	<5		92	
2012/07/05	3	40.12	0.08	9.96	7.39	11.26	1.9	-0.01	2.95	2.53	7.59	7.59	-0.057	7.52	15	-0.13		56	
2012/08/08				7.05	7.64	10.96	2.058			2.07		5.01	<0.057	6.42		0.85			<0.057
2012/08/30	25.33	34.88	0.079	10.12	7.56	10.97	2.021	<0.006	3.36	2.47	<0.001	7.18	0.525	6.41	9	<0.13		54	<0.025
2012/10/24				8.85	3.04	10.67	2.009			2.42		3.7	0.459	6.4		<0.132			
2013/01/15				8.07	<0.423	9.61	1.82			1.82		1.83	0.229	6.26		3.15			0.017
2013/02/28	145		<0.003	6.91	0.918	10.6	1.8	<0.003	2.05	1.77	0.062	2.32	0.455	7.35	22	<0.04	24.2	31	0.084
2013/04/05				9.6	<0.423	9.9	1.97			2.3		3.58	0.807	7.47		0.836			0.204
2013/04/25				7.26	<0.423	9.47	1.7			1.63		2.78	0.857	6.55		<0.04			0.008
2013/06/10	8.86		<0.003	7.59	<0.423	9.96	2.12	<0.003	1.51	2.17	0.101	3.05	0.537	6.93	61	1.72	25.9	34	<0.008
2013/07/04				9.29	0.548	9.45	1.69			2.13		2.92	0.371	6.43		<0.04			<0.008
2013/08/07					1.36	9.54	1.92					3.41	0.805	6.56		<0.04			0.012

G SP4	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TDS	TALK	P (ortho phosphate)	TDS
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l	mg/l			mg/l
2012/01/05				43	30	36.6	2.2			6		11	0.2	6.6		62				
2012/02/17	12		1.39	37	28	34.5	5.4	9.62	9.1	6	2.15	14	0.5	6.4	87	65		60		236
2012/03/30				38	26	36.5	5.7			7		10	0.2	6.6		8				
2012/05/05				42	25	35.4	5.7			7		9	0.5	6.6		9				
2012/06/04	20	64	0.244	42	25	36.7	7.3	4.28	10.1	7	2.32	10	0.2	6.5	39	64				230
2012/07/05	27.54	64.68	0.04	45.46	22.04	35.8	4.75	-0.01	10.59	7.56	2.12	9.61	-0.057	7.68	46	62.68				202
2012/08/07				10.56	23.69	37.2	5.192			5.83		6.1		6.68		72.43			<0.057	
2012/08/30	11.2	59.95	0.01	50.5	23.32	37.9	5.54	<0.006	11.99	8.14	2.25	10.57	<0.057	6.71	27	74.5	221		<0.025	
2012/10/24				118.13	59.24	191.2	3.986			22.71		263.66	0.41	4.67		776.78				
2013/01/15				45.6	18.2	37.3	4.51			7.33		5.08	<0.017	6.51		77				
2013/02/28	121		<0.003	40.6	17.8	41.5	4.98	<0.003	10.2	7.51	2.16	6.08	0.086	6.91	101	68.8	183	44.7	0.008	
2013/04/05				48.5	27.9	44.9	4.27			8.34		9.57	0.716	7.66		93.3			0.251	
2013/04/25				45.7	22.1	42.6	5.1			7.61		6.94	0.553	6.53		65.8			<0.008	
2013/06/10	18.8		<0.003	55.4	23.2	41	5.95	1.05	11	9.38	3.26	7.91	0.162	6.63	62	97.1	239	48.6	<0.008	
2013/07/04				50.2	20.5	40.7	4.84			9.04		8.02	<0.017	6.75		90.9			<0.008	
2013/08/07				48.1	22.8	42.2	5.56			8.6		8.61	0.268	6.73		99.3			<0.008	

G SP6	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TALK	P (ortho phosphate)	TDS
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l			mg/l
2012/01/05																			
2012/02/17	44		7.07	36	30	17.3	5.7	8.04	6.5	<2	1.06	7	2.6	5.9	551	9	20		192
2012/03/30				26	31	17.9	5.6			<2		7	2.3	5.9		8			
2012/05/05				23	33	17.7	5.3			<2		7	2.6	6		9			
2012/06/01	28	12	2.24	22	30	16.4	5.4	2.83	3.8	<2	0.255	6	2.5	5.9	76	7			126
2012/07/05	28.64	13.56	1.54	19.69	25.53	15.95	4.26	-0.01	3.77	1.2	0.118	7.12	1.28	6.83	97	10.35			81
2012/08/08				15.53	29.04	17.45	12.1			1.25		1.52	2.2	6.05		9.07		<0.025	
2012/08/30	33.49	9.37	1.309	21.72	29.81	19.17	4.624	<0.006	4.17	1.07	0.0035	9.55	2.19	5.92	108	11.77		<0.025	91
2012/10/24				24.9	33.1	25.46	4.653			1.97		13.95	1.47	6.1		15.85		0.03	

G SP6	Acidity	Alkalinity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TALK	P (ortho phosphate)	TDS
		mg/l	mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l			mg/l
2013/01/15				34.8	48.5	36.3	5.43			1.63		23.4	1.45	5.92		48.2		10.9	
2013/02/28	318		1.41	30.1	73.9	63.1	4.61	<0.003	22.5	2.34	0.058	30.3	1.74	6.33	331	6.28	42.8	3.58	197
2013/04/05				46.4	64.1	49.2	3.24			2.72		47	2.12	7.69		78.3		0.115	
2013/04/25				42.7	62.4	50.6	5.41			2.05		44	2.48	6.12		78.8		<0.008	
2013/06/10	55.5		1.38	47.5	65	51.8	5.88	<0.003	4.31	2.5	0.006	54.9	2.45	6.08	103	85.5	35.6	0.009	289
2013/07/04				43.5	58	50.3	4.95			2.28		54.5	3.27	6.19		81.3		<0.008	
2013/08/07				43	66.7	55.8	4.4			2.35		56.8	2.75	6.28		95.8		0.012	

Table 28: Process groundwater

G SP1	Acidity	Al	Ca	Cl	EC	F	Fe	K	Mg	Mn	Na	Nitrates	pH	SS	Sulphates	TALK	P (ortho phosphate)	TDS
		mg/l	mg/l	mg/l	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l			mg/l			mg/l
2012/01/05				77														
2012/02/17	12	<0.100	81	78	95.6	11	12	14.2	12	0.737	48	0.5	7.2	8.4	107	160		556
2012/03/30			79		80.4	10			13		51	0.2	7.1		58			
2012/05/05			81		77.6	10.3			12		48	0.5			102			
2012/06/01				73.46														
2012/07/05	18.67	-0.01	92.66		70.5	8.07	-0.01	15.06	13.11	0.987	43.13	-0.057	8.05	-1	82.29			419
2012/08/08			76.26	76.6	74	10.24			10.83		35.01	<0.057	7.16		86.35		<0.025	
2012/08/30	22.61	<0.006	88.71	72.36	75.5	9.2	<0.006	15.7	12.59	1.07	51.32	0.228	7.19	6	83.94		<0.025	154.3
2013/01/15			85.5	77.3	79.1	8.05			12.3		48.2	<0.017	7.69		102		80.5	
2013/02/28	174	<0.003	76.9	73.3	81.8	9.66	<0.003	14.1	11.8	0.898	45	0.027	7.57	8	115	132	0.008	425
2013/04/05			96.8	76.6	73.6	4.95			14.5		56.9	0.253	7.87	73.5			0.015	
2013/04/25			89	76.8	81.3	3.37			13		52	0.33	7.43		84.2		<0.008	
2013/06/10	7.85	<0.003	86.2	79.2	79.9	11.1	<0.003	16	14.4	1.1	58.4	0.083	7.44	4	86.6	161	<0.008	449
2013/07/04			87.5	72.3	76.5	8.93			13.3		55.8	<0.017	7.44		98.7		<0.008	
2013/08/07			84.2	80.3	78.5	7.14			13.1		52.7	0.255	7.49		108		0.047	

Groundwater monitoring results:

G SP3a is located upgradient from Vergenoeg mining activities and is regarded as a control borehole. Average groundwater quality for the database period shown indicate fresh recently recharged and unpolluted water with a Ca (Na)-HCO_3^-(Cl) type character. The quality can be described as slightly acidic, with an average pH of 6.64, non-saline and soft with medium to high levels of F (fluoride), Fe (iron) and Mn (manganese). Fluoride (F) which recorded an average concentration of 2.29 mg/l, a minimum of 0.01 mg/l and a maximum of 11 mg/l, exceeds the allowable limit for domestic use. However, because of the mineralogy of the ore body (fluorite-hematite) the high F this is not uncommon. The slightly acidic pH of 6.64 is also not uncommon for the region given the geology and low levels of base metals in groundwater. This slightly acidic nature of the groundwater most probably resulted in the medium to high levels of Fe and Mn recorded at G SP3a.

G SP1 is located in the mining area downgradient of the tailings dam and will show any impacts resulting from the dam. The average quality for G SP1 can be described as neutral, non-saline and very hard with high F and a Ca(Na)-HCO_3^-(Cl) type character. Although cation and anion levels are significantly greater compared to the upstream G SP3 a, there are no increasing trends which may indicate contamination.

G SP4 is situated within the mine boundary downgradient from the mining activities. The average quality for G SP4 can be described as slightly acidic, non-saline and hard with high F, Fe and Mn and a Ca-SO_4(HCO_3^-) type character. Increasing trends for most cations and anions and especially SO_4 for the database period shown may indicate contamination.

Groundwater quality for **G SP6** can be described as slightly acidic, non-saline and relatively hard with high levels of F, Al and Fe and a Ca(Na)-Cl(SO_4) type character. This water type, which is seldom found in nature together with significantly increasing concentrations of most cations and anions and especially SO_4, may be an indication of contamination. The high levels of F may be a natural phenomenon given the mineralogy of the ore.

The water quality profile for **G SP2** indicates fresh recently recharged and fresh water with a Ca(Na)-HCO_3^-(Cl) type character and medium levels of F. It can be described as slightly saline to neutral, non-saline and soft.

RC91 represent the most downgradient borehole relative to the mine and groundwater from this borehole is monitored to reflect the quality leaving the mine's premises. The average groundwater quality can be described as neutral, relatively saline and relatively soft with medium to high levels of Na, Cl, SO_4, F, Fe and Mn and a Na-SO_4(HCO_3^-) type character. The domination of SO_4 and Na together with significantly increasing trend analyses for EC (largely contributed by SO_4 and to a lesser extent Na) indicates mining related influences. The groundwater leaving the premises is not suitable for domestic use given the high level of Na, SO_4, F, Fe and Mn.

2.1.8.5 Groundwater use

There is only one private borehole water source in proximity to the mine (outside the mining area). This borehole yields insignificant quantities of water (less than 0.3l/s) from fractured felsitic strata for stock watering purposes. The farm Rhenosterfontein is being run as a game farm as well as cattle. Irrigation with borehole water is practised on a small scale for gardening. Vergenoeg pumps groundwater from boreholes at a volume of $10m^3$ per day for domestic use (only garden use) (Hydrogeology study, GCS (2010)).

2.1.9 Water Authority

The Water Use License Application for Vergenoeg mine was processed and approved through the Department of Water Affairs (DWA), Nelspruit Regional Office. The Water Use License details are filed under the following references: License number: 04/B31D/ACGIJ/991. File number: 16/2/7/B300/C92.

2.1.10 Land use and land capability

The 300 hectares shown north of the Kromdraaispruit on mine plans have been classified and mapped into the following pre-mining land capability classes, as defined in the Chamber of Mines Rehabilitation Guidelines:

1. Arable land
2. Grazing land
3. Wetland
4. Wilderness land.

The areas covered by the various categories of land are shown on Figure 13. Although only half of this land is disturbed by mining and associated operations, the land capability over the entire 300 ha has been assessed. An additional 50 ha on the south bank of the major valley of the Kromdraaispruitis will be affected by the No. 5 Tailings dam storage facility. Currently an EIA application is underway by a different mining company to further expand mining activities directly south of the Vergenoeg mine.

Table 29 below shows the area and percentage of each land capability class:

Table 29: Land capability classes (EMP, 2008)

Land capability class	Area in hectares		Percentage of total area	
	North bank	South bank	North bank	South bank
Arable land	0	0	0	0
Grazing land	121	0	40	0
Wetland	5	0	2	0
Wilderness land	174	50	58	100
TOTAL	300	50	100	100

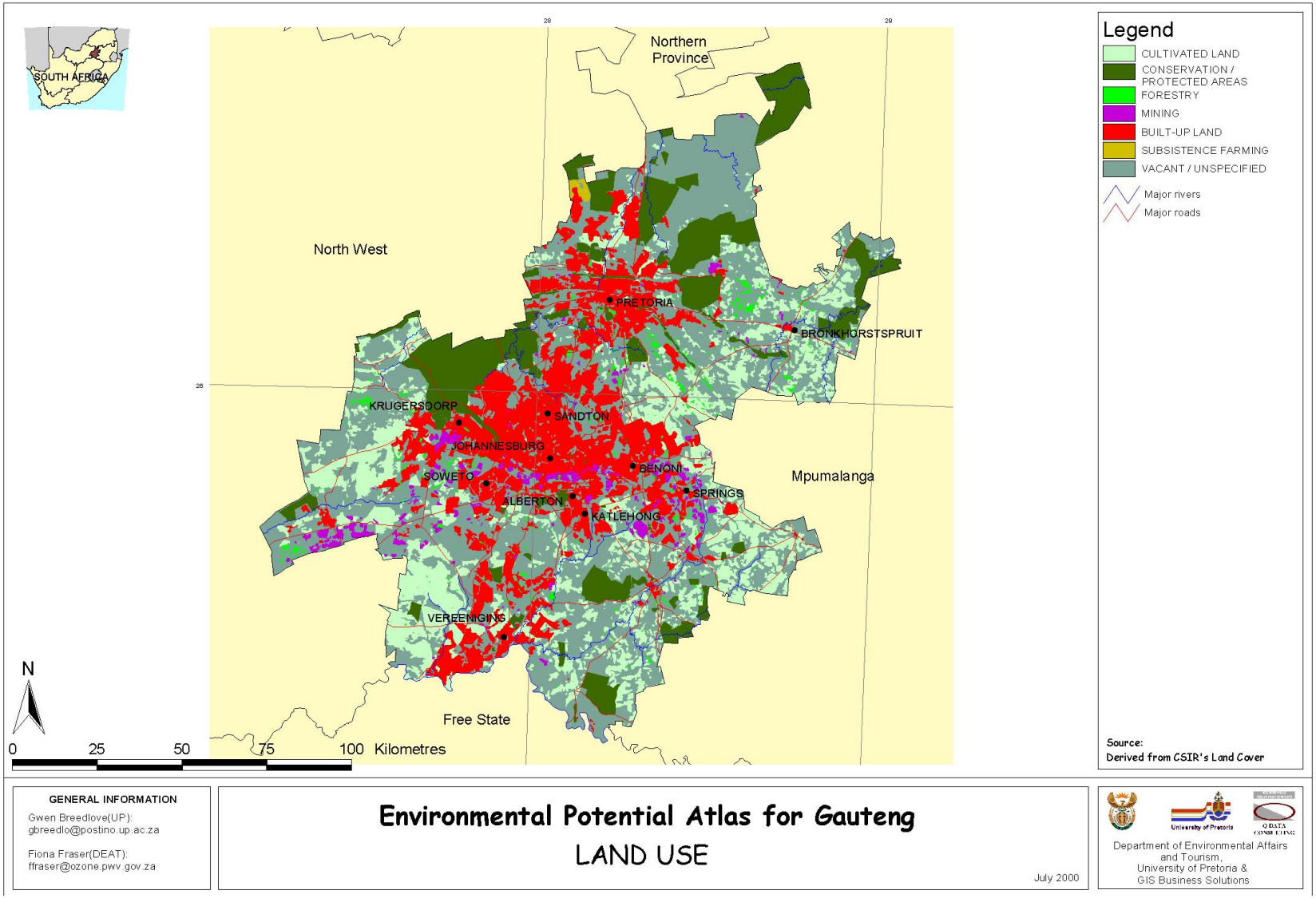


Figure 12: Land Use in Gauteng

2.1.10.1 Pre-mining land use

From the time of the original occupation of the farm, it has been used for cattle farming. There are some indications that a section on the eastern plains of the farm could have been used as cultivated land. This is however not confirmed and according to the age of trees in this vicinity, there was no bush clearing for many years.

On the mining site, no signs of misuse will be found since the hills are too rocky for erosion and the vegetation is too sparse for grazing. Fluorspar mining activities has been the only land use for approximately 50 years. (EMP, 2008).

2.1.10.2 Existing structures

There are no existing structures other than the mine related infrastructure. Existing plant, residential houses, hostel and offices were built by the mine.

2.1.11 Noise

During operation, there is noise from:

- Open pit drilling and blasting during the day.
- Earthmoving machinery during the day.
- Primary and secondary crushing, and
- Flotation and milling plant, but this is low due to the plant being enclosed in a building.

Noise levels are low and the impact thereof negligible, as the mining operations are within a valley with no nearby neighbouring activities. No complaints have been received in the 50 years of operation. Regular environmental noise monitoring is conducted to ensure operations limit the potential impacts associated with noise. Results from the noise monitoring indicate that levels are within acceptable standards with main sources of noise coming from bugs in close proximity of the test points (EMP, 2008).

Figure 13 illustrates the noise levels monitored from 2011 to 2013.

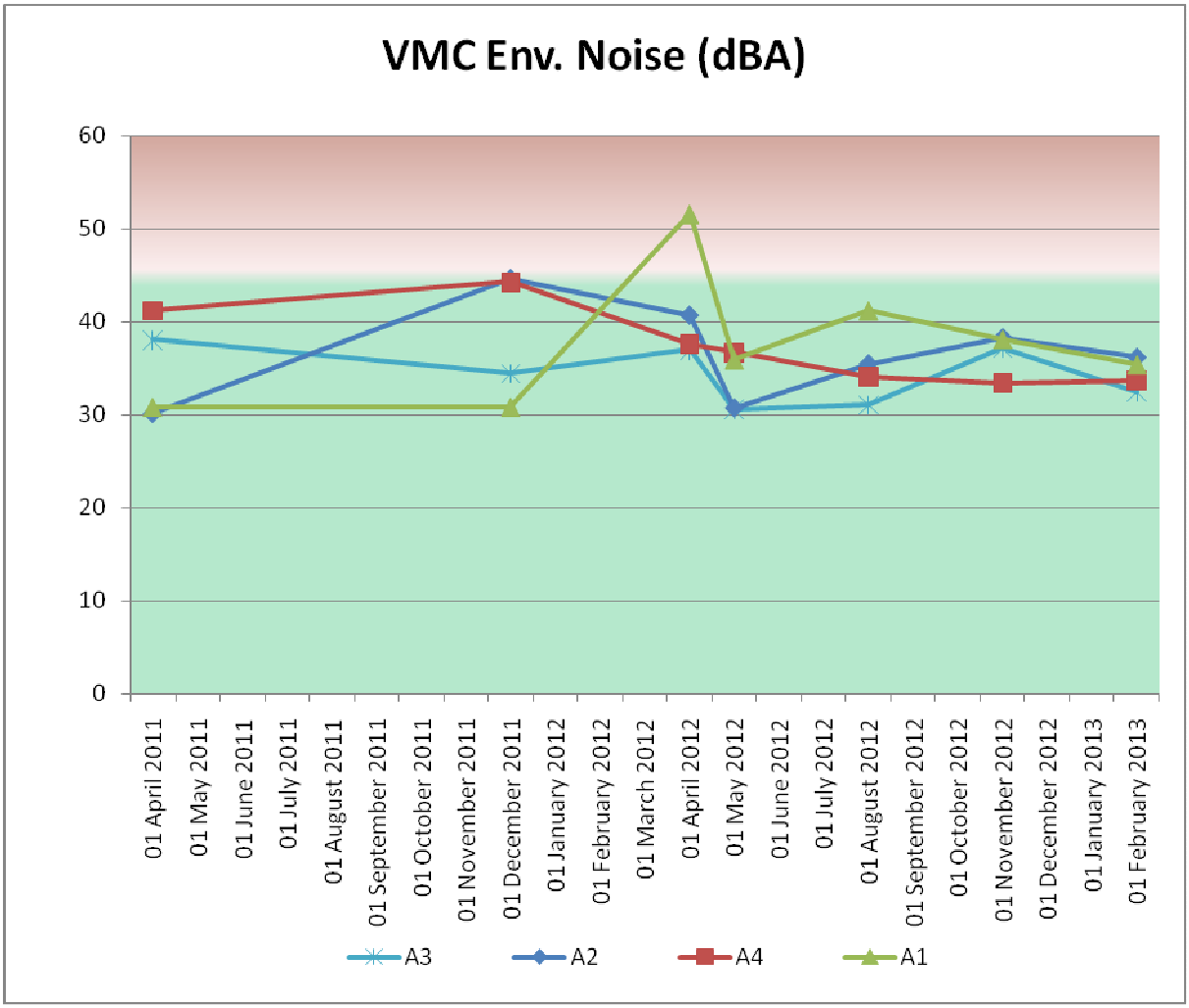


Figure 13: Noise monitoring results

A3 Northwest of plant - At perimeter S25 14' 58.9" E28 34' 14.8"
A2 Southwest of plant - At dam crossing S25 15' 44.1" E28 34' 02.0"
A4 East of plant - Residential area S25 15' 02.0" E28 35' 24.9"
A1 Southeast of plant - At approximately 1km from T-junction S25 15' 59.9" E28 36' 02.8

2.1.12 Air Quality

Although rural development areas have been established in the surrounding Kwandebele and Bophuthatswana, the air remains clear and unpolluted in the Rust de Winter area. The area was sparsely populated and the cities and towns too far off to pollute the air in this vicinity.

Within the mining area there is some dust coming from the open pit, the crusher plant and from the road surfaces but this is mitigated by the continuous application of water for dust suppression. Quarterly dust fallout monitoring is conducted in the four main wind directions from the pit and plant. Dust buckets are analysed to obtain the average daily dust fallout for the sampling period.

An air quality impact assessment study done by Gondwana Environmental Solutions conducted for the proposed waste rock stockpile at Vergenoeg mining company, in September 2013 described the predominant wind direction (as predicted by the MM5 regional scale model) is between north-easterly and easterly for about 48% of the time. Average hourly wind speed is about 3.16 m/s. Maximum hourly winds (between 5 and 8 m/s) tend to blow from the predominant north-easterly to easterly directions and occasionally from the west-south-west. Wind speeds of over 8 m/s are only expected 0.22% of the time. Calm conditions (wind speeds below 1 m/s) are expected about 16.33% of the time.

Refer to figure 14 below for fall out dust monitoring results from 2011 to 2013.

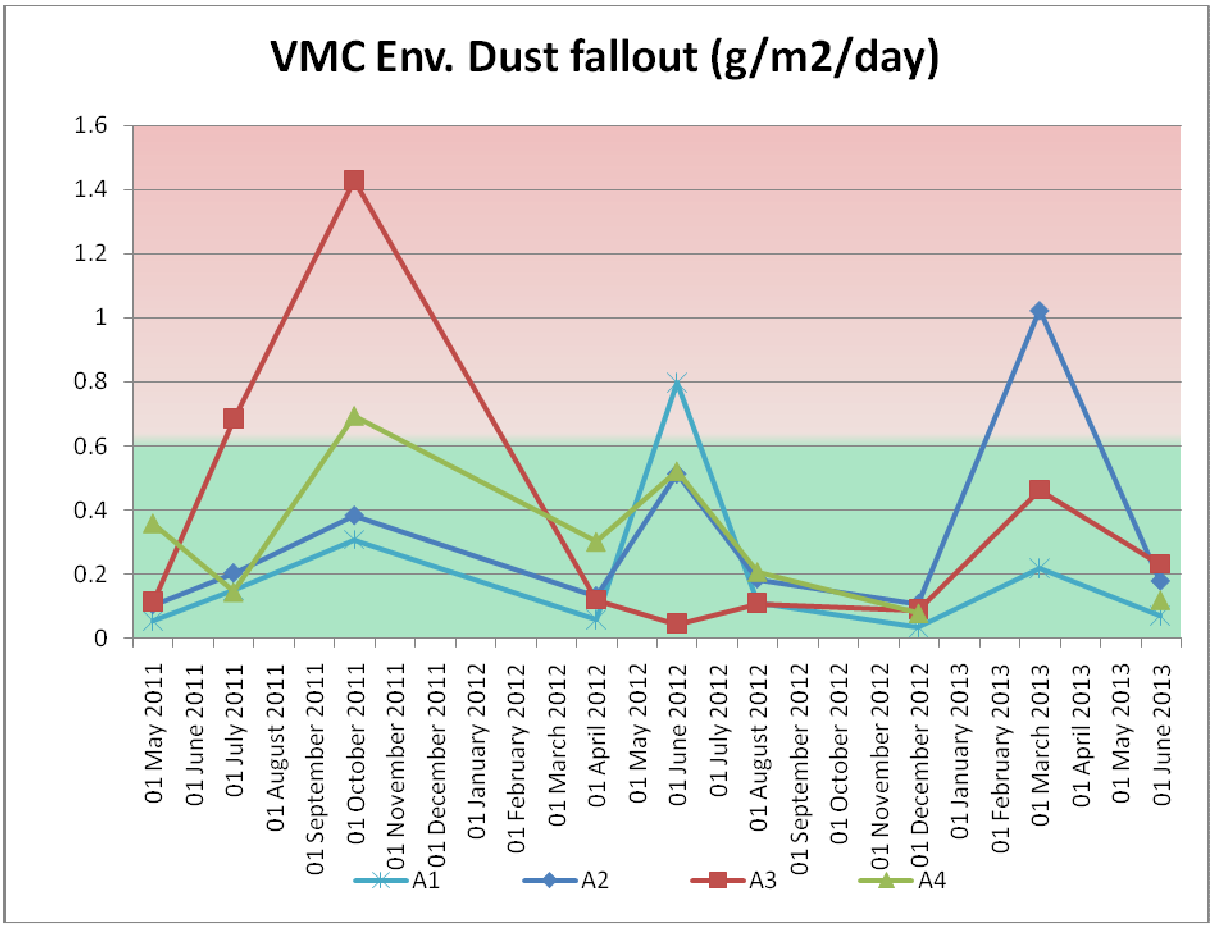


Figure 14: Fall out dust monitoring results

A1 - Perimeter - Southeast of plant and pit across the road
A2 - Perimeter - Housing area east of Plant
A3 - Perimeter - North of plant and pit
A4 - Dam crossing southwest of plant and pit

2.1.13 Sensitive landscapes

The mine falls within the Dinokeng expansion area and along a non-perennial tributary. Wetland areas are located within the valley bottom and on the banks of the clean water diversion dam. The southern tip of the proposed WRD area is near a ridge that stretches along the tributary. Between the ridge and proposed WRD area is a servitude road with the main water supply as well as a separate servitude with the main power supply. It is proposed that this power line represent the south-eastern border of the WRD area. The original layout of the WRD has been adjusted to concentrate close to the existing disturbed areas around the current mining as well as to avoid sensitive landscapes where possible.

According to Gauteng's Conservation plan dated 2012, the areas west and south of the mine are regarded as ecological support areas as indicated in Figure 15: Gauteng Conservation Plan. Niemand (2011a; 2011b) provides a detailed ecological assessment on the status of the vegetation where the proposed activities will be located. The pipeline has to cross the tributary and requires detail consideration of the alternatives in order to minimise disturbance to the sensitive environment in the valley bottom of the tributary.

AGES (2011) classified the wetland areas within the valley bottom and on the banks of the clean water diversion dam as a valley bottom system that forms a tributary of the Elands River as illustrated in Figure 16. The overall present ecological state of the wetland is assessed as a Category D, which implies a largely modified wetland system. The ecological importance and sensitivity is considered as high. The wetland assessment is attached as **Appendix G9**.

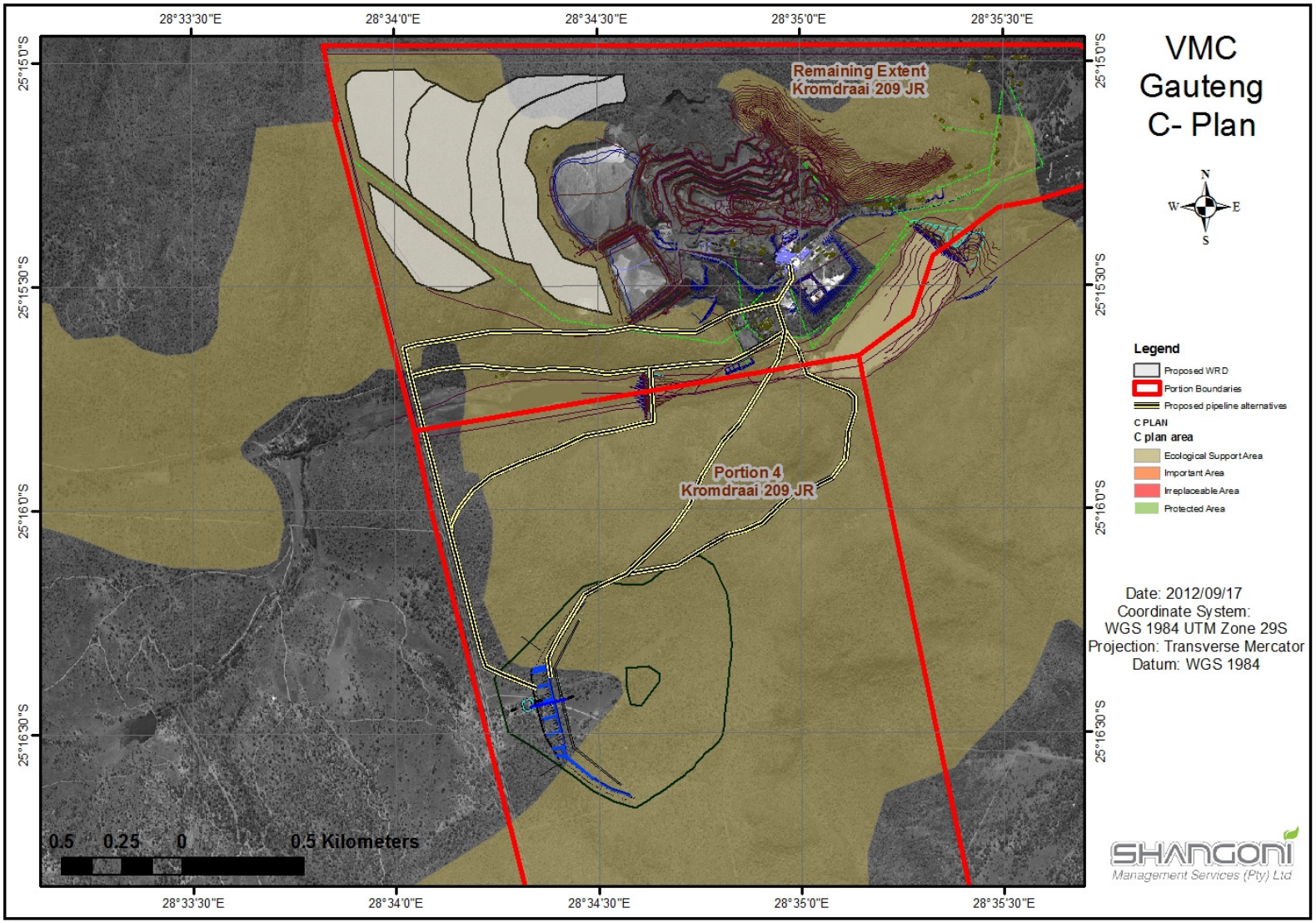


Figure 15: Gauteng Conservation Plan

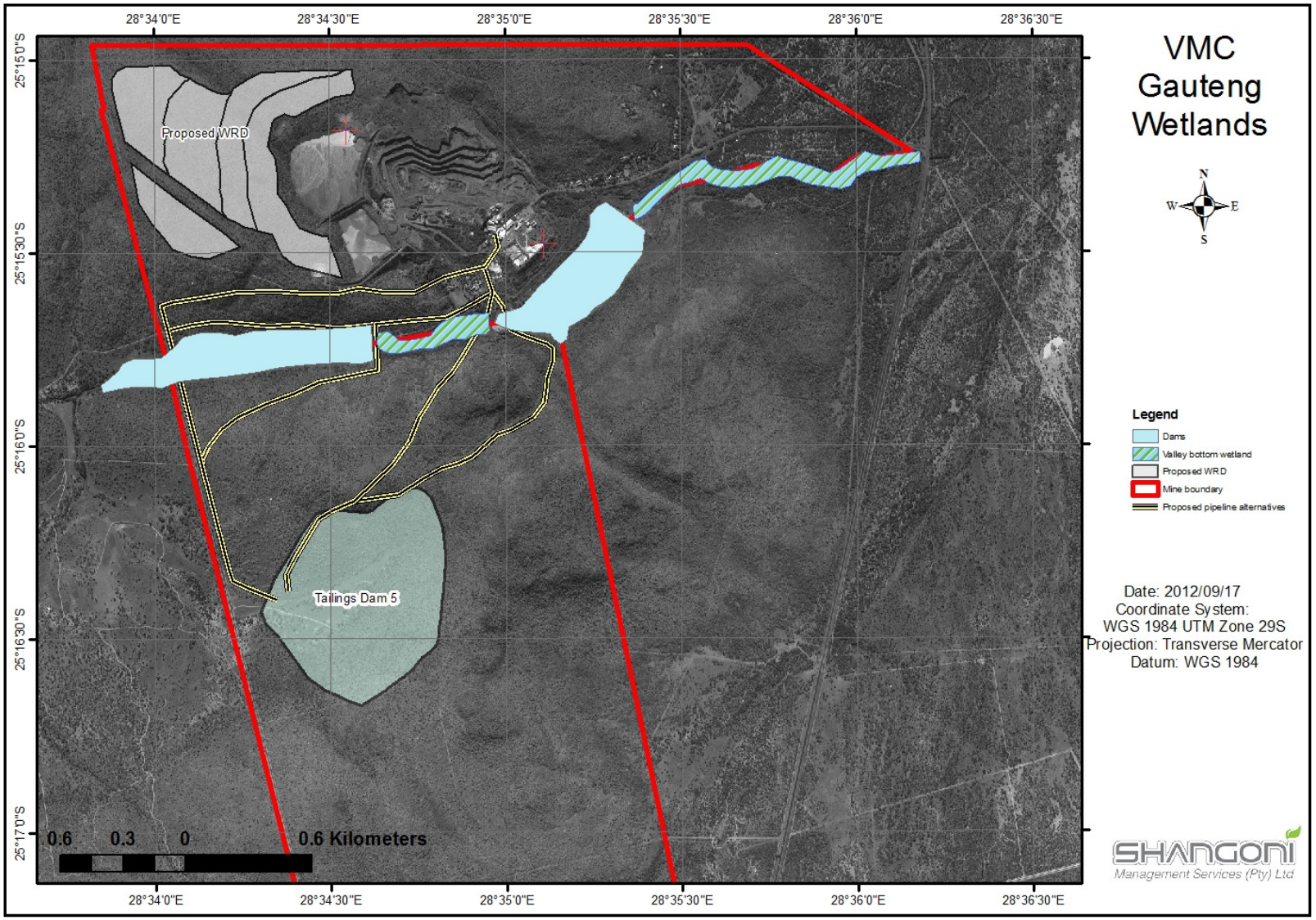


Figure 16: Wetland delineation

2.1.14 Sites of archaeological and cultural interest

A heritage study was conducted for the proposed project titled: "*Report on a Phase 1 Heritage Impact Assessment for the expansion of mining activities and the development of a waste rock dump for the Vergenoeg Mine on the remainder of the farm Kromdraai 209 JR, Cullinan Magisterial District, Gauteng*", and dated December 2013. The resultant report (compiled by Apelser Archaeological Consulting) is attached hereto as **Appendix G13**.

The results of the above-mentioned heritage study indicated that no sites or objects of cultural heritage (archaeological or historical) origin or significance were identified during the field assessment. The study area has been extensively disturbed since the 1950's when mining operations commenced. If any did exist in the past it would have been disturbed or to a large degree destroyed as a result.

The structures (including the staff housing and offices) are not older than 60 years of age and not significant from a heritage point of view.

2.1.15 Visual aspects

The mine is situated within the valley of the Rhenosterspruit and is not visible from any public roads. Tailings Dam Storage Facility Number 5 has limited visibility from the western neighbours. The absorption capacity for the area is very high with bushveld trees and shrubs camouflaging the dam wall from a distance. Re-establishing of vegetation on the tailings dam storage facility wall will increase the absorbing capacity of the dam wall.

The pipeline crossing over the valley bottom will become a permanent visible structure. Visibility will not be intrusive for the preferred option across the dam wall, as it will form part of the wall structure.

2.2 Socio-economic aspects

Sections 2.2.1 – 2.2.8 are sourced from the (EMP, 2008).

Prior to the establishment of Vergenoeg Mining Company (Pty) Ltd., the entire area between Pretoria, Cullinan and Bela Bela was thinly populated with only scattered farms linked to the main roads by dirt tracks, except for more dense concentrations at Rust de Winter and Settlers, respectively 10 km and 30 km from the mine site. This picture has not change significantly.

2.2.1 Population density, growth and location

On the cattle and game farms around the mine, the population density is about four persons per km^2 with almost no growth except for mine development. The population residing on the mine is 110.

2.2.2 Major economic activities and sources of employment

The irrigation farming at Rust de Winter was the only economic activity and source of employment in the area prior to the establishment of the mine. Recently game farming and tourism activities have become popular in the area as economic drive.

2.2.3 Unemployment estimate for the area

The immediate surroundings of the mine are thinly populated and unemployment is seasonal and associated with the farming crops and methods employed.

2.2.4 Housing

There are no houses in the area except for the scattered farms and the houses erected on the mine property.

2.2.5 Social infrastructure

The nearest schools, hospitals and sporting facilities are in Pretoria 60 km away, in Bela Bela 75 km away, Hammanskraal 40 km away, and Moloto 35 km away. At Rust de Winter, there is a police station and farm store. Sporting facilities i.e. tennis, are located on the mine property for own use.

2.2.6 Water supply

The main source of water for the area is the Rust de Winter dam scheme, which supplies water for the mining as well as drinking water. The mine constructed two large dams in a valley, in 1964 and 1972 respectively, with a catchment area of 40 km^2 and has drilled a large number of boreholes to become self-sufficient. Groundwater is also used in the village for garden watering.

2.2.7 Power supply

The area had no power supply before establishment of the mine. The mine entered into a power supply agreement with the Municipality of Bela Bela and built a private power line. The power supply infrastructure was later taken over by Eskom and the grid was extended to include the farms and settlement of Rust de Winter. Main power supply is received from Eskom's Rust de Winter substation.

2.2.8 Interested and Affected Parties

Known bodies representing interested and affected parties include:

Table 30: Identified interested and affected parties

Property	Farm Name	Owner	Manager/Foreman	Landline	Cell No.
Buffelsdrift		Francois Olivier		012 723 0700	0824423403
Buffelsdrift		Dave Howcroft		(011) 4621920	0825585125
Naawpoort	Loodswaai	Kallie Erichsen		012 723 0111	0820839424
Elandsdrift		Bill Venter		012 711 0562	
Nokeng Fluorspar Mine	Rights on Kromdraai	Sephaku Holdings Ltd	Loek van den Heever	012 665 5060	
Renosterfontein 210	Owners of the farm Renosterfontein 210 (Elandsdrift game loge to South west)	Elandsdrift game ranch Bill Venter		(012) 711 0562	

Table 31: Identified Stakeholders

Stakeholder	Contact number	Postal Address
GDARD	011 355 1256	P.O. Box 8769. Johannesburg. 2000
DMR Gauteng Regional	(011) 358 9700	Private Bag X 4, BRAAMFONTEIN, 2017
Dinokeng Game Reserve, Gauteng Provincial Government	(011) 3551350	Dept. Agriculture, Conservation, Environment and Land Affairs, P.O. Box 8769, Johannesburg, 2000
Pienaarsrivier -Radium Boerevereniging	(012) 7220375	PO Box 28 Pienaarsrivier, 0420
Dept. Water Affairs, Olifants Catchment	012 336 8103	Private Bag x313, Pretoria, 0001
National Director of Land Affairs, Pretoria	(012) 3129397	Dept. Land Affairs, Private Bag X 833, Pretoria, 0001
Region 5 Tshwane LM (former Nokeng TsaTaemane LM)	012 734 6036	PO Box 204, Rayton, 1001

Stakeholder	Contact number	Postal Address
Metsweding DM	013 933 6531/013 932 5121	Private Bag x10579, Bronkhorstspruit, 1020
Eskom	015 299 0028	92 Hans van Rensburg St, Polokwane, 0699
South African Heritage Resources Agency	011 403 0683	Provincial Heritage Council JHB, 38 Rissik street. Netbank Building 8th Floor, JHB, 2000
Department of Agriculture, Forestry and Fisheries	012 319 6000	Private Bag x120, Pretoria, 0001
SAPS, Rust De Winter	(011) 7237904	P. O. Box 2, Rust De Winter, 0406
DinokengBig5 Game Reserve	079 936 8028	P.O. Box 2451, Hammanskraal, 0400
Ward 1 Counsellor	071 096 9746	1070/1 Block H, Steve BikoVill, Hammanskraal, 0400
DWA Rust de Winter dam	082 941 0844	P.O. Box 119, Pienaarsrivier, 0420

3. LEGISLATION AND GUIDELINES APPLICABLE

3.1 Laws of general application

- Constitution of the RSA, 1996 (Act No 108 of 1996)
- National Environmental Management Act, 1998 (Act No 107 of 1998)
- Promotion of Access to Information Act, 2000 (Act No 2 of 2000 as amended)

3.2 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.

Note that activity no.18 listed within GN R544 was not initially included as part of the listed activities. During the scoping phase, site selection study and discussions with the engineers the alternatives 1b and 4 would require upgrading of the low water crossing and thereby trigger afore mentioned listed activity. These alternative routes are not preferred options for various reasons discussed in chapter 6, one of which is the structural requirements to cross the dam along the boundary. Refer to table 32 for the proposed listed activities.

Table 32: Proposed listed activities

No and date of notice	Activity no	Description
No. 544, 18 June 2010	9	**Project Description:** Vergenoeg Mining Company (VMC) proposes to construct a pipeline comprising a collection of three pipes (two of 150 mm and one of 200 mm diameter) and between 1.2-3 kilometres in length, and a power line to the Tailings dam storage facility number 5. **Listed Activity:** The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water – (i) with an internal diameter of 0.36 metres or more; or (ii) with a peak throughput of 120 litres per second or more. Excluding where: a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve;

No and date of notice	Activity no	Description
		or b. where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse
No. 544, 18 June 2010	11	**Project Description:** The construction of dirty water channels to divert dirty water in the event of a pipe burst to the red dam. The pipeline from the plant will be crossing the Rhenosterspruit and require support structures between 4-13 meters. **Listed Activity:** The construction of: (ii) channels; (iii) bridges; (xi) infrastructure or structures covering 50 square metres or more Where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.
No. R544 18 June 2010	18	**Project Description:** Removal and infilling of material along the Rhenosterspruit for the dirty water channel and pipeline support structures. **Listed Activity:** The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a watercourse; But excluding where such infilling, depositing, dredging, excavation, removal or moving (i) is for maintenance purposes undertaken in accordance with management plan agreed to by the relevant environmental authority; or
No. R 545 18 June 2010	5	**Project Description:** The new waste rock dump will be disposed of to the west of the Tailings Storage Facilities Number 3 and 4. A drainage line is situated on the easterly corner of year 5 deposition plan. Therefore the following water use activities will be triggered: Section 21(c): Impeding or diverting the

No and date of notice	Activity no	Description
		flow of water in a watercourse, Section 21(i): Altering the bed, banks, course or characteristics of a watercourse. Section 21 (g) disposing of waste in a manner which may detrimentally impact on a water resource. The pipeline crossing will be directly over the valley bottom floor in the Rhenosterspruit. Therefore the following water use activities will be triggered: Section 21(c): Impeding or diverting the flow of water in a watercourse, Section 21(i): Altering the bed, banks, course or characteristics of a watercourse. **Listed Activity:** The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which cast that Act will apply.
No. R 546 18 June 2010	14 (a), (i)	**Project Description:** Clearing of an area of approximately 75 hectares for waste rock dump deposition with a maximum capacity of 28 million tons / 11 million m^3. This will be done next to the current operational tailings facilities. **Listed Activity:** The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation. (a) In Eastern Cape, Free State, KwaZulu-Natal, Gauteng, Limpopo, Mpumalanga, Northern Cape, Northwest and Western Cape: i. All areas outside urban areas.

3.3 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.

VMC is operating within an approved Water Use License, which was approved in 2011. The proposed new waste rock dump and the pipeline crossing will trigger additional activities that will require licensing. An update of the Water Use License Application was done in 2012 and submitted to the Department of Water Affairs (DWA). The following activities were included in the updated IWULA:

- Section 21(g): Disposing of waste in a manner, which may detrimentally impact on a water resource for the new waste rock dump,
- Section 21(c) in terms of the National Water Act, 1998: Impeding or diverting the flow of water in a watercourse, and Section 21(i): Altering the bed, banks, course or characteristics of a watercourse for the pipeline crossing over the Rhenosterspruit.

A change of location of the preferred alternatives occurred from the pipeline crossing over the blue dam wall to crossing directly over the valley bottom floor. An update to the IWULA is thus required to reflect these changes. Furthermore the drainage line situated in the easterly corner of year 5 deposition of the new waste rock dump may trigger a Section 21(c) in terms of the National Water Act, 1998: Impeding or diverting the flow of water in a watercourse, and Section 21(i): Altering the bed, banks, course or characteristics of a watercourse.

The listed activities as discussed above have to be subjected to an Environmental Impact Assessment (EIA) process, so as to identify the environmental (positive and negative) impacts associated with such activities and determine and implement suitable management measures to prevent and/or mitigate negative environmental impacts.

4. PUBLIC PARTICIPATION PROCESS

4.1 Introduction

Through the Public Participation process (PPP), I&APs need to be informed of proposed projects and issues of concern and / or objections obtained. The issues of concern and / or objections must be documented and addressed if possible. I&APs need to be considered and consulted throughout the entire life cycle of any project. This section provides information pertaining to the Public Participation Process that was followed for Vergenoeg Mine's proposed Pipeline and Waste Rock Dump activities.

Public Participation is a requirement in terms of the Environment Conservation Act, 1989 (Act 73 of 1989), the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), the National Water Act, 1998 (Act 36 of 1998) and the National Environmental Management Act, 1998 (Act 107 of 1998). It forms an integral part of the Environmental Impact Assessment (EIA), Environmental Management Programme Report (EMPR) and the IWULA processes.

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 Planning, Construction and Operational Phases of the proposed activities on the Vergenoeg Mine. The communities and public have been identified as Interested and Affected Parties (I&APs). The I&APs have been given the opportunity to participate in this process and their comments, whether positive or negative, will influence the decision of the Authorities and the mine's final actions.

4.2 Objectives of the Public Participation Process

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 / concerns and make suggestions;
- To promote transparency and an understanding of the project and its consequences;
- 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 project 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) as well as the vision of Vergenoeg Mining Company (Pty) Ltd.

4.3 The Guidelines Followed for the Public Participation Process

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

54. (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.

Register of interested and affected parties

55. (1) An EAP managing an application must open and maintain a register, which contains the names, contact details and addresses of -

(a) all persons who, as a consequence of the public participation process conducted in respect of that application in terms of regulation 54 have submitted written comments or attended meetings with the applicant or EAP;

(b) all persons who, after completion of the public participation process referred to in paragraph (a), have requested the applicant or the EAP managing the application, in writing, for their names to be placed on the register; and

(c) all organs of state, which have jurisdiction in respect of the *activity* to which the application relates.

(2) An EAP managing an application must give access to the register to any person who submits a request for access to the register in writing.

Registered interested and affected parties entitled to comment on submissions

56. (1) A registered interested and affected party is entitled to comment, in writing, on all written submissions, including draft reports made to the competent authority by the applicant or the EAP managing an application, and to bring to the attention of the competent authority any issues which that party believes may be of significance to the consideration of the application, provided that-

(a) comments are submitted within-

(i) the timeframes that have been approved or set by the competent authority; or

(ii) any extension of a timeframe agreed to by the applicant or EAP;

(b) a copy of comments submitted directly to the competent authority is served on the EAP; and

(c) the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.

(2) Before the EAP managing an application for environmental authorisation submits a final report compiled in terms of these Regulations to the competent authority, the EAP must give registered interested and affected parties access to, and an opportunity to comment on the report in writing.

(3) The report referred to in sub regulation (2) include-

(a) basic assessment reports;
(b basic assessment reports amended and resubmitted in terms of regulation 24 (4);
(c) scoping reports;
(d) scoping reports amended and resubmitted in terms of regulation 30(3);
(e) specialist reports and reports on specialised processes compiled in terms of regulation 32;
(f) environmental impact assessment reports submitted in terms of regulation 31;
(g) environmental impact assessment reports amended and resubmitted in terms of regulation 34(4); and
(h) draft environmental management programmes compiled in terms of regulation 33.

(4) The draft versions of reports referred to in sub regulation (3) must be submitted to the competent authority prior to awarding registered interested and affected parties an opportunity to comment.

(5) Registered interested and affected parties must submit comments on draft reports contemplated in sub regulation (4) to the EAP, who should record it in accordance with regulations 21, 28 or 31.

(6) Registered interested and affected parties must submit comments on final reports contemplated in sub regulation (3) to the competent authority and provide a copy of such comments to the applicant or EAP.

(7) The competent authority must, in order to give effect to section 24O of the Act, on receipt of the draft reports contemplated in sub regulation (5), request any State department that administers a law relating to a matter affecting the environment to comment within 40 days.

(8) The timeframe of 40 days as contemplated in sub regulation (7) must be read as 60 days in the case of waste management activities as contemplated in the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), on which the Department of Water Affairs must concur and issue a record of decision in terms of section 49(2) of the National Environmental Management: Waste Management Act, 2008 (Act No. 59 of 2008).

(9)(a)When a State department is requested by the competent authority to comment, such State department must, within 40 days or in the case of Department of Water Affairs, 60 days for waste management activities, of being requested to comment by the competent authority, provide comments to the competent authority.

(b)If a State department fails to submit comments within 40, or 60 days for waste management activities, from the date on which the Minister, MEC, Minister of Mineral Resources or identified

competent authority requests such State department in writing to submit comment, it will be regarded that there are no comments.

Comments of interested and affected parties to be recorded in reports submitted to competent authority

57. (1) The EAP managing an application for environmental authorisation must ensure that the comments of interested and affected parties are recorded in reports and that such written comments, including records of meetings, are attached to the report, submitted to the competent authority in terms of these Regulations.

(2) Where a person is desiring but unable to access written comments as contemplated in sub regulation (1) due to-

(i) a lack of skills to read or write;
(ii) disability; or
(iii) any other disadvantage,

reasonable alternative methods of recording comments must be provided for.

4.5 Public Participation Process Followed

The following PPP was conducted for the proposed Vergenoeg Mine 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 Nokeng News, 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 GDARD together with the plan of study;
- The draft EIR was submitted to stakeholders and made available electronically for registered I&APs for commenting; and
- Comments received on the draft EIR was incorporated into this final report which was submitted to GDARD.

4.5.1 Notification of Interested and Affected Parties (I&APs)

The following Interested and Affected Parties were identified during the Public Participation Process. Reference can be made to Table 33 below for information pertaining to the Interested and Affected Parties.

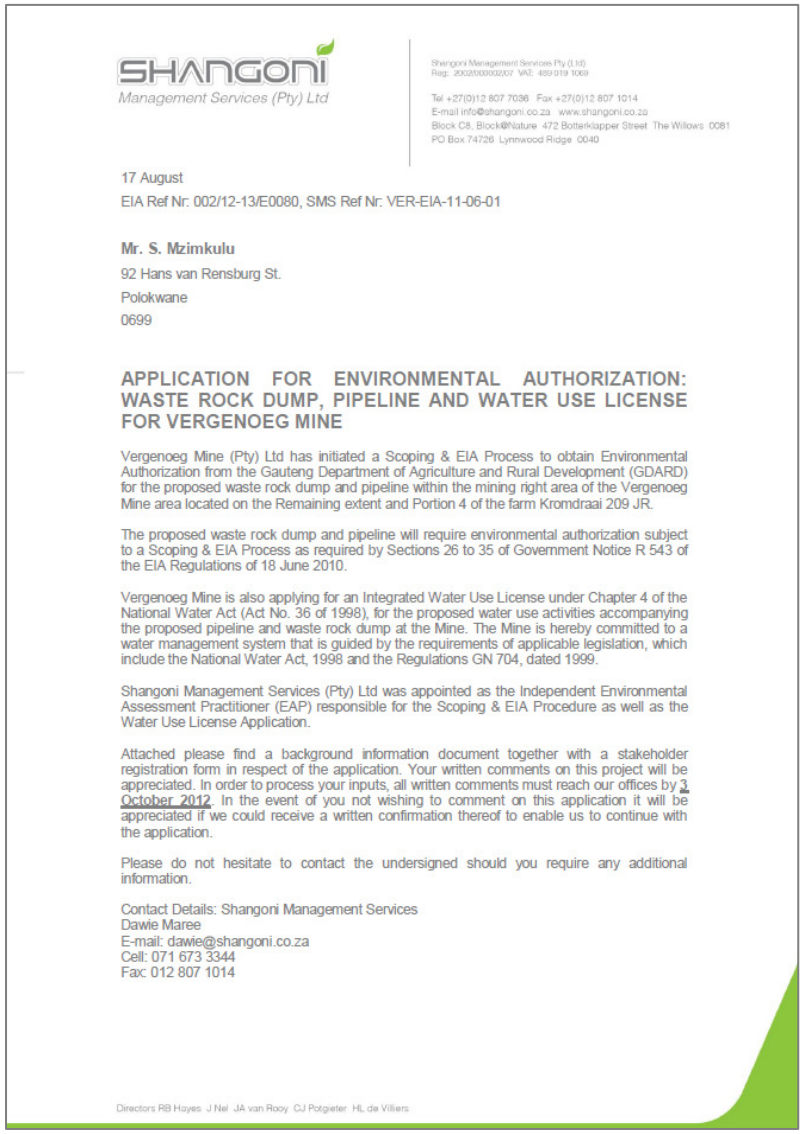
Table 33: I&AP's Identified during the Public Participation Process

Property	Farm Name	Owner	Manager/Foreman	Landline/Cell phone
Buffelsdrift		Francois Olivier		012 723 0700 082 442 3403
Buffelsdrift Hiking Trails		Dave Howcroft		(011) 4621920
Naawpoort	Loodswaai	Kallie Erichsen Hennie Erichsen		012 723 0111 082 388 3536 082 388 3550
Elandsdrift	Elandsdrift Game Ranch	Bill Venter	Derik de Jager	012 711 0562 083 321 9551
Rights on Kromdraai	Nokeng Fluorspar Mine	Sephaku Holdings Ltd	Loek van den Heever	012 665 5060
Renosterfontein 210	Owners of the farm Renosterfontein 210 (Elandsdrift game loge to South west)	Elandsdrift game ranch Bill Venter	Derik de Jager	(012) 711 0562 083 321 9551

4.5.2 Information to Interested and Affected Parties

Registered letters were sent by Shangoni Management Services to the I&AP's on 17 August 2012, containing information about the proposed developments, as well as the contact details to obtain more information and provide comments/ concerns. Follow-up has been done after the public participation expiry date on the 3rd of October 2012 to confirm further comments and concerns from the I&APs.

Figure 17 is an example of the letter sent to the I&AP's. The background information document (BID) was sent to I&APs and Stakeholders on request containing the locality map of the proposed activities indicating the different alternatives.



SHANGONI
Management Services (Pty) Ltd

Shangoni Management Services Pty (Ltd)
Reg: 2002/000002/07 VAT: 489 019 1069

Tel +27(0)12 807 7036 Fax +27(0)12 807 1014
E-mail info@shangoni.co.za www.shangoni.co.za
Block C8, Block@Nature 472 Botterklapper Street The Willows 0081
PO Box 74726 Lynnwood Ridge 0040

17 August

EIA Ref Nr: 002/12-13/E0080, SMS Ref Nr: VER-EIA-11-06-01

Mr. S. Mzimkulu
92 Hans van Rensburg St.
Polokwane
0699

APPLICATION FOR ENVIRONMENTAL AUTHORIZATION: WASTE ROCK DUMP, PIPELINE AND WATER USE LICENSE FOR VERGENOEG MINE

Vergenoeg Mine (Pty) Ltd has initiated a Scoping & EIA Process to obtain Environmental Authorization from the Gauteng Department of Agriculture and Rural Development (GDARD) for the proposed waste rock dump and pipeline within the mining right area of the Vergenoeg Mine area located on the Remaining extent and Portion 4 of the farm Kromdraai 209 JR.

The proposed waste rock dump and pipeline will require environmental authorization subject to a Scoping & EIA Process as required by Sections 26 to 35 of Government Notice R 543 of the EIA Regulations of 18 June 2010.

Vergenoeg Mine is also applying for an Integrated Water Use License under Chapter 4 of the National Water Act (Act No. 36 of 1998), for the proposed water use activities accompanying the proposed pipeline and waste rock dump at the Mine. The Mine is hereby committed to a water management system that is guided by the requirements of applicable legislation, which include the National Water Act, 1998 and the Regulations GN 704, dated 1999.

Shangoni Management Services (Pty) Ltd was appointed as the Independent Environmental Assessment Practitioner (EAP) responsible for the Scoping & EIA Procedure as well as the Water Use License Application.

Attached please find a background information document together with a stakeholder registration form in respect of the application. Your written comments on this project will be appreciated. In order to process your inputs, all written comments must reach our offices by 3 October 2012. In the event of you not wishing to comment on this application it will be appreciated if we could receive a written confirmation thereof to enable us to continue with the application.

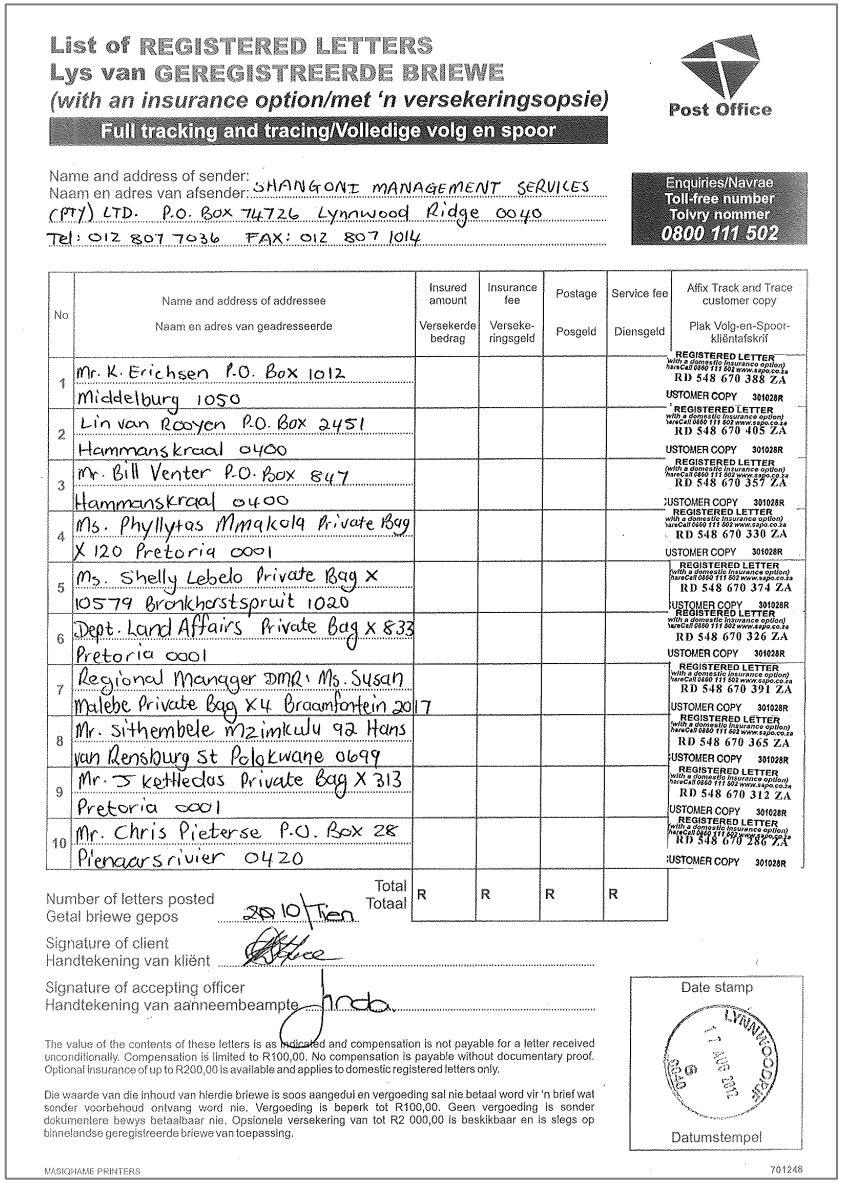
Please do not hesitate to contact the undersigned should you require any additional information.

Contact Details: Shangoni Management Services
Dawie Maree
E-mail: dawie@shangoni.co.za
Cell: 071 673 3344
Fax: 012 807 1014

Yours Faithfully

Dawie Maree
Environmental Assessment Practitioner

Figure 17: Example of registered letters sent to I&APs and Organs of State



List of REGISTERED LETTERS
Lys van GEREGISTREERDE BRIEWE
(with an insurance option/met 'n versekeringsopsie)
Full tracking and tracing/Volledige volg en spoor

Post Office

Name and address of sender:
Naam en adres van afsender: SHANGONI MANAGEMENT SERVICES (PTY) LTD. P.O. Box 74726 Lynnwood Ridge 0040
Tel: 012 807 7036 FAX: 012 807 1014

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	Mr. K. Erichsen P.O. Box 1012 Middelburg 1050					REGISTERED LETTER RD 548 670 388 ZA CUSTOMER COPY 301028R
2	Lin van Rooyen P.O. Box 2451 Hammanskraal 0400					REGISTERED LETTER RD 548 670 405 ZA CUSTOMER COPY 301028R
3	Mr. Bill Venter P.O. Box 847 Hammanskraal 0400					REGISTERED LETTER RD 548 670 357 ZA CUSTOMER COPY 301028R
4	Ms. Phyllytas Mmakola Private Bag X 120 Pretoria 0001					REGISTERED LETTER RD 548 670 330 ZA CUSTOMER COPY 301028R
5	Ms. Shelly Lebelo Private Bag X 10579 Bronkhorstspruit 1020					REGISTERED LETTER RD 548 670 374 ZA CUSTOMER COPY 301028R
6	Dept. Land Affairs Private Bag X 833 Pretoria 0001					REGISTERED LETTER RD 548 670 326 ZA CUSTOMER COPY 301028R
7	Regional Mangger DMR: Ms. Susan Malebe Private Bag X4 Braamfontein 2017					REGISTERED LETTER RD 548 670 391 ZA CUSTOMER COPY 301028R
8	Mr. Sithembele Mzimkulu 92 Hans van Rensburg St Polokwane 0699					REGISTERED LETTER RD 548 670 365 ZA CUSTOMER COPY 301028R
9	Mr. J Kotlledas Private Bag X 313 Pretoria 0001					REGISTERED LETTER RD 548 670 312 ZA CUSTOMER COPY 301028R
10	Mr. Chris Pieterse P.O. Box 28 Pienaarsrivier 0420					REGISTERED LETTER RD 548 670 [illegible] ZA CUSTOMER COPY 301028R
	Total / Totaal	R	R	R	R	

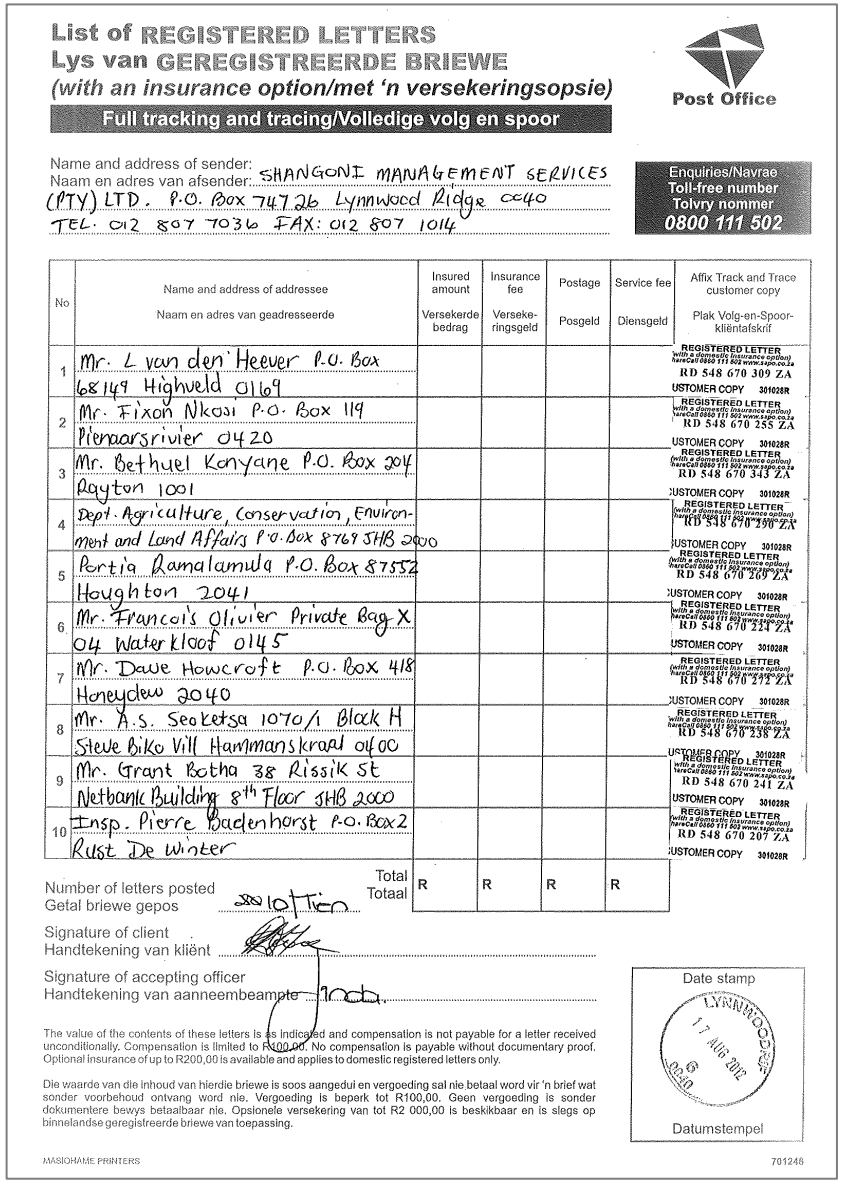
Number of letters posted / Getal briewe gepos: 2010 Tien
Signature of client / Handtekening van kliënt:
Signature of accepting officer / Handtekening van aanneembeampte:

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 R200,00 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 dokumentere bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

Date stamp: LYNNWOOD RIDGE 17 AUG 2012 0040
Datumstempel

MASIQHAME PRINTERS 701248



List of REGISTERED LETTERS
Lys van GEREGISTREERDE BRIEWE
(with an insurance option/met 'n versekeringsopsie)
Full tracking and tracing/Volledige volg en spoor

Post Office

Name and address of sender:
Naam en adres van afsender: SHANGONI MANAGEMENT SERVICES (PTY) LTD. P.O. Box 74726 Lynnwood Ridge 0040
TEL. 012 807 7036 FAX: 012 807 1014

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	Mr. L van den Heever P.O. Box 68149 Highveld 0169					REGISTERED LETTER RD 548 670 309 ZA CUSTOMER COPY 301028R
2	Mr. Fixon Nkosi P.O. Box 119 Pienaarsrivier 0420					REGISTERED LETTER RD 548 670 255 ZA CUSTOMER COPY 301028R
3	Mr. Bethuel Konyane P.O. Box 204 Rayton 1001					REGISTERED LETTER RD 548 670 343 ZA CUSTOMER COPY 301028R
4	Dept. Agriculture, Conservation, Environment and Land Affairs P.O. Box 8769 JHB 2000					REGISTERED LETTER RD 548 670 290 ZA CUSTOMER COPY 301028R
5	Portia Ramalamula P.O. Box 87552 Houghton 2041					REGISTERED LETTER RD 548 670 267 ZA CUSTOMER COPY 301028R
6	Mr. Francois Olivier Private Bag X 04 Waterkloof 0145					REGISTERED LETTER RD 548 670 224 ZA CUSTOMER COPY 301028R
7	Mr. Dave Howcroft P.O. Box 418 Honeydew 2040					REGISTERED LETTER RD 548 670 272 ZA CUSTOMER COPY 301028R
8	Mr. A.S. Seoketsa 1070/1 Black H Steve Biko Vill Hammanskraal 0400					REGISTERED LETTER RD 548 670 238 ZA CUSTOMER COPY 301028R
9	Mr. Grant Botha 38 Rissik St Netbank Building 8th Floor JHB 2000					REGISTERED LETTER RD 548 670 241 ZA CUSTOMER COPY 301028R
10	Insp. Pierre Badenhorst P.O. Box 2 Rust De Winter					REGISTERED LETTER RD 548 670 207 ZA CUSTOMER COPY 301028R
	Total / Totaal	R	R	R	R	

Number of letters posted / Getal briewe gepos: 2010 Tien
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 R200,00 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 dokumentere bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

Date stamp: LYNNWOOD RIDGE 17 AUG 2012 0040
Datumstempel

MASIQHAME PRINTERS 701248

Figure 18: Proof of registered letters

4.5.3 Registered Interested and Affected Parties

Despite personal registered letters addressed to the owners of the neighbouring farms, local newspaper advertisement and site notices, no response was received from I&APs prior to the expiry date of the public participation process that was held . This may be because the mine predates all surrounding owners and/or that the proposed activities are not considered as a significant concern for the neighbours. None of the registered letters to the I&APs returned undelivered which is confirmation that all identified parties takes notice of the proposed development.

4.5.4 Feedback from Interested and Affected Parties

Follow-up was done after the public participation expiry date on the 3rd of October 2012 to confirm further comments and concerns from the I&APs.

An open day was held at Vergenoeg Mining Company (Pty) Ltd. on Wednesday 21 November 2012, from 14h00 to 18h00. Topics for discussion included:

- Proposed pipeline to connect the Plant with existing new Tailings storage facility, crossing the Rhenosterspruit;
- Proposed new designated area for waste rock;
- The Environmental Impact Assessment processes.

Table 34 lists the feedback received from the registered I&APs.

Table 34: Registered I&APs and comments received

Interested and Affected Parties (I&APs)	Comments Received
Francois Olivier (Buffelsdrift Farm)	"No objection towards proposed project." Shangoni Response - Your reply with regards to the mentioned project is gladly appreciated. We acknowledge that you have no objection to the activity.
Dave Howcroft (Buffelsdrift Hiking Trails)	"Please note that I, David Howcroft, Director of Buffelsdrift Hiking Trails (Pty) Ltd have read the EPA for Vergenoeg Rock dump and pipeline and have no objection to this activity." Shangoni Response - Your reply with regards to the mentioned project is gladly appreciated. We acknowledge that you have no objection to the activity.

Interested and Affected Parties (I&APs)	Comments Received
Hennie Erichsen (Farm Loodswaai) Kallie Erichsen	"Sir, We have read your Draft Scoping Report. We will appreciate to be kept up to date on your future progress. Your report is very well done and we are prepared to support your future expansion. Yours sincerely, O.H.Erichsen For Loodswaai Game Ranch." Shangoni Response - Your reply with regards to the mentioned project is gladly appreciated. You are registered and will be kept up to date with the project progress.
Derik de Jager (Elandsdrift Game Ranch)	"Dear Mr Dawie Maree As this will probably not affect operations on our farm, we do not wish to comment. Regards Derik de Jager Manager Elandsdrift Game Ranch" Shangoni Response - Your reply with regards to the mentioned project is gladly appreciated. We acknowledge that you have no objection to the activity.
Loek van den Heever (Sephaku Holdings – Nokeng Fluorspar Mine	"What height will Tailings dam storage facility 5 reach at full capacity?" Shangoni Response – At full capacity, the dam will be approximately 40 meters above the lowest point of the wall.

4.5.5 Notification of Key Stakeholders

Organs of State are all the relevant Authorities identified; which may be affected by the proposed activities. The following Organs of State were identified:

Table 35: Stakeholders identified during the Public Participation Process

Stakeholder	Contact number	Postal Address
GDARD	011 355 1256	P.O. Box 8769. Johannesburg. 2000
DMR Gauteng Regional Manager (Mrs. Susan Malebe)	(011) 358 9700 (011) 339 2423	Private Bag X 4, BRAAMFONTEIN, 2017
Dinokeng Game Reserve, Gauteng Provincial Government (The Director Dinokeng Section)	(011) 3551350	Dept. Agriculture, Conservation, Environment and Land Affairs, P.O. Box 8769, Johannesburg, 2000
Pienaarsrivier -Radium Boerevereniging (Mr. Chris Pieterse)	(012) 7220375 0824546535	PO Box 28 Pienaarsrivier, 0420
Dept. Water Affairs, Olifants Catchment (Mr. J. Nortje)	012 336 8103 0828063794	Private Bag x313, Pretoria, 0001
National Director of Land Affairs, Pretoria.	(012) 3129397	Dept. Land Affairs, Private Bag X 833, Pretoria, 0001
Region 5 Tshwane LM(former Nokeng Tsa Taemane LM) (Mr. Bethuel Konyane)	012 734 6036 012 734 6065 012 734 6064	PO Box 204, Rayton, 1001
Metsweding DM (Mrs. Shelly Lebelo)	013 933 6531	Private Bag x10579, Bronkhorstspruit, 1020
Eskom Network Planning Manager (Mr. S. Mzimkulu)	015 299 0028 079 887 6846	92 Hans van Rensburg St, Polokwane, 0699
South African Heritage Resources Agency (Mrs. Portia Ramalamula)	011 403 0683	Provincial Heritage Council JHB, 38 Rissik street. Netbank Building 8th Floor, JHB, 2000
Department of Agriculture, Forestry and Fisheries (Mrs. Phyllystas Mmakola)	012 319 6000 082 468 8629	Private Bag x120, Pretoria, 0001
SAPS, Rust De Winter (Capt. P. Badenhorst)	(011) 7237904 082 468 8629	P. O. Box 2, Rust De Winter, 0406
Dinokeng Big5 Game Reserve	079 936 8028	P.O. Box 2451, Hammanskraal, 0400

Stakeholder	Contact number	Postal Address
(Mr. L. van Rooyen)	079 492 0393	
Ward 1 Counsellor (Mr. A.S Seoketsa)	071 096 9746	1070/1 Block H, Steve BikoVill, Hammanskraal, 0400
DWA Rust de Winter dam (Mr. F. Nkosi) (Mr. M. Hendriks) (Mr. K. Pretorius)	082 941 0844	P.O. Box 119, Pienaarsrivier, 0420
SAHRA (Mr. Grant Botha)		38 Rissik Street Netbank Building Johannesburg 8th Floor 2000

4.5.6 Information to Stakeholders

Registered letters were sent by Shangoni Management Services to all Organs of State, containing information about the proposed developments. Figure 17 is an example of the letters sent to the Organs of State, and Figure 18 contains the proof of registered letters.

Follow-up has been done after the public participation expiry date on the 3rd of October 2012 to confirm further comments and concerns from the Stakeholders.

An open day was held at Vergenoeg Mining Company (Pty) Ltd. on Wednesday 21 November 2012, from 14h00 to 18h00. Topics for discussion included:

- Proposed pipeline to connect the plant with existing new Tailings dam storage facility, crossing the Rhenosterspruit;
- Proposed new designated area for waste rock;
- The Environmental Impact Assessment processes.

4.5.7 Registering Stakeholders

Refer to Table 35 for a list of Stakeholders.

4.5.8 Feedback from Stakeholders

Table 36 provides a summarised list of all comments received from the registered Stakeholders. Copies of the comments can also be found attached to **Appendix E**.

Table 36: Summary of registered Stakeholders and comments received

Stakeholders	Comments Received
Dinokeng Big 5 Game Reserve (Mr. L van Rooyen)	1. Response on the Background Information Document (BID) was received on 27.08.2012 highlighting the following concerns: o Interest in the project – Proposed activities situated in expansion area of the Reserve. o Clarify the following: i. Visual pollution ii. Sound pollution iii. Water pollution (Elandsriver) iv. Seepage from Waste Rock Dump 1. **Shangoni Response** – Proposed measures were discussed during the Open day. All concerns will be addressed during the Environmental Impact Reporting (EIR) phase of the project.
Dinokeng Big 5 Game Reserve (Open Day 21st Nov 2012, Mr. L van Rooyen)	2 Is there boreholes used to monitor potential groundwater contamination? 2. **Shangoni Response** – Monitoring is done continuously to determine possible groundwater pollution. 3 With regards to the pipeline over the dam wall, will the necessary precautions be implemented in the event of a flood? Will the pipeline be lifted for such an event? **3 Shangoni Response –** Yes, the pipeline will be built on a lifted structure that will contain launders for pollution prevention. Correspondence with the Dam Safety office is done on a regular basis for approval of designs. **4** Will the necessary storm water measures be implemented at the proposed WRD? 4 **Shangoni Response** – The necessary storm water measures will be implemented with berms and evaporation paddocks to contain contaminated runoff. 5 How will the pipeline and the dam wall function together?

Stakeholders	Comments Received
	5 **Shangoni Response** – Correspondence with the approved professional person (Geotechnical engineer) is done on a regular basis. The designs were also sent to the dam safety office for approval. **6** Which company is responsible for the water monitoring on the mine? 6 **Shangoni Response** – Shangoni Management Services is the independent environmental consultants responsible for monitoring of surface and groundwater on the mine property.
Dept. Water Affairs, Olifants Catchment Dam Safety Office (Mr. J Nortje)	Response on BID was received on 4.10.2012 highlighting the following: 7. Mr. Nortje is commenting on behalf of the Dam Safety Office Only (G.N. R. 139 of 24 Feb 2012) "The proposed pipeline route and details have been submitted to me and have accepted this, on condition that the final drawings and details are submitted to the Dam Safety Office before construction thereof. 7. **Shangoni Response** – The applicant takes note of the above-mentioned comment.
Nokeng Fluorspar Mine (Mr. Loek van der Heever)	8. What height will Tailings dam storage facility 5 reach at full capacity? 8. **Shangoni Response** – At full capacity, the dam will lie approximately 40 meters from the lowest point to the highest point of the wall.

Stakeholders	Comments Received
Ward 1 Counsellor (Mr. A.S Seoketsa)	9. Please view attached document PDC INPUTES to VMC under the original comments received in **Appendix E6**. 9. **Shangoni Response** – The public participation was conducted as stipulated in the National Environmental Management Act (Act 107 of 1998) regulation 54 – 57. The reason the public meeting/open day was held on the mine was because a site visit was done after the meeting. Therefore interested and affected parties could gain an understanding of the proposed activities and how these activities could affect them. The consultant noted the counsellors comments and took cognisance of the fact that the counsellor conducts public participation process as a business.

4.5.9 Press notices

In accordance with the National Environmental Management Act (NEMA), (Act No. 107 of 1998) a notice was placed in the local newspaper, namely Nokeng News dated “end August” 2012. Press notices are crucial to create awareness of the project and to reach a broader range of Interested and Affected Parties. The advertisement that appeared on page 6 of the Nokeng News on the “end August 2012” paper is attached as Figure 19.

4.5.10 Placement of the press advertisement

6 Nokeng Nuus • News End August 2012

DEPARTMENTAL REFUSAL: APPLICATION FOR ENVIRONMENTAL AUTHORIZATION FOR THE PROPOSED MINING OPERATIONS ON PORTION 1 OF THE FARM NAAUWPOORT 208 JR AND PORTIONS 4, 11 AND THE REMAINING EXTENT OF PORTION 2 OF THE FARM KROMDRAAI 209 JR, Gaut 002/10-11/E0197.

Notice is hereby given in terms of regulation 10(2)(d) of GNR 543 of 18 June 2010 published under section 24(5) of the National Environmental Management Act (Act no. 107 of 1998) that the Gauteng Department of Agriculture and Rural Development (GDARD), as the competent authority in the abovementioned matter, has reached a decision, and decided to refuse authorization in respect of the environmental authorisation application, for the Proposed Mining Operations On Portion 1 Of The Farm Naauwpoort 208 JR And Portions 4, 11 And The Remaining Extent Of Portion 2 Of The Farm Kromdraai 209 JR.

GDARD reference number: Gaut 002/10-11/E0197

The refusal is dated 2012/08/14

A Copy of the Negative Record of Decision (RoD), which contains the reasons for the GDARD's decision, will be furnished on request. Kindly contact AGES (details below) in this regard.

In terms of Chapter 7 of the EIA Regulations, 2010, registered Interested and Affected Parties (I&APs) may appeal the Department's decision. Should you wish to appeal any aspect of this decision, you must lodge a notice of intent to appeal with the MEC, within 20 days of the date of the Refusal, by any of the following methods:

By facsimile: (011) 333 0620
By post: PO Box 8769, Johannesburg, 2000
By hand: 16th Floor, Diamond Corner Building, 68 Eloff Street, Johannesburg.

Please do not hesitate to contact AGES should you require additional information in this regard.
Consultants: AGES Gauteng (Pty) Ltd.
Postnet 74, Private Bag X07, Arcadia, 0007.
Telephone: (012) 751 2160 Fax: 086 607 2405.
Attention: Mrs Reneé Kruger Ems _.kruger@ages-group.com
Reference: Nokeng Mine EIA

Tshwane consult business people of Region 5

As part of the public participation process of Tshwane's Growth & Development Strategy (GDS) 2055, a consultative meeting about the area's social-economic dynamics and programmes was held with the business people of Region 5 on 21 August in the Refilwe community hall.

Adv Frederick Lekwane (Executive Director of Region 5) said it is due to the collective planning that was done in 1955 for the ANC's Freedom Charter, that this country is where it is today. "We are building a legacy for the children of this country", he said.

He reminded the business people of Region 5 (Refilwe, Cullinan, Rayton) that they are now part of the huge City of Tshwane (CoT), which had many advantages for them. Already work is being done on the roads, water and electricity, as can be seen everywhere. "It was therefore a blessing in disguise that Nokeng couldn't sustain itself", he said.

"With this strategy of the CoT we are going to formalise all these fragmented businesses that we see around us so that we will do business in the right ways and according to legislature." He used seamstresses and bakers of vetkoek as examples, and said these small informal businesses should grow into big bakeries and clothing manufacturers right inside Refilwe.

"Refilwe is our town. By 2055 it must be a proper big town with big shops, so that people won't have a need to travel into town anymore. Everything must be here. Business men and women must make sure they employ businesses here and help to develop this area for ourselves, as we know this area better", he said. Adv Lekwane encouraged the business people of the area to sit down with the CoT (the ward councillor) to plan the business sector for their area.

During question time, Mr Corrine Easter of the Rockplain Development Forum thanked the CoT for the changes in the area that have already become visible since they took over in June 2011, like work on roads, water and various bulk infrastructure projects. "To build the city of 2055, the work should start underground."

Mr Dan Molepotsi, Chairperson of the Refilwe Business Chamber, also thanked the CoT for the positive changes they can already see in terms of roads and water pipes. "We cannot have long term growth without the infrastructure being installed". He mentioned quite a few needs in the community as they have observed from the Refilwe Business Chamber office:

- Will the regional municipal office in Refilwe be rebuilt after it was burnt down a few years ago?
- Are there any plans to bring foreign investors into the area?
- Local businesses must be empowered by the procurement policies we have with Tshwane. Issues were recorded well in the Nokeng office, but was the information taken over by Tshwane?
- The transport system WITHIN the region should be looked at.
- The staff in the Rayton municipal office should be trained and more effective so that turn-around time for assisting a client is 20 minutes, and not 4 hours. Staff should also work shifts so that the offices can be open and customers be served during lunch time.

Mr Dan Molepotsi, Chairperson of the Refilwe Business Chamber, putting into words what many people of the community are talking about.

VERGENOEG MINE (PTY) LTD

PUBLIC NOTICE OF APPLICATION FOR ENVIRONMENTAL AUTHORISATION

SHANGONI Management Services (Pty) Ltd

In terms of the regulations published in Government Notice R. 543, R. 544, R. 545 and R. 546 of 18 June 2010, in terms of section 24D of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the National Water Act (Act No. 36 of 1998) the interested and affected parties are herewith notified of the intent to carry out the following activity:

Activity Description: The applicant, Vergenoeg Mine (Pty) Ltd, has initiated an Environmental Authorisation process under the National Environmental Management Act, 1998 (Act No. 107 of 1998) in order to obtain Environmental Authorization for the proposed waste rock dump and pipeline.

Vergenoeg Mine is also applying for an Integrated Water Use License under Chapter 4 of the National Water Act (Act No. 36 of 1998), for the proposed water use activities accompanying the proposed pipeline and waste rock dump at the Mine.

Reference numbers: (GDARD) 002/12-13/E0080

Applicant: Vergenoeg Mine (Pty) Ltd

Locations: Remaining extent and Portion 4 of the farm Kromdraai 209 JR.

Legislation: Activity No 9, 11 and 18 of Government Notice 544, Activity No 5 of Government Notice 545, Activity No 14(a), (i) of Government Notice 546 published 18 June 2010 as well as Section 21 (c), (i) and (g) of the National Water Act (Act No 36 of 1998).

Invitation to Participate: Should you require any additional information or wish to register as I&AP and/or inform us of any other I&APs and/or organisation and/or organ of state who should be notified, please submit your name, contact information, and interest in the matter in writing to address below not later than 3 October 2012. A Background Information Document is also available from the Consultant.

Independent Environmental Consultants:
Shangoni Management Services (Pty) Ltd
PO Box 74726
Lynnwood Ridge
Pretoria
0040
Tel: (012) 807 7036
Fax: (012) 807 1014
Mobile: 071 673 3344
E-mail: davie@shangoni.co.za

VERGENOEG MYN (EDMS) BPK

PUBLIEKE KENNISGEWING TER AANSOEK VIR OMGEWINGSMAGTIGING

Ingevolge die regulasies gepubliseer in Staatskennisgewing R. 543, R. 544, R. 545 en R. 546 op 18 Junie 2010, Afdeling 24D van die Wet op Nasionale Omgewingsbestuur (Wet No. 107 van 1998) asook die Nasionale Waterwet (Wet No. 36 van 1998), word belanghebbende en geaffekteerde partye in kennis gestel van die voorgenome aktiwiteit:

Beskrywing van aktiwiteit: Die aansoeker, Vergenoeg Myn (EDMS) BPK is besig met 'n omgewings goedkeuringsproses onder die vereistes van die Wet op Nasionale Omgewingsbestuur (Wet No. 107 van 1998) vir die konstruksie van die voorgenome stykdam en pyplyn.

Die myn doen ook aansoek vir 'n geïntegreerde waterlisensie volgens die vereistes van die Nasionale Waterwet (Wet No. 36 van 1998) vir die watergebruik aktiwiteite wat gepaard gaan met die voorgenome stykdam en pyplyn.

Verwysingsnommers: (GDARD) 002/12-13/E0080

Aansoeker: Vergenoeg Myn (Edms) Bpk

Ligging: Gedeelte 4 en die restant gedeelte van die plaas Kromdraai 209 JR.

Wetgewing: Aktiwiteit No 9, 11 en 18 van Staatskennisgewing 544, Aktiwiteit No 5 van Staatskennisgewing 545, Aktiwiteit No 14 (a), (i) van Staatskennisgewing 546 gepubliseer op 18 Junie 2010 asook Afdeling 21 (c), (i) en (g) van die Nasionale Waterwet (Wet No 36 van 1998).

Publieke Deelname Uitnodiging: Vir enige kommentaar en-/of navrae, of indien u as belanghebbende en/of geaffekteerde party wil registreer of ons wil inlig van enige ander partye en/of organisasie en-/of staatsinstelling wat in kennis gestel moet word, kan u gerus u naam, kontakbesonderhede en die kommentaar en-/of navrae stuur aan die adres hieronder voor 3 Oktober 2012. Vir meer inligting kan u ook 'n Agtergrond Inligtingsdokument vanaf die Konsultant aanvra.

Onafhanklike Omgewingskonsultante:
Shangoni Management Services (Pty) Ltd
Posbus 74726
Lynnwood Ridge
Pretoria
0040
Tel: (012) 807 7036
Faks: (012) 807 1014
Sel nr: 071 673 3344
E-pos: davie@shangoni.co.za

Figure 19: Copy of notice in Nokeng News

4.5.11 Placement of public site notices

The site notices were placed at the following locations:

- Entrance at the Vergenoeg mine on the Remaining Extent of the farm Kromdraai 209 JR.
- Entrance next to the R567 Rust de Winter road at Portion 4 of the farm Kromdraai 209 JR.

Figure 20: Site notice at mine entrance

Figure 21: Site notice at Portion 4 entrance

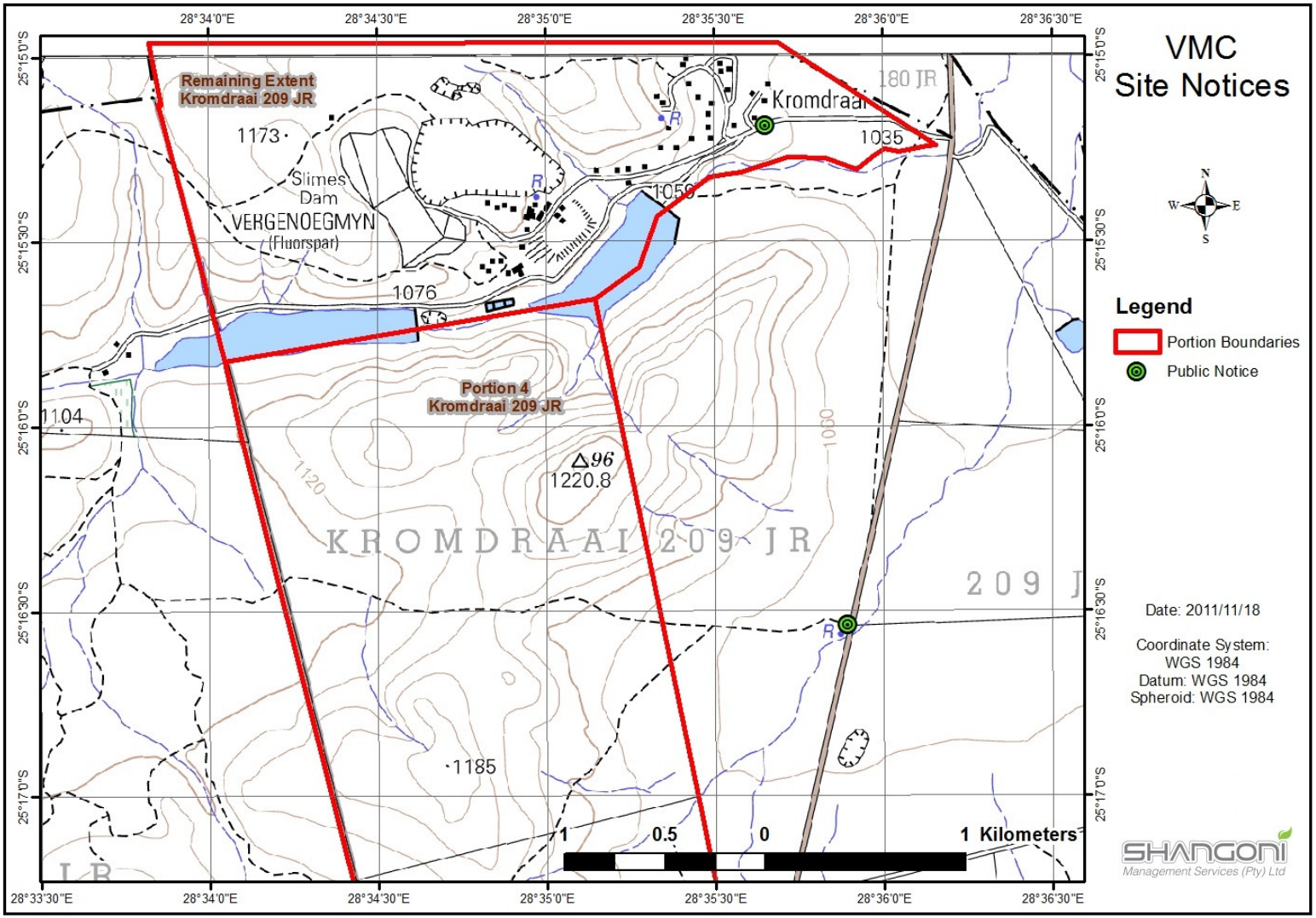


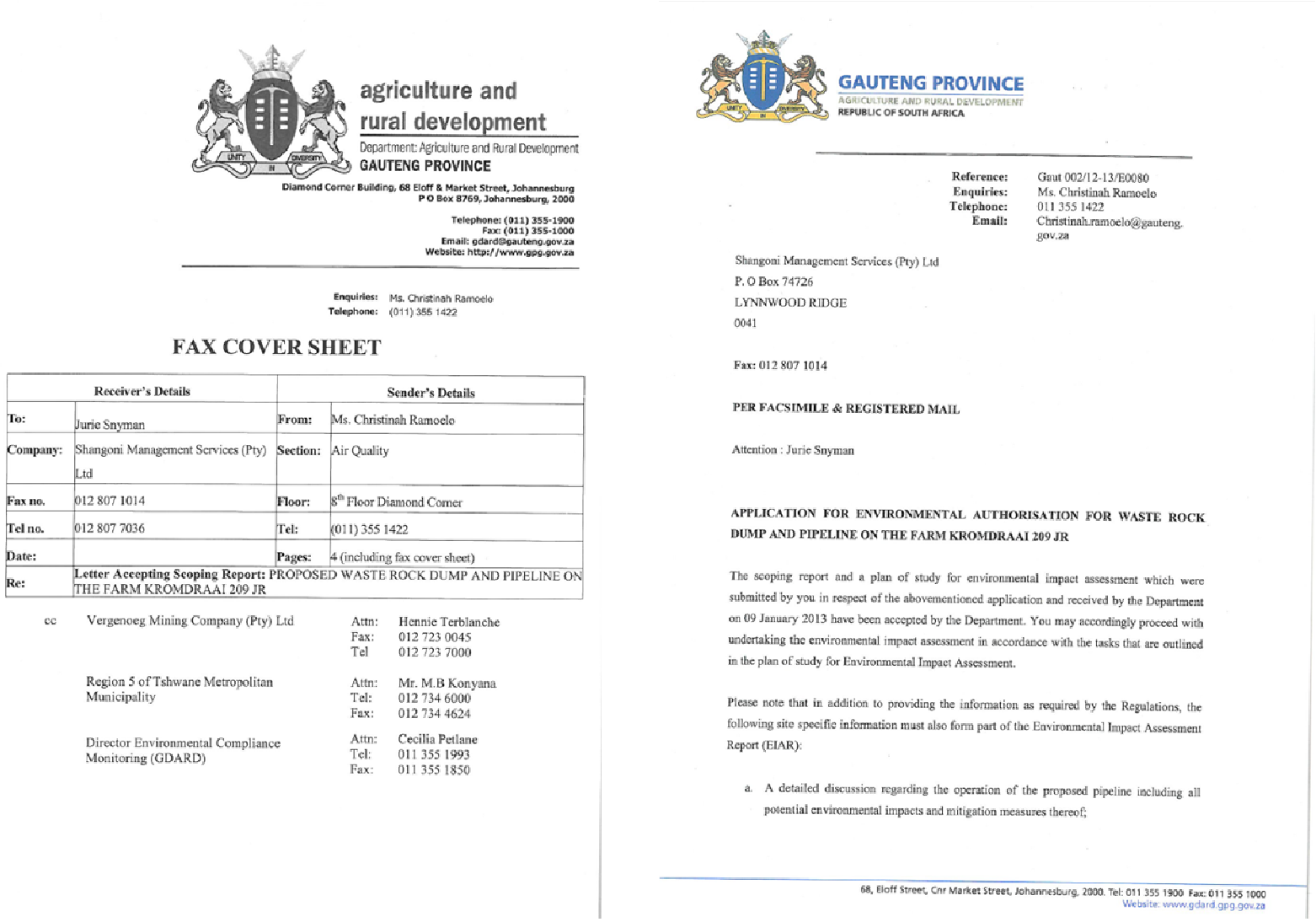
Figure 22: Location of Site notices

4.5.12 Issuing Interested and Affected Parties and Organs of State with a Draft Environmental Scoping Report

The Draft Environmental Scoping Report (ESR) was sent to all registered Organs of State. The review period was from 24 August 2012 to 3 October 2012. The draft ESR was also made available to all registered I&APs and displayed at the Mine office and the Rust de Winter Police Station. The draft ESR was also available on the Shangoni website (www.shangoni.co.za).

4.5.13 Consideration of the final Scoping Report

The final Scoping Report was submitted to the Gauteng Department of Agriculture and Rural Development (GDARD) for consideration on the 9th of January 2013. After a site visit from two officials from the department and several correspondences through email and telephone conversations, the Department accepted the final Scoping Report and plan of study in a letter sent on 30 April 2013. The complete letter is attached below in Figures 23 and 24.



agriculture and rural development
Department: Agriculture and Rural Development
GAUTENG PROVINCE
Diamond Corner Building, 68 Eloff & Market Street, Johannesburg
P O Box 8769, Johannesburg, 2000

Telephone: (011) 355-1900
Fax: (011) 355-1000
Email: gdard@gauteng.gov.za
Website: http://www.gpg.gov.za

Enquiries: Ms. Christinah Ramoelo
Telephone: (011) 355 1422

FAX COVER SHEET

Receiver's Details		Sender's Details	
To:	Jurie Snyman	From:	Ms. Christinah Ramoelo
Company:	Shangoni Management Services (Pty) Ltd	Section:	Air Quality
Fax no.	012 807 1014	Floor:	8th Floor Diamond Corner
Tel no.	012 807 7036	Tel:	(011) 355 1422
Date:		Pages:	4 (including fax cover sheet)
Re:	Letter Accepting Scoping Report: PROPOSED WASTE ROCK DUMP AND PIPELINE ON THE FARM KROMDRAAI 209 JR		

cc Vergenoeg Mining Company (Pty) Ltd — Attn: Hennie Terblanche, Fax: 012 723 0045, Tel 012 723 7000

Region 5 of Tshwane Metropolitan Municipality — Attn: Mr. M.B Konyana, Tel: 012 734 6000, Fax: 012 734 4624

Director Environmental Compliance Monitoring (GDARD) — Attn: Cecilia Petlane, Tel: 011 355 1993, Fax: 011 355 1850

GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

Reference: Gaut 002/12-13/E0080
Enquiries: Ms. Christinah Ramoelo
Telephone: 011 355 1422
Email: Christinah.ramoelo@gauteng.gov.za

Shangoni Management Services (Pty) Ltd
P. O Box 74726
LYNNWOOD RIDGE
0041

Fax: 012 807 1014

PER FACSIMILE & REGISTERED MAIL

Attention : Jurie Snyman

APPLICATION FOR ENVIRONMENTAL AUTHORISATION FOR WASTE ROCK DUMP AND PIPELINE ON THE FARM KROMDRAAI 209 JR

The scoping report and a plan of study for environmental impact assessment which were submitted by you in respect of the abovementioned application and received by the Department on 09 January 2013 have been accepted by the Department. You may accordingly proceed with undertaking the environmental impact assessment in accordance with the tasks that are outlined in the plan of study for Environmental Impact Assessment.

Please note that in addition to providing the information as required by the Regulations, the following site specific information must also form part of the Environmental Impact Assessment Report (EIAR):

a. A detailed discussion regarding the operation of the proposed pipeline including all potential environmental impacts and mitigation measures thereof;

68, Eloff Street, Cnr Market Street, Johannesburg, 2000. Tel: 011 355 1900 Fax: 011 355 1000
Website: www.gdard.gpg.gov.za

Figure 23: Letter from GDARD on final scoping report (1 of 2)

b. Details on dust prevention mechanism and air quality impact assessment study for the operation of the proposed new waste rock dump must be addressed in the EIA report and the air quality monitoring results must be provided.
c. Comments from DWA on water quality monitoring including extending to area of waste rock dump;
d. Delineation must be undertaken according to "DWAF, 2003: A practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones";
e. Vegetation surveys must be undertaken by suitably qualified specialists registered as Professional Natural Scientists in accordance with the Natural Scientific Professions Act (No. 27 of 2003) within the field of Botanical Science. Specialists must have qualifications and experience relevant to vegetation science/ecology;
f. All specialist studies including waste rock characterization (e.g. potential for Acid mine drainage, salinity etc) must be undertaken by suitably qualified specialists.
g. A detailed discussion regarding storm water management system and Leachate management measures thereof if and when occur, this must include measures for waste rock dump impact on blue dam.
h. An emergency/fire plan must be included. This plan must be approved by an approved risk consultant and/or local authority;
i. Type and quantities of waste to be produced and managed thereof. A waste management plan (for both hazardous and general waste) must be compiled and include the EIAR based on various stages of the process; and
j. Alien species eradication plan;
k. The emergency spillage plan, particularly for pipe crossing blue dam.
l. The applicant must also provide detailed information on the intended plan with respect to TSF 3 and 4 as they are out of capacity, including mitigation of environmental impacts.
m. In terms of activity no 11 of the Environmental Impact Assessment Regulations 2010 (GN R.544) published under National Environmental Management Act, 1998 (Act No 107 of 1998) (as amended on 18 June 2010), TSF 5 is a listed activity and therefore requires authorisation from this Department and application must be submitted to section S24G.
n. All comments and issues raised by interested and affected parties and other stakeholders must be addressed and incorporated into an Environmental Impact Assessment Report;
o. A comprehensive Environmental Management Programme (EMPr) for various phases of the proposed activities (construction, operational and decommissioning phases). The EMPr must include a discussion on mitigation measures for all potential impacts as well as the persons responsible for implementing such measures.
p. Offsets to be considered.

Please note that the EIA report must reflect all the requirements as stated in section 31 (2) of Government Notice R543 of Environmental Impact Assessment Regulations of 2010 promulgated in terms of section 24 (5), 24M and 44 of the NEMA act, 1998 (as amended).

Yours faithfully

Mr. Loyiso Mkwana
Acting Director: Sustainable Use of Environment
Date: 30/04/2013

CC: Vergenoeg Mining Company (Pty) Ltd Attn: Hennie Terblanche
Tel: 012 723 7000
Fax: 012 723 0045

GAUT: 002/12-13/E0080, Proposed Waste Rock Dump and pipeline on the farm Kromdraai 209 JR Page 2 of 3

GAUT: 002/12-13/E0080, Proposed Waste Rock Dump and pipeline on the farm Kromdraai 209 JR Page 3 of 3

Figure 24: Letter from GDARD on final scoping report (2 of 2)

4.5.14 Response to letter from Gauteng Department of Agriculture and Rural Development

Responses to the comments made within the letter received from Gauteng Department of Agriculture and Rural Development on 2013/04/30 on the final scoping report are contained within the Table 37 below. Reference is made to the relevant section in the report where applicable.

Table 37: Response on letter from Gauteng Department of Agriculture and Rural Development

Comment	Response
a. A detailed discussion regarding the operation of the proposed pipeline including all potential environmental impacts and mitigation measures thereof;	Potential environmental impacts and mitigation measures associated with the proposed pipeline is discussed in detail within the Environmental Impact Assessment section (Chapter 7) of this report. Further, an operational manual has been drafted for the TSF5 pipeline with details on the design and operation of the pipeline to include proposed mitigation measures. Note that this manual is still in draft format as the technical engineering details are based on conceptual information, which will only be finalised once a contractor has been appointed.
b. Details on dust prevention mechanism and air quality impact assessment study for the operation of the proposed new waste rock dump must be addressed in the EIA report and the air quality monitoring results must be provided.	Gondwana Environmental Solutions conducted an Air quality impact assessment for the proposed waste rock stockpile at Vergenoeg mining company, dated September 2013 attached as **Appendix G10**. The main objective of the assessment was to assess the potential impact on ambient air quality and human health risks associated with the mining operations including the new waste rock stockpile. The impact assessment was limited to the impact of airborne particulates. Although the mining activities would also emit other gases, primarily by haul trucks and mining vehicles, it was established that the impact of these

Comment	Response
	compounds would be insignificant and were therefore not included. The main modelling results can be summarised as follows: • PM10 (24-hour Average Concentrations) – With mitigation measures, the predicted maximum daily concentrations exceed the national daily standard of 75µg/m3 (Compliance date: January 2015) up to approximately 1 km north of the northern fence line of the mine's property. • PM10 (Annual Average Concentrations) – With mitigation measures, the predicted maximum annual average concentrations also exceed the national annual average standard of 40µg/m3 (Compliance date: January 2015), but only up to less than ½ km north of the mine's northern property boundary. Although fugitive emissions from the mine do result in an impact on the nearby surrounding areas, concentrations fall off rapidly, moving away from the mining area, having a relatively localized impact. Given the remote location of the mine, the impact on the environment immediately surrounding the proposed mine is low, even with the new proposed waste rock stockpile. The predicted maximum daily concentrations of PM10 exceed the National Daily Standards up to 5km from the mine boundary without mitigation and only up to 1km with mitigation measures. For this reason it is recommended that the current dustfall monitoring programme and the current air pollution mitigation measures be continued.

Comment	Response
c. Comments from DWA on water quality monitoring including extending to area of waste rock dump;	Vergenoeg mine operates with a water use license for the existing activities. The approved water quality-monitoring programme includes areas upstream, downstream and other strategic locations within the mining area to monitor specific quality outcomes. A water use license application was submitted to DWA regional offices on 26 October 2012 for the proposed pipeline and waste rock dump. Water quality monitoring is included in the application. The department will be notified of the outcome when evaluation of the application has been completed. Geochemical characterisation has been done on the two main groups of waste rock that will be dumped on the area for which environmental authorisation is applied for.
d. Delineation must be undertaken according to "DWAF, 2003: A practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones";	Imperata Consulting cc (on behalf of AGES) conducted the wetland delineation using the applicable guideline, dated 2005, edition 1. Reference can be made to **Appendix G9** for the full report.
e. Vegetation surveys must be undertaken by suitably qualified specialists registered as Professional Natural Scientists in accordance with the Natural Scientific Professions Act (No. 27 of 2003) within the field of Botanical Science. Specialists must have qualifications and experience relevant to vegetation science/ecology.	Vegetation surveys was conducted by Mr. Lukas Niemand, director of Pachnoda Consulting cc and registered as professional scientist (Pr. Sci. Nat.) Reg. no. 400095/06. The work he conducted was further peer reviewed by a third party, Mr. LER Grobler from Imperata Consulting, (MSc Plant Sciences - UP; Pr. Sci. NAT. Reg. No. 400097/09. Please find Mr. Niemand's CV as well as the peer reviewed letter from Mr. Grobler attached in **Appendix I1**.

Comment	Response
f. All specialist studies including waste rock characterisation (e.g. potential for Acid mine drainage, salinity etc) must be undertaken by suitably qualified specialists.	Waste rock characterisation is done by Waterlab, a SANAS accredited laboratory and attached to **Appendix G8**. Reference can also be made to section 1.4.3. in this report for the discussion on the geochemical characterisation of the waste rock. All other specialist studies are done by suitably qualified specialists.
g. A detailed discussion regarding storm water management system and Leachate management measures thereof if and when occur, this must include measures for waste rock dump impact on blue dam.	A Storm Water Management Plan is compiled for Vergenoeg mine according to the DWAF best practice guidelines (2006) G1 Storm Water Management and requirements set by GNR 704 of 4 June1999. The SWMP is attached to **Appendix G12** of this report.
h. An emergency/ fire plan must be included. This plan must be approved by an approved risk consultant and / or local authority;	The mine operates according to the approved procedures addressing cases of emergency / fire. These procedures are attached to **Appendix I3**, labelled: SP 5.6 Emergency Evacuation Procedure SP 5.7 Fire Response Procedure These procedures are compiled and approved by Mr. Peter Muller, the legally appointed Safety Officer on the mine. His credentials and appointment can be found attached in **Appendix I** together with the emergency / fire procedures.
i. Type and quantities of waste to be produced and managed thereof. A waste management plan (for both hazardous and general waste) must be compiled and include the EIAR based on various stages of the process; and	The Waste management plan is attached to **Appendix I4** of this report. This WMP contains information from the approved Environmental Management Programme as well as the Integrated Water and Waste Management Plan (IWWMP), updated annually.
j. Alien species eradication plan;	An Alien Invasive Program is attached to **Appendix G6** of this EIA report.
k. The emergency spillage plan, particularly for pipe crossing blue dam.	The operational manual for the TSF 5 pipeline incorporates an emergency spillage plan, including the section crossing the blue dam.

Comment	Response
l. The applicant must also provide detailed information on the intended plan with respect to TSF 3 and 4 as they are out of capacity, including mitigation of environmental impacts.	Note that TSF 3 and 4 are NOT out of capacity. Deposition of tailings to TSF 5 is promoted as an operational strategy to allow alternative use of TSF 3 and 4 during maintenance and downtime on the TSF 5 pipeline. TSF 3 and 4 will therefore remain operational.
m. In terms of activity no 11 of the Environmental Impact Assessment Regulations 2010 (GN R.544) published under National Environmental Management Act, 1998 (Act No 107 of 1998), TSF 5 is a listed activity and therefore requires authorisation from this Department and application must be submitted to section S24G.	An e-mail received from Maryjane Ramahlodi on the 25th of July 2013 who is an Environmental Management Inspector for the Gauteng Department of Agriculture and Rural Development Enforcement (S24G) section refers; The department has decided that the client is exempted from rectification of the Tailings dam storage facility, as it is not an illegal activity. This is because during 2007 all mining activities were under the administration of Department of Mineral Resources and Energy now known as the Department of Mineral Resources. Therefore, the client did not legally require an authorisation in terms of the National Environmental Management Act (Act No. 107 of 1998). If the Tailings dam storage facility was approved by Department of Mineral Resources and Energy then, it cannot be considered illegal and there is no need for your client to apply for rectification in terms of Section 24G-rectification application.
n. All comments and issues raised by interested and affected parties and other stakeholders must be addressed and incorporated into an Environmental Impact Assessment Report;	Comments and issues raised by interested and affected parties and other stakeholders are addressed within section 4.5.4 & 4.5.8 of the report. Where applicable, original correspondence has been attached in **Appendix E** of this EIA report.

Comment	Response
o. A comprehensive Environmental Management Programme (EMPr) for various phases of the proposed activities (construction, operational and decommissioning phases). The EMPr must include a discussion on mitigation measures for all potential impacts as well as the persons responsible for implementing such measures.	An Environmental Management Programme has been compiled for all stages of the activities and is attached to **Appendix H** of this EIA report. The EMP includes, but is not limited to, mitigation measures as well as responsible persons.
p. Offsets to be considered.	Consideration of offsets is discussed within the risk assessment (Tables 46 and 47) of this EIA report.

4.5.15 Review of the Environmental Impact Assessment Report

4.5.15.1 Public Review of the draft Environmental Impact Assessment report

The draft EIA report was made available to the Organs of state and registered I&APs for public review and comment. Hard copies of the document was placed at the Rust de Winter Police Station and at Vergenoeg Mine. The document was also uploaded onto www.shangoni.co.za.

A 40-day period was allowed for this review process from 16 October 2013 to 25 November 2013. An extended period (60 days in total) was provided to the Department of Water Affairs (DWA) (up until mid-December 2013). Refer to **Appendix E11** for information on the letters sent out as notification of the commenting period.

4.5.15.2 Authority review of the Environmental Impact Assessment report

After the public review period, all relevant comments received from the Departments, Organs of State and I&APs were considered and included into this final EIA report. The only comments that were received were from the Department of Water Affairs (DWA). Refer to Table 38 below for the comments received from the DWA and responses thereto. A copy of the letter is also attached in **Appendix E**.

Table 38: DWA comments and responses

Comment	Response
The applicant shall conduct a preliminary legal assessment to identify all the water use activities associated with the proposed project that will require authorisation by the DWA and the applicant is hereby referred to Section 22(1) of the National Water Act, 1998 (Act 36 of 1998).	A legal assessment was conducted, the initial Integrated Water Use License Application (IWULA) for Vergenoeg mine was processed and approved through the Department of Water Affairs (DWA), Nelspruit Regional Office. The Water Use License details are filed under the following references: License number:04/B31D/ACGIJ/991 File number: 16/2/7/B300/C92. Furthermore, an Integrated Water Use License Application (IWULA) and Integrated Water and Waste Management Plan (IWWMP) specifically for the pipeline and Waste Rock Dump activities was submitted in October 2012. Correspondence between Vergenoeg Mining Company and DWA took place in March 2013, April 2013 and October 2013, subsequent to the submission (refer to **Appendix F**).
Therefore any other water use related activities associated with this project that are not permissible as indicated on Section 22(1) of the National Water Act, 1998 shall have to be authorised by the DWA prior to such water use activities taking place and the applicant is requested to liaise with the DWA for guidance on the requirements for such an authorisation.	
The applicant is requested to liaise with the DWA for guidance on the requirements for water use authorisations, as the current Departmental records show that such an application has not been launched for the water use activities associated with the proposed project.	
Flood-lines: The map of location of the proposed project showing the 1:100 year floodline in terms of Section 144 of the National Water Act, 1998 shall be submitted to the DWA.	Refer to the Flood line map in **Appendix A**.

Comment	Response
Wetlands: An indication shall be provided on the availability of any wetlands and rivers within the area surrounding the proposed project. Any activity that will fall within 500m radius of a wetland will require a water use license application in terms of the National Water Act, 1998. The applicant must therefore conduct a wetland delineation study or alternatively the applicant should provide another option which will not involve wetland destruction. If wetlands are to be destructed, the applicant should provide mitigation measures for the impacts on wetlands.	A description of sensitive landscapes is provided in Section 2.1.13 of this report, as well as in Figure 16. Refer also to the following for more information on the wetlands: • **Appendix G9**; • The Environmental Impact Assessment Section (Table 46 – mitigation measures); and • **Appendix H**.
Storm water management: Storm water management plan must be implemented to prevent pollution on run-off.	The Storm Water Management Plan was compiled for the mine according to the DWA Best Practice Guidelines (2006): G1 Storm Water Management and requirements set by the GN704, dated 1999. The plan is attached to this report as **Appendix G12**. In addition, recommendations from the mentioned plan has been included in this report as mitigation, measures (refer to Tables 46 and 47 and **Appendix H**).
In page 22 of the report, it is stated that an area of approximately 75 hectares next to the current operational tailings facilities will be for stockpiling. The stockpiling of waste is regarded as a Section 21 (g) of the National Water Act, 1998.	The following activities were included in the IWULA that was submitted in 2012: • Section 21(g): Disposing of waste in a manner, which may detrimentally impact on a water resource for the new waste rock dump, • Section 21(c) in terms of the National Water Act, 1998: Impeding or diverting the flow of water in a watercourse, and Section 21(i): Altering the bed, banks, course or characteristics of a watercourse for the pipeline crossing over the Rhenosterspruit. Refer also to Section 3.3 of this report.
Sanitation: The Department requires information regarding sewage management during and after the Operational Phase of the proposed development before any construction can take place.	Refer to Section 7.3.1.1. Refer also to Table 46 for impacts and mitigation measures.

Comment	Response
Storage of oil, diesel, hydraulic fluids and grease: It is recommended that the storage area for these fluids be bunded in such a manner that any spillages can be contained and reclaimed without causing any pollution to the ground and surface water resources.	Bunded storage areas are used on the mine where hazardous substances are being stored. The hazardous waste site is situated on an impermeable surface and is roofed. Furthermore, it is equipped with a sump and oil separator. Refer also to Tables 46 and 47 for risk assessments and mitigation measures regarding potential spillages.
Pollution incidents: The applicant is referred to Section 19(1) of the National Water Act, 1998, and to report any pollution incidents originating from the proposed project to the Regional Office of DWA within 24 hours.	This comment is noted.
In page 33 of the report in paragraph 2, it is stated that a disadvantage of the chosen alternative is that there is a future....	The sentence is incomplete on the DWA letter. It is assumed that DWA is referring to the sentence “a disadvantage of the chosen alternative is that there is a future risk of polluting the Blue Dam.” Proper water management infrastructure and monitoring should however be able to mitigate the risk of pollution to the flood diversion dam. Refer also to Tables 46 and 47 for risk assessments and mitigation measures.
Therefore the applicant shall provide clarity on the above-mentioned issues of concern prior to any recommendations from the DWA.	Refer to responses above. Further communication with DWA will be ongoing.

4.5.15.3 Environmental Management Plan (EMP)

A draft EMP was compiled for this project and submitted along with the EIA report to the relevant Departments, Organs of State and I&APs (refer to **Appendix H**). The EMP prioritises 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 EMP will be finalised upon receipt of authorisation, to ensure that any specific conditions of approval are addressed in the EMP.

4.5.16 Conclusions of the Public Participation Exercise

In conclusion, the Public Participation exercise has provided adequate information to enable an understanding of what the proposed mining activities would entail and to address the concerns and comments of this Draft Environmental Impact Assessment Report.

5. NEED AND DESIRABILITY FOR THE ACTIVITY

A need and desirability for this project is evident from the following factors that were considered:

Vergenoeg Mining Company (Pty) Ltd. has been supplying acid grade fluorspar to the chemical industry for more than 50 years. This on-going production is met by a relative steady demand ensuring economic growth in South Africa. With the life of mine estimated at more than 100 years, this mine provides a steady income to its employees for at least four more generations to come. The proposed activities as part of this EIA are essential to the continuation of mining activities at the Vergenoeg mine. Limited space for waste disposal produced during mining operations increase the need for authorised waste disposal facilities in the form of waste rock and tailings.

5.1 Market

The entire production is currently exported to the international chemical industry with small tonnages of metallurgical grade fluorspar sold to local foundries. Fluorspar is utilised in a wide variety of products forming part of the building blocks in the following materials:

- PTFE (Teflon)
- Enamels
- Refrigeration and Air conditioning
- Flux to reduce melting point in steel and aluminium industries.
- In the production of Hydrogen fluoride as catalyst for linear alkyl benzene production i detergent industries.
- In the production of Hydrofluoric acid, that is a compound for various pharmaceutical products.
- Aerosol cans (HFC's)

5.2 Domestic Market

The metallurgical grade fluorspar is used in the local metal and aluminium smelting industries.

5.3 Benefits

Through the direct operation, Vergenoeg mine employs 240 permanent workers and 21 contractors. The proposed pipeline and waste rock dump activities form an integral component for the on-going operation of the mine, which in turn provides abovementioned benefits to the socio-economic structures. Reference can be made to the Social and Labour Plan attached in **Appendix G2** for detailed socio-economic contribution of the mine.

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 alternatives assessment was conducted using a simple cost-benefit analysis of each proposed alternative, through assessing various environmental attributes. These attributes can include physical; biophysical; and social characteristics.

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 impact of the preferred project option on environmental and socio-economic attributes, identified during the assessment phase, is evaluated against the potential impact of the no-go option on the same attributes. The summary of this assessment is provided in Table 39 hereafter.

Table 39: Development vs. No-Go Option

Attribute	Development Option	No-go Option
Physical environment		
Air Pollution	-1	0
Noise Pollution	0	0
Water Quality	-1	0
Water Quantity	0	0
Visual Aesthetics	0	0

Biophysical environment		
Fauna and Flora	-1	0
Sensitive Environments	-1	0

- The negative environmental impacts expected by the proposed development can be mitigated to acceptable limits. The positive social impacts outweigh the negative impacts and the consideration of the "No-Go" option.
-
- A "No-Go" alternative for these activities will result in closure of the mine with much larger ramifications beyond the proposed activities. The mine will be forced to stop all operations due to no facility to dispose of waste rock or system to convey return water and tailings. This will subsequently lead to the premature closure of the mine and unemployment of 240 permanent employees and 21 contractors involved in different sections of the mining operation. Production of fluorspar will cease and economic growth associated and dependent on the mine will be diminished. Unemployment, poverty and degrading of living standards will raise in the entire mine's servicing areas.

Social environment		
Traffic during construction	0	0
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	0	-4

6.2 Alternatives regarding the Pipeline

6.2.1 Consideration of Alternative Sites (pipeline routes)

During the conceptual design phase, the main alternative pipeline routes were considered and assessed according to the ecological disturbance, engineering and technical design requirements and the financial costs associated with each alternative. Once the preferred route was selected based on the optimal conditions for all criteria, the route was analysed in more detail to finalise designs, costing and implementation requirements.

Initially four (4) routes were identified as options for the pipe laying and power line. Refer to figure 25. All the alternative pipeline routes commence at the plant and will transport tailings to the tailings dam, and return water back to the plant. Below follows a description of the four initial alternative pipeline routes that were considered:

Alternative 1

This alternative represents the route from the return water dam to Tailings Storage Facility Number 5 (TSF5) directly over the ridge to the west of the Red Dam. This route has different challenges than the blue dam routes, but also beneficial features that were considered. Apart from construction requirements, access during the operational phase is required for inspections. This will require vegetation clearance and levelling for service vehicles to gain access to the rough terrain.

Alternative 2

This route will follow the existing road running parallel to the Oxidation Plant and will run to the north of the Blue Dam up to the western border of the property. At the property boundary, the line will turn south and cross over the Blue Dam making use of a suspended launder pipe system with pillars approximately 20 m apart. The launder has to be elevated to the height of the dam wall to ensure clearance during a flood, which will require an 8-10 m high structure crossing the dam. From the southern part of the dam, the pipeline will continue straight along the existing road on the property boundary until it reaches TSF5.

Alternative 3

This option was proposed as an alternative to the route along the Blue Dam road (Alternative 2). The route should go on top of the hill above the ridge area to the western property boundary. From the boundary, it will continue in a southerly direction towards TSF 5.

Alternative 4

This option for the pipeline route was initially identified as an alternative to the sensitive ridge. It was however confirmed by the process engineers that the slope is too steep to convey the tailings straight over the hill.

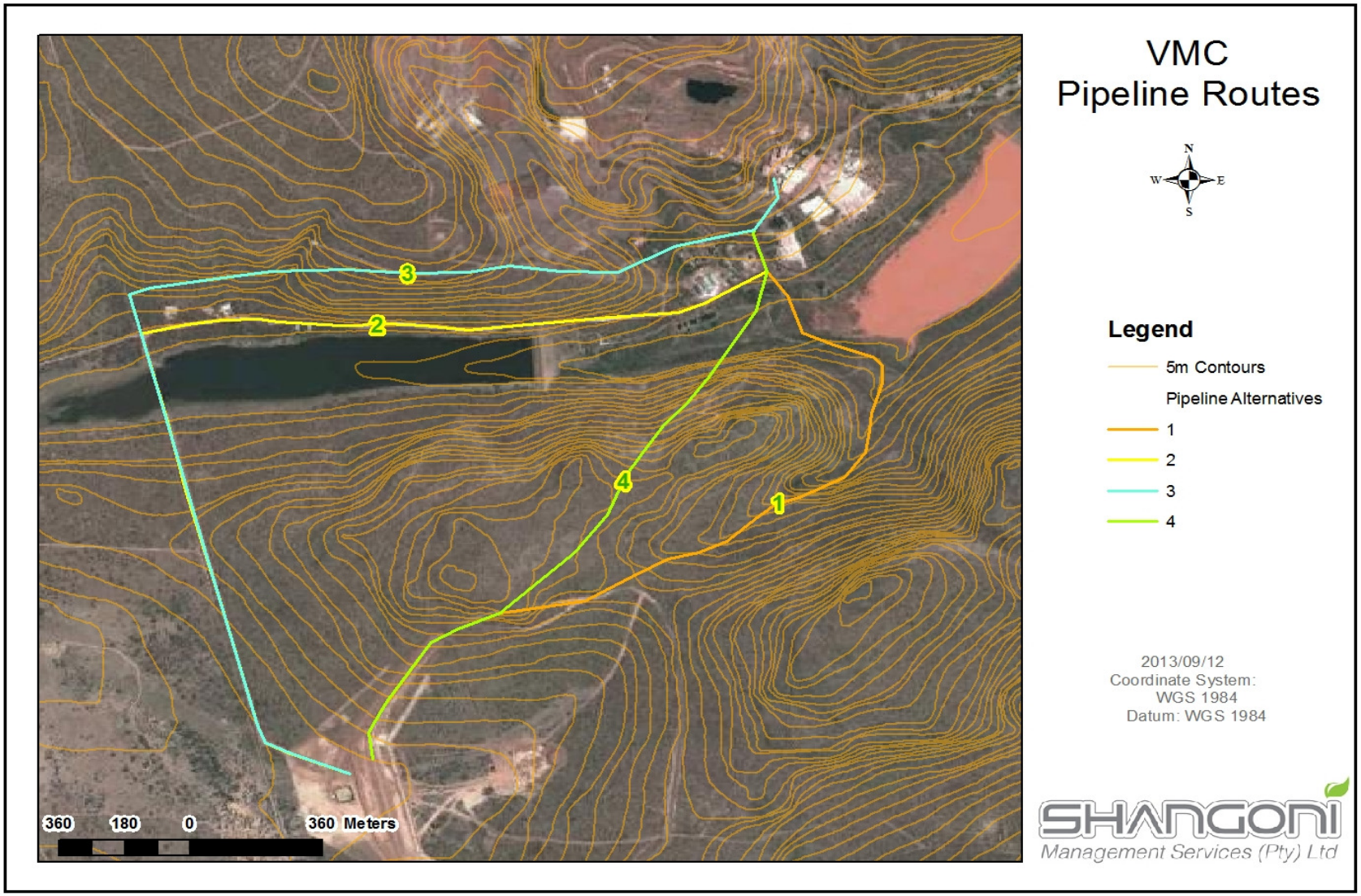


Figure 25: Initial site selection pipeline alternatives

Shangoni Management Services (Pty) Ltd conducted a Site Selection Study on the mentioned alternatives to determine the best route for the pipeline, taking Environmental/Legal, Technical/Engineering and Economical factors into consideration. Refer to the resultant report in **Appendix G1**. An ecological assessment, conducted by Pachnoda Consulting cc (2011a) was also conducted as per the various route alternatives to identify areas of potential developmental suitability from an ecological perspective. The mentioned specialist study report was incorporated into the Site Selection Study, and is included **Appendix G3.**

The criteria used in the site selection process are included in Table 40 below.

Table 40: Criteria used to evaluate alternative pipeline routes

Environmental/Legal	Technical/Engineering	Economical
Fauna and flora • Fragmented habitat, • Intact vegetation, • Ecological features	Constraints to site layout/accessibility	Capital costs
River Diversion • Legal, • Environmental Risk	Gradient	Operational costs
	River diversion	Site rehabilitation

For each of the criteria, a weighting was allocated to the respective sites to assist in prioritising site selection. A quantitative approach is adopted to compare various criteria that may contribute to the desirability of each route. The weighting process is designed to indicate the severity and/or significance that each element poses in the selection of an appropriate site.

From the initial four route alternatives, the alternative along the existing road and crossing the Blue Dam at the western border was found to be the most favourable at that time. Details of this assessment can be studied in the site selection report under **Appendix G**. Also refer to the Scoping Report titled: "*Vergenoeg Mining Company: Pipeline and Waste Rock Dump Final Scoping Report, dated September 2012*".

Following consultation with the engineers responsible to design the pipeline and its associated infrastructure, and the geotechnical engineer assigned as the approved professional person (APP) for the dam, it was found that crossing over the dam wall was more favourable (at that time) for various reasons. For referencing purposes, this option is indicated as Preferred Option 1 (P1) on Figure 25, (which indicates the various alternatives routes).

Alternative P1

The initial suggestion to cross the valley at the western border of the property became a concern when the engineers indicated that the pipeline should cross at the same elevation of the dam wall in order to avoid flooding of the pipeline. Subsequently, the dam safety office was approached on the option to cross the valley over the existing dam wall. The Chief Engineer: Dam Safety Office indicated

that according to the proposed designs, there should not be a significant risk and the option may be explored further as long as the final designs are submitted for approval.

The route marked P1 in Figure 26 represents this option. With this alternative the pipeline will follow existing roads from the plant to the blue dam wall (Pipeline Conceptual Design Report attached to **Appendix G5**).

The route of Alternative P1 was considered to run as follows:

- At the dam wall, the entire pipeline runs within a launder at an angle to drain any possible leakages to the side of the dam wall. As part of the dam safety requirements no obstruction of the spillway section of the wall will be allowed, which includes the road directly adjacent the crest of the wall. The engineers proposed to lift the pipeline high enough for light vehicles to pass underneath the launder, and keep it suspended for the entire length of the spillway. This ensures no changes are required to the authorised dam safety specifications.
- The launder will remain suspended on pins along the dam wall, with the pipelines running on the inside. This location will also provide additional mitigation against potential spillages into the clean dam (Blue Dam). It was also proposed to enclose the launder with a corrugated iron type roof to prevent potential pipe bursts to spray upwards and beyond the sidewalls of the launder.
- Spillages will be contained within the launder and conveyed to the northern side of the valley from where it will drain along the existing road. Tailings will drain directly back to the pump house during a power failure.
- After crossing the dam wall to the southern side, the pipeline route will gradually cut the contours to maintain a slope towards the dam wall until it reaches the existing road at the western property boundary. The design of this service road will allow for a continuous slope in the downstream direction to ensure any potential leakages to be diverted downstream of the Blue Dam into the dirty catchment area. This section of the road will also be cut opposite to the natural slope to prevent runoff flowing into the clean dam. The road will act as a cut-off trench for any potential spillages. Apart from the initial disturbance associated with the construction activities, this road will only be used for inspections and maintenance during the operational phase.
- From there the pipeline will follow the existing road along the western border to TSF5. No vegetation clearance will be required as the road will be wide enough for vehicles to move beside the pipeline. Vegetation encroachment will have to be prevented to ensure clear sight of the pipeline during inspection as well as to minimise damage that may be caused by runaway fires.

During the site inspection by the engineers there were some concerns raised with this route (i.e. crossing over the dam wall – Alternative P1) mainly that there will not be access for vehicles on top of the dam wall for construction and maintenance, and that the tailings line design cannot achieve the required 90° bends. The most important process limitation that influences the design is that the tailings line is required to have a minimum gradient of 2% to prevent settling of solids within the

pipeline. This constraint ruled out the option completely, as crossing on top of the dam wall, and maintaining the required slope would result in a too high structure.

Therefore, the area between the clean diversion dam (Blue Dam) and the process Return Water Dam (Red Dam) was investigated to find an alternative crossing that will comply with the process and design requirements, while minimising the environmental risks.

Thus, apart from the dam wall crossing (Alternative P1) mentioned above, two (2) additional alternatives were proposed for the crossing section of the Rhenosterspruit.

Final Preferred Route

The route starts at the Plant from where it gravity feeds to a balancing tank at a lower point where the pumping station will be located. Tailings will be pumped through the pipeline along the desired route and be disposed at TSF 5. Return water will be pumped back from the TSF 5 to the Plant.

Design criteria and the alternative options (for the crossings) are described briefly below with comparable advantages and disadvantages in Table 41.

Design criteria:

- Slope of pumped tailings must be between 2% and 6%,
- Tailings line cannot have a 90° bend, and
- Mitigation measures to contain spillages and divert into the affected catchment area.

6.2.2 Consideration of Alternative sites (crossings)

Preferred Crossing (Alternative P2):

After due consideration of the main routes with additional three crossing alternatives, the most favourable route was chosen to convey tailings and return water across the valley floor at the upper reach of the return water dam (Red Dam) where there is no functional wetland. Once the valley is crossed, the route will follow the valley by gradually cutting the contour lines to obtain a minimum of 2% gradient.

A road will be constructed to cross the valley floor, which will include culverts to allow free drainage. Contingency measures in case of power outages will include a designated lined sump area at the lowest point of the pipeline, which will include a separate outlet for tailings to drain out of the pipes and into the sump area. This sump will have a solid concrete floor to stabilise the floor and allow for effective cleaning. Tailings from the sump area will be pumped back into the pump house-balancing tank once power is restored and from there the pumping process will return to normal operation. Refer to **Figure 26**.

Alternative P3

With this alternative, the pump house will be located north of the access road. The pipelines will follow the access road towards the clean dam (Blue Dam) until it reaches a point approximately halfway between the pump station and the dam wall. From here, the pipelines will cross the valley diagonal towards the southern point of the dam wall. The pipelines will become suspended once it moves away from the road and crossing the valley with the maximum elevation between 8-13 meters at the valley floor. This height is required to maintain the 2% gradient of the tailings line.

Mitigation measures in case of a spillage will require a separate lined sump at the foot of the dam wall. This sump will need to be able to contain the design flood storm water as well as a pump that can remove affected water from the sump and discharge into the return water dam. Tailings will drain directly back to the pump house during a power failure.

Table 41: Advantages and disadvantages of three crossings

	Alternative P1	Alternative P2 (Final preferred crossing)	Alternative P3
Advantages	• No additional sump required for tailings during power failure • Existing road will be used up to the dam wall crossing • Crossing in an already disturbed area	• Crossing within already disturbed valley • Road construction will be less expensive than other alternatives • One spillage mitigation line into affected catchment • Sump construction within return water dam floor	• No additional sump required for tailings during power failure • Existing road will be used for the first section towards the dam wall

	Alternative P1	Alternative P2 (Final preferred crossing)	Alternative P3
Disadvantages	• Stilts will be located within valley floor of clean wetland area • Structure will be very expensive to cross on top of the wall • Dam wall crest is too narrow for vehicles to access • Safety risk of working on top of dam wall • High visibility on top of dam wall • Maintenance will be difficult and dangerous	• Separate sump required to contain tailings from pipe during power failure	• Stilts will be located within valley floor of clean wetland area • Construction will be more expensive with very high elevations • Separate spillage sump required at toe dam with mechanical pump • Maintenance of elevated pipes will be difficult

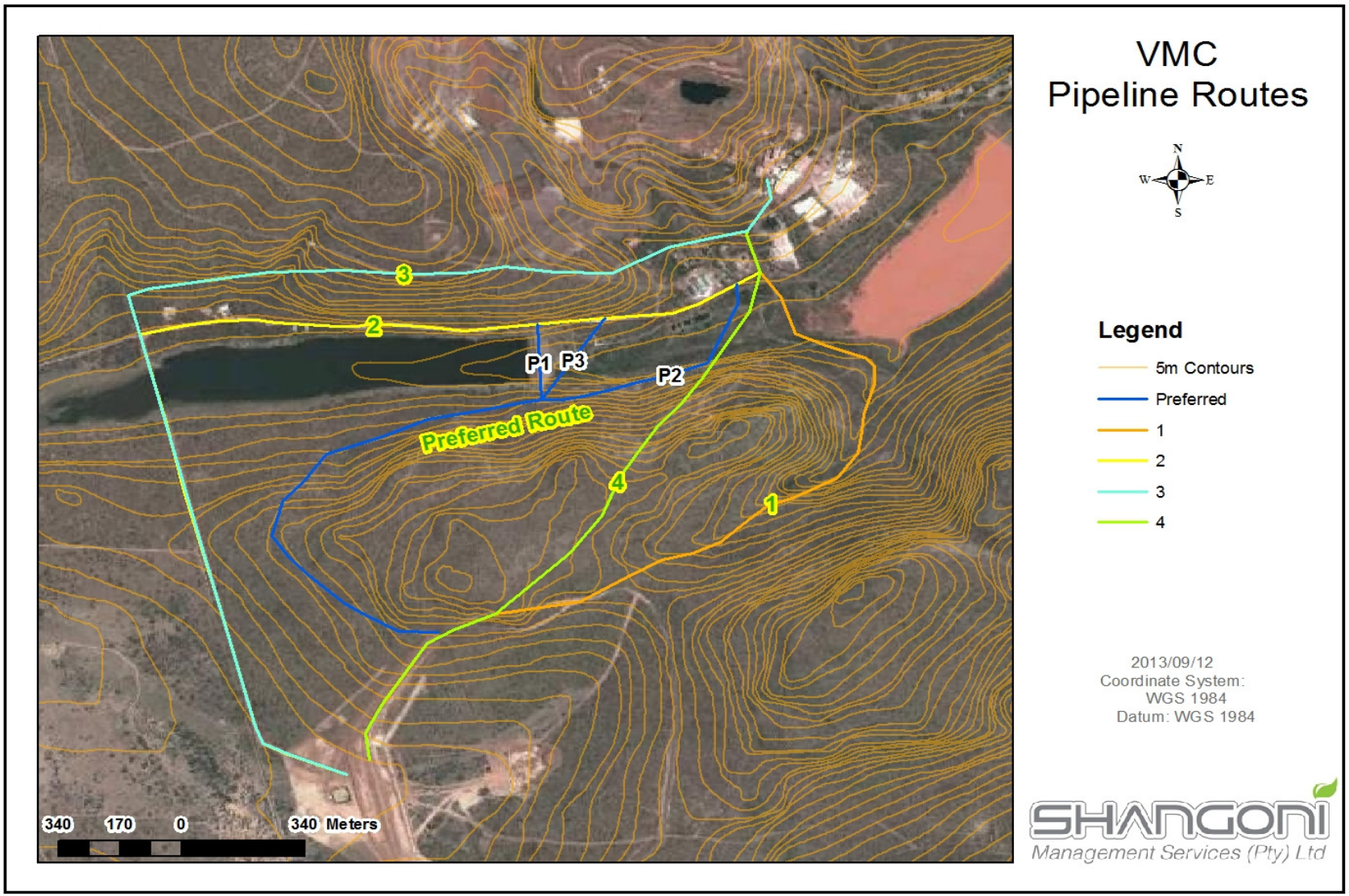


Figure 26: Pipeline route crossings

As part of the Environmental Impact Assessment phase, the following criteria were used in the selection process for the various crossing alternatives:

Table 42: Criteria used to evaluate alternative route "P" crossings

Environmental/Legal	Technical/Engineering	Economical
Environmental risk	Constraints to site layout/accessibility	Capital costs
Legal contravention risk	Gradient	Operational costs
Present ecological status of wetland	Critical equipment	Site rehabilitation

6.3 Calculating Score

Initial Score

An initial score is assigned to each of the routes, for each of the identified criteria. As this is a comparative analysis, a score of 1, 2, 3 and 4 is assigned, where 1 is most favourable and 4 being the least favourable.

Assigning weighting

Weighting of criteria serves the purpose to prioritise aspects within a quantitative model. Criteria with greater importance in terms of site selection receive a higher percentage influence on the final score. The weighting value of the assessed criteria is multiplied with the initial score allocated to each criteria assessed, which is added to obtain a final score to be reflected under the three categories. Final values are reflected as percentage of maximum score.

Final score

The final score for each of the sites is obtained by multiplying the score for each category by the assigned weighting and adding the respective scores (as obtained for each category) to reach a final value for each site. The higher the value (between 1 and 100) reflects the most suitable alternative. Refer to Table 43 below for the calculation of the scores with regards to the route crossings for Alternative 1a (pipeline route).

Table 43: Calculating of Scores for Pipeline Route Crossing Alternatives

Criteria	Criteria weighting	Alternative P1				Alternative P2			Alternative P3		
		Weighting	Score	% Score	Category Score	Score	% Score	Category Score	Score	% Score	Category Score
Environmental / Legal	4				1.9			1.1			1.8
	Environmental risk (e.g. spillage control)	0.3	3	0.9		1	0.3		2	0.6	
	Legal contravention risk	0.2	2	0.4		2	0.4		2	0.4	
	Wetland (Present Ecological Status)	0.2	3	0.6		2	0.4		4	0.8	
Technical / Engineering	4				3.2			1.8			2.5
	Accessibility	0.2	4	0.8		1	0.2		3	0.6	
	Gradient	0.5	3	1.5		2	1		2	1.0	
	Infrastructure (road, stilts, culverts)	0.3	4	1.2		2	0.6		3	0.9	
Economic	4				3.3			2.7			2.3
	Capital cost	0.3	4	1.2		3	0.9		3	0.9	
	Operational cost	0.3	3	0.9		2	0.6		2	0.6	
	Rehabilitation costs	0.4	3	1.2		3	1.2		2	0.8	
Total	12				8.4			5.6			6.6
Total (%)	**100%**				**70%**			**46.7%**			**55%**

6.3.1 Consideration of Alternative Activities (conveying of tailings and return water)

Conveying slimes generated as part of the plant process can only be done using a pipeline. Also, the use of a pipeline for the return of water collected in TSF 5 sump is the only practical method to transport affected water across such a distance. The only activity alternative is to investigate a no-go alternative where no activity will take place.

6.5 Alternatives regarding the Waste Rock Dump

6.5.1 Consideration of Alternative sites

In the search of alternative sites for the proposed waste rock dump there were a number of variables to be taken into consideration. These variables included effectiveness and efficiency on the mining operation side, but also sustainability and conservation on the environmental side.

Identification of alternative sites was assessed using the following arguments:

Effectiveness and efficiency for mining operations are as follows:

- The waste rock dump (WRD) should be as close as possible to the pit in order to minimise time and cost for waste rock transportation,
- Concentration of mining operations further reduces health and safety risks.
- Least amount of additional infrastructure to operate WRD. These include slopes, vegetation, clearance, access roads and storm water management.
- Large space to allow for a long operational life.

Environmental sustainability and conservation are as follows:

- The operation must be close to other mining operations to limit extent of environmental disturbance. This will also reduce generation of dust along access roads.
- Least amount of habitat loss with specific reference to sensitivity and replace-ability.
- Storm water management structures are required to contain runoff in affected water system.
- The waste rock dump needs to be out of visible sight to neighbours and public traffic.

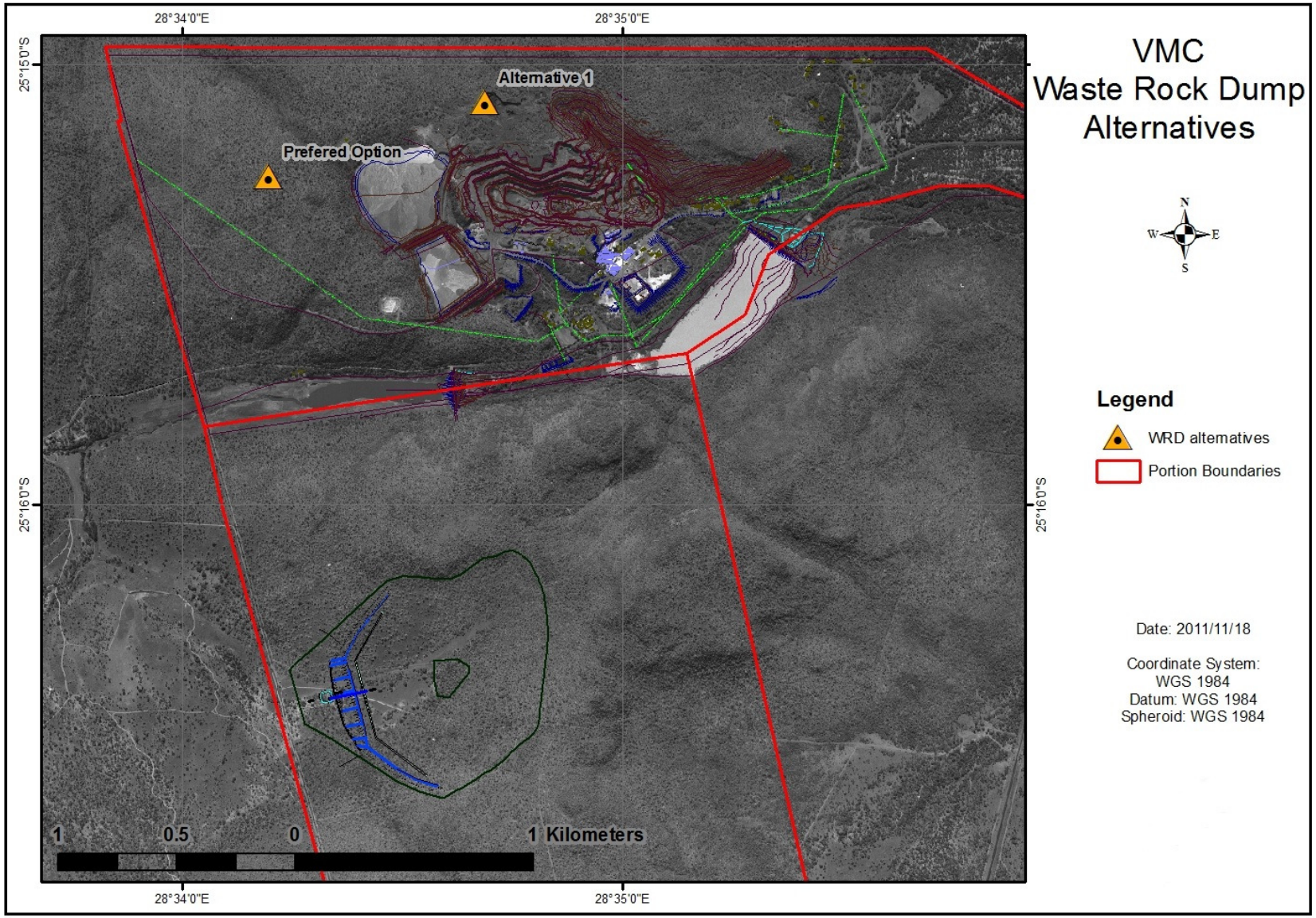


Figure 27: Waste rock dump alternatives

Advantages and Disadvantages of WRD Site Alternatives

All possible areas on the property of the mine were investigated that have sufficient open space and within a reasonable proximity to the pit. Figure 27 indicates the most feasible alternatives identified. Both alternatives had the same disadvantage that will require clearance of indigenous vegetation. However, Alternative 1 had an additional disadvantage in that it would be very difficult to prevent contaminated runoff water from the WRD to enter pristine bushveld north of the mine. Currently all disturbances caused by mining activities are located south and west of the pit. It is therefore recommended to limit any additional disturbances within this area. The site for Alternative 1 is also within the final pit boundary and does not allow large enough space for a feasible waste rock dump. Alternative 1 had a further disadvantage of close proximity to the mine's residential area.

The chosen alternative adheres to most of the preferences excluding the sacrifice of vegetation clearance. Storm water management strategies will divert runoff water for Phase 1 from the WRD to the current tailings storage facility to the east of the proposed waste rock dump facility, and to paddock facilities for the remainder of the waste rock dump phases. A disadvantage of the chosen alternative is that there is a future risk of polluting the Blue Dam. Proper water management infrastructure and monitoring should be able to mitigate the risk of pollution to the flood diversion dam.

6.5.2 Consideration of Alternative Waste Rock Disposal Activities

The following three alternatives were considered for the disposal of waste rock:

- Preferred option: Disposal at a dedicated waste rock dump,
- Backfilling into the open pit, and
- Use of waste rock as a buttress to strengthen the outer walls of the tailings storage facility.

Advantages and Disadvantages of Waste Rock Disposal Activities

As per the mine's current production rate and life of mine estimates (taking into consideration future expansion), the open pit backfill option is not considered to be a viable option.

Waste rock is currently used on-site as a buttress to strengthen the outer walls of the tailings storage facility. However, as a result of the mine's future expansion, the amount of waste rock generated will require a dedicated storage facility.

The preferred option (disposal at a dedicated waste rock dump) is thus considered to be the only viable option in terms of financial and practical considerations.

7. ENVIROMENTAL IMPACT ASSESSMENT

7.1 Aims of Environmental Impact Assessment

Potential environmental impacts (biophysical) associated with the proposed pipeline and waste rock dump activities have been identified. All potentially significant impacts will be further investigated and assessed 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 H** of this EIA report.

The EIA phase aims to adequately investigate and address all potentially significant environmental issues in order to provide the Gauteng Department of Rural Development (GDARD) 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. It is believed that the proposed approach will adequately fulfil the environmental authorities' requirements, the requirements of the EIA Regulations (2010) and the objectives of the environmental 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).

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

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.

Any specialist studies are combined into a consolidated report to allow for easy assessment of the 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 pipeline and waste rock dump 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 significance is determined by the extent, duration and intensity/ reversibility of the impact. Cumulative impacts for the pipeline and waste rock dump are discussed in sections 7.3.1.4 and 7.3.2.4.

The environmental risk of any aspect is determined by multiplying the significance of the impact by the probability of the impact occurring. Each parameter connects the physical characteristics of an impact to a quantifiable value to rate the environmental risk. Descriptions of the parameters used in this impact assessment are listed in Table 42 below. Refer also to Table 43 for the risk matrix used in evaluating the significance of the impacts.

The environmental risk assessment has been conducted as per activity and environmental aspect (unwanted event) that could result in an environmental impact. Where alternatives have been rated separately, this has been indicated as such.

Mitigation measures are included in the risk assessment, tables (refer to Tables 44 and 45). A comparison of the significance of the impact before and after the proposed mitigation measure is done. Furthermore, an indication has been 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 H**. 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 44: Environmental impact assessment parameters

Parameters	Description
Extent	Refers to the physical or geographical size that is affected by the impact. It can be categorised into the following ranges: • Onsite–Within specific site boundary (weight value – 1) • Local – Within municipal boundary (weight value – 2) • Regional –Outside municipal boundary (weight value – 3)
Duration	Time span associated with impact: • Short term – 1 Year or less (weight value – 1) • Medium term – 1-5 Years (weight value –2) • Long term –Longer than 5 Years (weight value – 3)
Intensity and reversibility	The severity of an impact on the receiving environment: • Low – Natural and/or cultural processes continue in a modified way and is reversible (weight value – 1) • Medium – Natural and/or cultural processes stop and is partially reversible (weight value – 2) • High – Natural and/or cultural processes disturbed to an irreversible state (weight value – 3)
Significance of Impact / Consequence	Adding the extent, duration and intensity together provides the significance of the impact (High, Medium or Low). Extent + Duration + Intensity = High/Medium/Low Impact
Probability	The likelihood of an impact occurring: • Unlikely – 0% - 45% chance of the potential impact occurring (weight value – 1) • Possible – 46% - 75% chance of the potential impact occurring (weight value – 2) • Likely - >75% chance of the potential impact occurring (weight value – 3)
Environmental Risk Refer to Table 36below	Multiplication of the significance of the impact by the probability of the impact occurring produces a final conclusion of the overall risk that an impact poses to the surrounding environment. High/Medium/Low Impact X Probability = High/Medium/Low Environmental Risk

Table 45: Environmental Risk Matrix

Significance of Impact				
		Low Impact (3 → 5)	Medium Impact (6 → 8)	High Impact (9)
Probability	Definite / Very Likely 3	9 - 15 L - M	18 - 24 M - H	27 H
	Possible 2	6 - 10 L - M	12 – 16 M	18 M - H
	Unlikely 1	3 - 5 L	6 – 8 L	9 L

ENVIRONMENTAL RISK	Guidelines for Control Strategies
(H) - High	Proactively reduce risk level, short-term response.
(M- H) Medium to High	Proactively reduce risk level, short-term response.
(M) – Medium	Management strategies to reduce risk level, short to medium term response.
(L – M) Low to Medium	Management strategies to reduce risk level, short to medium term response, operational control and housekeeping.
(L) - Low	Operational control and housekeeping.

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 46 for the impacts associated with the pipeline and Table 47 for the impacts associated with the waste rock dump.

7.3.1 Pipelines

7.3.1.1 Construction phase

The construction phase will consist of laying three pipelines. The pipelines will consist of two (2) tailings pipelines, which will be 150 millimetres in diameter. Furthermore, there will be one (1) return water pipeline of 200 millimetres in diameter. The length of the pipelines will be between 2,5 kilometres and 3 kilometres dependent on the selected route. A 6,6 Kv power line will be erected alongside the pipelines. There is an existing road running parallel to the oxidation ponds and valley drainage area that may be used depending on the selected route (refer to description of alternatives).

Waste rock dump material and mill rejects will be used to fill the road area for the preferred alternative. A pump house will be constructed that will consist of a balancing tank, series of pumps, lights. The pump house will be enclosed in a brick structure and the floor will be bunded.

The following machinery will be used:

- Bobcats to move material around on site,
- concrete mixer to mix the cement required,
- dozer to clear the vegetation,
- and excavators to excavate material,
- Mobile crane to lift the pipes, and
- Flatbed to transport the pipes.

Drilling and blasting may be required for the road construction.

The tailings storage facility will also have a pump, which will be enclosed within a brick structure and will be fenced and equipped with security lights.

Servicing of vehicles and refuelling will be done at the mine's current workshop area.

The contractor's camp will be within the mine's existing hostel area and the contractors will use the mine's ablution facilities.

There will no stripping of topsoil, due to the absence of topsoil.

7.3.1.2 Operational phase

The operational phase consists of pumping tailings from the plant to the tailings storage facility.

Maintenance will be required on the pipelines and pumps. The pipes will be rotated annually to avoid erosion. The pump will be serviced bi-annually. The pump house will be fitted with a level switch. A barge pump will be installed on the top of the tailings storage facility. The seepage collection pond's siltation will be removed annually.

7.3.1.3 Decommissioning phase

Decommissioning phase will consist of all the piping that will be removed and inspected for salvaging. The access roads will be sloped to re-establish natural water flow (i.e. to be free draining) to the Blue Dam. Culverts, where applicable, will remain to allow for storm water flow under the road. Power lines will be removed and salvaged. The pump house brick structures and bunded floors (for the preferred option and at TSF 5) will be demolished. The balancing tank, series of pumps and lights will be salvaged.

The sump will be decommissioned and the associated pump salvaged. The stilts will be removed and disposed of as building rubble.

The tailings life of mine is 25 and it takes 25 years to drain the Tailings dam storage facility. Once the decommissioning phase commences the mine will stop pumping tailings to the tailings facility and the pipelines will be removed. Old pipes can be salvaged if possible. The pump house and seepage pond will be used until the facility is fully drained. Once the tailings storage facility is drained the seepage pond's lining and fencing will be removed, and the sidewalls will be sloped to decrease the gradient for a drinking point for game.

All disturbed areas that will not be used for the mine's end land use (game farming) will be re-vegetated with an approved endemic seed mix (this includes the tailings storage facility). Trees will also be planted to be representative of the natural surrounding environment. The access road from the Blue Dam to the tailings storage facility will remain and left intact to serve as the main access road subsequent to the rehabilitation phase.

The relevant Government Department will be notified and consulted regarding the mine's intension to dispose of all building rubble generated during the decommissioning phase at the mine's waste rock dump.

Table 46: Environmental risk assessment for pipeline and associated infrastructure

Activity: Design and planning of the proposed pipelines and associated infrastructure
Applicable Location Alternatives: 1, 2, 3, 4 & P1, P2, P3
Aspect: Potential inadequate planning and design

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Planning and Design Phase	X							To effectively plan and design the pipelines and associated infrastructure taking the on-site environment into consideration.	• Site selection for the proposed activities must include consideration of the following: ➢ 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. ➢ 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. ➢ Possible heritage or archaeological resources on-site. ➢ Soil types and land capability. ➢ Surface water quality (pre-project status) and possible impacts that would result from proposed activities. *The above listed information must be recorded before the construction at the site commences and should be used for future monitoring purposes.*						
Impacts on the environment that could potentially have been avoided.		2	3	2	7	3	21			1	2	1	4	2	8
Construction Phase															
The activity is not applicable to the Operational Phase		N/A								N/A					
Operational Phase															
The activity is not applicable to the Operational Phase		N/A								N/A					
Decommissioning Phase															
The activity is not applicable to the Decommissioning Phase		N/A								N/A					

Activity: Site preparation and construction of pipeline and associated infrastructure (including excavation, dozing, grading and installation activities)
Applicable Location Alternatives: 1, 2, 3, 4 & P1, P2, P3
Aspect: Clearance of vegetation

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating before mitigation						Environmental Objective	Mitigation Measures	Risk rating after mitigation					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-Construction and Construction Phase	X								• The contractor is to draw up a plan for submission to the ECO (independent Environmental Control Officer) and the mine indicating the locations of construction infrastructure camps, equipment cleaning areas, toilets, stores, office, and "no-go" areas. • The contractor is to ensure that all employees, including sub-contractors and their employees, attend on-site Environmental Awareness Training prior to commencing work on site. • Site clearing is to be limited to only the area necessary for carrying out the specified works. • Habitat and sensitivity maps must be used as a decision tool to guide the proposed development • The mine, with the assistance of a qualified botanist (or qualified ECO), should familiarise themselves with the "declining", "near-threatened" and protected plant species occurring on the mine area or those likely to occur on-site. • The site should be inspected in spring or in summer in order to identity individuals/populations that might have been previously missed; • All protected plant species should, where possible, be left *in situ*, but if threatened by the pipeline development, be removed (with the relevant permits) and temporarily placed within an on-site nursery for re-establishment after construction; • If any faunal species of conservation concern is exposed during the development, all activities in the direct vicinity of the animal should be halted. The Environmental Manager shall be informed, who shall then issue instructions for its capture, translocation and safe release to adjacent suitable habitat (with the necessary permits and permission from the local authorities); Large trees (including dead tree) should be retained on site since these provide potential breeding and roosting habitat for Red-billed Oxpeckers. • Where electric cables or earth wires associated with the pipeline cross important roosting and dispersal networks for birds (e.g. drainage lines, impoundments or wetland systems), these should be marked with appropriate bird deterrent devices (e.g. the Double Loop Bird Flight Diverter; www. preformedsa.co.za). • All outside lighting should be directed away from important dispersal networks; • All labour or staff should be advised (induction) by means of environmental awareness training on the importance of the area, the intentional killing of any faunal species, harvesting of plant material and the feeding of animals, which is prohibited. • Signage should be applied to remind people of the dangers associated with feeding of wild animals. Proper animal-proof dustbins should be used. • All construction workers shall be issued with ID badges and clearly identifiable uniforms. • Workers shall remain on the site at all times during the work day and no one will be allowed to leave site by foot. • Environmental signage is to be displayed on the site including – "no smoking", "fire hazards", etc.						
Habitat loss resulting in disturbance on the flora and fauna environment which has the potential to impact on biodiversity and habitat characteristics. This Includes: • Change in plant pollinator composition, • Loss of habitat, • Disturbance to animal life.		1	1	1	3	3	9	To minimise the disturbance on the flora and fauna environment.		1	1	1	3	1	3

Nature and significance of environmental impact																		
Impact per Project Phase	Applicable	Risk rating before mitigation						Environmental Objective	Mitigation Measures	Risk rating after mitigation					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
The clearance of vegetation for preparation purposes may result in an impact on sensitive landscapes, such as wetland functioning and subsequently on the aquatic habitat associated with the wetland. A Wetland Assessment: was conducted by AGES in November 2011 for the proposed Nokeng Fluorspar Mine, which is located on the surface rights area of Vergenoeg Mining Company. The proposed location of the pipeline and associated infrastructure for this project falls within the northern section of the Wetland Assessment's study area (refer to Annexure G9 for an indication on the location of the study area). The valley bottom (drainage line) area between the Blue Dam and Red Dam is classified as a valley bottom system that forms a tributary of the Elands River. The overall Present Ecological State of the wetland is assessed as a Category D, which implies a largely modified wetland system. The ecological importance and sensitivity was scored as high. All the alternatives in terms of pipeline locations that were considered during the Scoping and EIA Phases will cross the wetland at some stage and each have thus been considered in terms of potential impacts on the wetland. Therefore, the risk rating (below) is conducted for each alternative in terms of significance.									• The mine shall appoint an Environmental Control Officer (ECO) (independently appointed person) with a relevant qualification during the Construction Phase; • Site clearing is to be limited to only the area necessary for carrying out the specified works. • The Environmental Manager will ensure that the contractor is aware of all the specifications pertaining to the project, • Training is to cover all aspects of the EMP procedures to be followed, the sensitivity of the site and importance of adhering to "no-go" areas such as the wetland. • Any damage to the environment will be repaired as soon as possible after consultation between the ECO, Environmental Manager, Engineer and Contractor, • The Environmental Manager will ensure that the project staff and/or contractor are adhering to all stipulations of the Rehabilitation Management Plan. • The ECO will be responsible for monitoring the rehabilitation works throughout the project by means of site visits and meetings. All site visits and meetings will be documented as part of the site meeting minutes which will be made available for inspection at any time; • The Environmental Manager will ensure that all clean up and rehabilitation or any remedial actions required during the Construction Phase are completed swiftly as and when required. • The contractor should not be permitted to leave site until the rehabilitation works have been signed off by a suitably qualified ECO. • Employees, including sub-contractors, must be trained to operate specific equipment and have the necessary competency certificates. This must be done prior to work commencing on-site. • The ECO shall monitor employees and contractor's compliance with the requirement to provide sufficient environmental awareness training to all site staff. • Construction workers must adhere to Health, Safety and Environmental procedures of the mine. • Record plan of action regarding sensitive landscapes, habitats and fauna and flora species (including alien vegetation eradication) in a Biodiversity Action Plan and implement such plan. • Sumps will be constructed of sufficient capacity to contain spillages as well as rain water during a storm. • The access road should be constructed using cut-and0fill techniques to limit disturbance as well as to optimize rehabilitation objectives.						
• Alternative 1		2	1	1	4	2	8	Appoint an Environmental Control Person (ECO) and document and communicate responsibilities		1	1	1	3	2	6
• Alternative 2		2	1	2	4	2	8			1	1	1	3	2	6
• Alternative 3															
• Alternative 4		1	1	2	4	3	12			2	1	2	4	2	8
• Alternative P1		2	2	2	6	2	12			2	1	2	4	2	8
• Alternative P2 (Preferred Alternative)		1	1	2	4	3	12			2	1	2	4	2	8
• Alternative P3															
The clearance of vegetation could pose an impact on sensitive rocky ridges within the study area in terms of disturbance to biodiversity and habitat. Ridges with undisturbed vegetation can be described as ideal python habitat. An ecological evaluation was conducted in 2011 for the proposed project (refer to Appendix G3). As pipeline locations Alternatives 1 to 4 will cross ridges from the plant to the tailings storage facility, these four alternatives have been rated separately (below) in terms of significance.															
• Alternative 1		3	2	2	7	2	14	Establish and implement a Biodiversity Management Plan for the conservation of sensitive areas and protected fauna and flora species, as well as for the eradication of alien invasive vegetation		1	1	1	3	2	6
• Alternative 2		2	2	2	6	2	12			2	1	2	4	2	8
• Alternative 3															
• Alternative 4		3	2	2	7	2	14			2	1	2	4	2	8

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating before mitigation						Environmental Objective	Mitigation Measures	Risk rating after mitigation					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
The establishment of alien invasive vegetation, which may result in the following: • 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.		2	1	2	5	2	10	Establish and implement a Biodiversity Management Plan for the conservation of sensitive areas and protected fauna and flora species, as well as for the eradication of alien invasive vegetation	• Refer to mitigation measures above. • Eradicate alien invasive species as per a detailed eradication programme and continued monitoring of the effectiveness of removal of alien invasive species. • The road reserve should be kept free (by means of regular monitoring and intervention) of noxious weed (Category 1) species.	2	1	2	4	2	8
Operational Phase		N/A								N/A					
No preparation and construction will take place during the Operational Phase.															
Decommissioning Phase		N/A								N/A					
No preparation and construction will take place during the Decommissioning Phase.															

Aspect: Potential spillage of concrete and cement during storage, mixing or disposal

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-Construction and Construction Phase	X							To prevent the contamination of soil and water as a result of concrete and cement used on site.	• No mixing of concrete or cement directly on the ground is permitted. The mixing of concrete will only be done on mortarboards (dugga-boards). • Ready-mix trucks are not permitted to clean chutes on site. • Both used and unused cement bags are to be stored in weatherproof containers so as not to be affected by rain or runoff. • Contaminated soil resulting from concrete or cement spills, is to be removed immediately after the spillage has occurred and placed on the appropriate containers on-site.						
Potential soil, surface water or groundwater pollution as a result of cement or concrete spillages during the Construction Phase.		1	1	2	4	2	8			1	1	1	3	2	6
Operational Phase															
No preparation and construction will take place during the Operational Phase.		N/A								N/A					
Decommissioning Phase															
No preparation and construction will take place during the Operational Phase..		N/A								N/A					

Aspect: Potential destruction of heritage or archaeological resources

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-Construction and Construction Phase	X							Establish and implement a Heritage Resources procedure or work instruction	• Develop a Heritage Resources procedure with instructions in the case heritage resources are found on-site. Also make reference to the applicable legislative requirements (e.g. permit applications) Implement an awareness campaign on the above-mentioned instructions.						
The heritage impact assessment (**Appendix G13**) indicates that no sites of heritage or archaeological importance were found on-site during the assessment. However, it is possible that some might be uncovered during the proposed development and future expansions. This will include low stone packed or unmarked graves.		1	3	2	6	2	12			1	3	1	5	1	5
Operational Phase	X														
Environmental impacts are similar as for the Construction Phase.		1	3	2	6	2	12			1	3	1	5	1	5
Decommissioning Phase	X														
Environmental impacts are similar as for the Construction Phase.		1	3	2	6	2	12			1	3	1	5	1	5

Activity: Drilling and Blasting activities

Applicable Location Alternatives: 1, 2, 3, 4 & P1, P2, P3

Aspect: Generation of dust during potential drilling and blasting activities

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X														
Generation of dust as a result of drilling activities during the Construction Phase which could lead to air pollution. It is however anticipated that this impact will have a short duration (i.e. during Construction Phase).		1	1	2	4	2	8	Implement an effective Air Quality Management Programme	• Document and implement a dust monitoring procedure • Continue with the current dust monitoring programme • Ensure the availability of a complaints register for the recording of complaints relating to dust). The complaints register must as a minimum, record the following: date when complaint was received,	1	1	1	3	2	6

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Generation of dust as a result of blasting activities during the Construction Phase which could lead to air pollution. It is however anticipated that this impact will have a short duration (i.e. during Construction Phase).		1	1	2	4	2	8		name of person who reported the complaint and when and how the concern was addressed.	1	1	1	3	2	6
Operational Phase		N/A								N/A					
Drilling and blasting activities are not applicable to the Operational Phase.															
Decommissioning Phase		N/A								N/A					
Drilling and blasting activities are not applicable to the Decommissioning Phase.															

Aspect: Generation of nuisance noise and vibration as a result of potential drilling and blasting activities

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							Ensure that potential environmental noise and vibration levels are controlled	• Implement an effective blast management plan • Ensure the availability of a complaints register for the recording of complaints relating to dust). The complaints register must 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. • Implement an environmental noise monitoring programme.						
Generation of potential environmental noise as a result of drilling activities which could result in nuisance to surrounding communities. It is however anticipated that this impact will have a short duration.		2	1	2	5	1	5			2	1	1	4	1	4
Generation of potential environmental noise as a result of blasting activities which could result in nuisance to surrounding communities. It is however anticipated that this impact will have a short duration.		2	1	2	5	2	10			2	1	1	4	1	4
Generation of potential vibration damage to surrounding communities infrastructure (e,g, houses) as a result of blasting activities.		2	3	2	7	2	14			2	2	1	5	1	5

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Operational Phase		N/A								N/A					
Drilling and blasting activities are not applicable to the Operational Phase.															
Decommissioning Phase		N/A								N/A					
Drilling and blasting activities are not applicable to the Decommissioning Phase.															

Activity: Use and maintenance of vehicles and machinery during Construction, Operational and Decommissioning Phase
Applicable Location Alternatives: 1, 2, 3, 4 & P1, P2, P3
Aspect: Potential ineffective maintenance of vehicles or machinery

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating before mitigation						Environmental Objective	Mitigation Measures	Risk rating after mitigation					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							Implement effective spill handling and planned maintenance systems	• Implement an effective planned maintenance system for vehicles and equipment. • Implement an effective spill management procedure for the clean-up of leakages and spillages of hydrocarbons. • Implement an emergency preparedness and response procedure in case of reportable incidents to Authorities.						
Soil, surface and / or groundwater pollution resulting from leakages from vehicles and machinery. This impact is however anticipated to be localised within the site boundaries and of a small volume.		1	2	1	3	2	6			1	1	1	3	2	6
Construction Phase impacts on air pollution would be limited to vehicle-related emissions during the Construction Phase resulting in air pollution.		2	2	1	5	3	15			2	1	2	4	2	8
Potential depletion of a natural resource (fuel / diesel).		2	2	1	5	3	15			2	1	1	4	2	8
Potential spillage from cement mixing activity resulting in potential soil, surface and groundwater pollution.		1	2	1	4	2	8			1	1	1	3	2	6

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating before mitigation						Environmental Objective	Mitigation Measures	Risk rating after mitigation					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Operational Phase	X														
Leakage related impacts are similar as for the Construction Phase.		1	2	1	4	2	8			1	1	1	3	2	6
Emission related impacts are similar as for the Construction Phase.		2	2	1	5	3	15			2	1	2	4	2	8
Resource usage related impacts are similar as for the Construction Phase.		2	3	1	6	3	18			2	1	1	4	2	8
Decommissioning Phase	X														
Leakage related impacts are similar as for the Construction Phase.		2	1	2	5	2	10			1	1	1	3	2	6
Emission related impacts are similar as for the Construction Phase.		2	2	1	5	3	15			2	1	2	4	2	8
Resource usage related impacts are similar as for the Construction Phase.		2	3	1	6	3	18			2	1	1	4	2	8

Aspect: Generation of dust as a result of the use of vehicles and machinery for construction purposes, maintenance purposes during the Operational Phase as well as re-sloping and rehabilitation activities during the Decommissioning Phase

Nature and significance of environmental impact																		
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							Implement an effective Air Quality Management Programme	• Document and implement a dust monitoring procedure • Continue with the current dust monitoring programme • Implement dust suppression measures on the main roads on a daily basis • Implement strict speed limits on roads						
Generation of dust from vehicles and machinery during the Construction Phase is certain to occur. However, it is unlikely that this will contribute significantly to the overall dust impact of the mine, if current mitigation measures at the mine (such as dust suppression) are implemented.		2	1	1	4	2	8			1	1	1	3	2	6
Operational phase	X														
The use of vehicles and machinery during the Operational Phase for inspection and maintenance purposes is anticipated to generate dust.		2	2	1	5	3	15			1	3	1	4	2	8
Decommissioning phase	X														
Dust generation is anticipated to occur during the Decommissioning Phase as a result of the use of vehicles and machinery for rehabilitation purposes, the removal of surface infrastructure and sloping practices.		2	1	2	5	3	15			1	1	1	3	2	6

Aspect: Generation of potential nuisance (environmental) noise to surrounding communities as a result of the use of vehicles and machinery for construction purposes, maintenance purposes during the Operational Phase as well as re-sloping and rehabilitation activities during the Decommissioning Phase

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							Ensure that potential environmental noise levels are controlled.	• Implement an environmental noise monitoring programme. • Ensure effective maintenance of vehicles and machinery. • Equip machinery (where possible) with silencers. • Ensure the availability of a complaints register for the recording of complaints relating to noise). The complaints register must 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.						
Potential generation of environmental noise as a result of the use of vehicles and machinery during the Construction Phase activities.		2	1	1	4	2	8			1	1	1	3	2	6
Operational Phase	X														
An environmental noise impact may occur during the Operational Phase as a result of the use of vehicles for inspection and maintenance activities.		2	3	1	6	2	12			1	3	1	4	2	8
Decommissioning Phase	X														
Potential generation of environmental noise as a result of the use of vehicles and machinery for sloping and rehabilitation work conducted during the Decommissioning Phase.		2	1	1	4	2	8			1	1	1	3	2	6

Activity: Generation, storage and disposal of waste during the Construction, Operational and Decommissioning Phases

Applicable Location Alternatives: 1, 2, 3, 4 & P1, P2, P3

Aspect: Potential incorrect storage or disposal of waste on-site

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X														
Potential incorrect disposal of building rubble resulting in soil, surface and groundwater pollution, depletion of landfill space or wastage of re-usable material		2	2	1	5	2	10			1	1	2	4	2	8
Potential illegal dumping or incorrect disposal of waste such cement bags, scrap metal, domestic waste or contaminated soil or hydrocarbons resulting in potential soil, surface or groundwater pollution, visual impacts in terms of littering or illegal dumping, potential depletion of landfill space or wastage of recyclable or re-usable material.		2	1	2	6	2	12		• Establish a waste separation system at the mine. • Provide the relevant waste telecons or bins for the temporary waste storage on site prior to removal off-site. • Appropriate equipment to deal with fire incidents is to be readily available on site. Soil contaminated with hazardous substances, fuel or oil shall be treated as hazardous waste and removed from site. • Make use of registered waste transporters and licensed waste disposal landfill sites. • Implement a waste awareness training programme. • Adherence to the mine's waste procedure. • Obtain and keep on file safe disposal certificates for waste disposed off site. • All building rubble will be disposed of at the mine's waste rock dump , however, this will be communicated to and discussed with the relevant Government Department. • Access will be restricted to the mine's employees who have access to the pit area which is adjacent to the waste rock dump. • Regular inspections by the ECO to confirm correct waste handling practices are employed during the construction phase of the project.	1	3	1	4	2	8
Operational Phase	X														
Potential illegal dumping or incorrect disposal of waste such cement bags, scrap metal, domestic waste or contaminated soil or hydrocarbons resulting in potential soil, surface or groundwater pollution, visual impacts in terms of littering or illegal dumping, potential depletion of landfill space or wastage of recyclable or re-usable material.		2	3	2	6	2	12	Establish an effective waste management system		1	3	1	4	2	8
Decommissioning Phase	X														
Potential incorrect disposal of building rubble resulting in soil, surface and groundwater pollution, depletion of landfill space or wastage of re-usable material		2	2	1	5	2	10			1	1	2	4	2	8
Potential illegal dumping or incorrect disposal of waste such cement bags, scrap metal, domestic waste or contaminated soil or hydrocarbons resulting in potential soil, surface or groundwater pollution, visual impacts in terms of littering or illegal dumping, potential depletion of landfill space or wastage of recyclable or re-usable material.		2	1	2	6	2	12			1	3	1	4	2	8

Activity: Sloping , leveling and maintenance of road surfaces
Applicable Location Alternatives: 1, 2, 3, 4 & P1, P2, P3
Aspect: Change in topography and surface water flow patterns as a result of sloping of road surfaces

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							Implement the measures as contained in the Storm Water Management Plan, dated July 2013, as well as the National Water Act (NWA) (Act 36 of 1998) and GN704, dated June 1999.	• Comply with the requirements of GN 704, dated 1999, and implement the measures as contained in the Storm Water Management Plan, dated July 2013 (refer to **Appendix G12**) from Construction through to Decommissioning Phase. • Infrastructure will be constructed and maintained so as to comply with the requirements contained in the National Water Act (NWA) (Act 36 of 1998) and the GN704, dated June 1999. This includes the following requirements: • Construct the necessary erosion control measures to control surface water run-off from the area. • Conduct regular site inspections in order to verify the effectiveness of the water separation system and to identify possible erosion. • The access road should be constructed using cut-and0fill techniques to limit disturbance as well as to optimize rehabilitation objectives.						
The sloping of the road surfaces in order to serve as storm water management measures will lead to a change in topography. This will result in altered surface water flow patterns. If measures are not constructed / sloped correctly this could ultimately result in soil erosion.		1	3	2	6	2	12			1	1	1	3	2	6
Operational Phase	X														
Impact in terms of altered surface water flow patterns will continue during the Operational Phase. If measures are not maintained adequately, this could ultimately result in soil erosion.		1	3	2	6	2	12			1	2	1	4	2	8
Decommissioning Phase	X														
The re-sloping of road surfaces during the Decommissioning Phase will cause a change in topography and yet another alteration to surface water flow patterns. This could subsequently lead to soil erosion.		1	3	2	6	2	12			1	2	1	4	2	8

Activity: Presence, operation and maintenance of pipelines and associated critical equipment, such as sumps, pump houses, power lines and the seepage collection pond
Applicable Location Alternatives: 1, 2, 3, 4 & P1, P2, P3
Aspect: Potential failure of critical equipment and infrastructure

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase															
The operation and maintenance of equipment and infrastructure is not applicable to the Pre-construction and Construction Phases.		N/A								N/A					
Operational Phase	X														
Potential spillages or leakages of hydrocarbons from the pumps at the pump houses (located in the vicinity of the plant and at the tailings storage facility, respectively). This could lead to soil, surface or groundwater pollution, however, this impact is rated low as only a small volume of hydrocarbon spillage or leakage is anticipated, should this impact occur.		1	2	1	4	2	8	Implement effective spill handling and planned maintenance systems	• Implement an effective planned maintenance system for all critical pollution control equipment. • Implement an effective spill management procedure for the clean-up of leakages and spillages of hydrocarbons. • Implement an emergency preparedness and response procedure in case of reportable incidents to Authorities. • Implement an environmental awareness programme in terms of spill management.	1	1	1	3	2	6
The presence of the pipeline infrastructure, along with the power line (during the Operational Phase) will result in a visual impact. However, the pipeline infrastructure will be located within the existing mine boundary area. It is therefore not anticipated that the visual impact will be of a significant nature when evaluating it along with the already existing infrastructure on the mine.		1	3	1	5	3	15	Reduce visual impact as far as possible	• Make use of visual screening berms, other structures or trees (where possible) in areas where there are sensitive receptors.	1	3	1	5	2	10
Potential inadequate maintenance of sumps situated within the valley floor for the purpose of containing tailings spillages from the pipeline. This could result in siltation and reduced capacity of the sumps and a subsequent increase of silt into the Red Dam.		2	3	2	7	2	14	Implement an effective inspection and planned maintenance system	• Conduct daily site inspections at sumps during start up in order to verify the effectiveness and capacity and the need for maintenance.	1	2	1	4	2	8
Potential siltation of the Seepage Collection Pond located at the Tailings Storage Facility No. 5 resulting in a decrease in capacity of the pond.		1	3	2	6	2	12	Implement pollution prevention measures	• Conduct regular inspections at Seepage Pond to verify the effectiveness and capacity and the need for maintenance. • Ensure that a proper lining is used at the Seepage Pond. • Continue with groundwater monitoring programme.	1	1	1	3	2	6
Potential leaching (seepage) from the Seepage Collection Pond located at the Tailings Storage Facility No. 5, resulting in potential groundwater pollution.		2	3	2	7	2	14			1	1	2	4	2	8
Potential fire hazard due to clearance and temporary storage of vegetation for maintenance activities along the pipeline.		2	1	2	5	2	10	Establish and implement an Emergency Preparedness and Response Procedure	• Implement an effective vegetation clearance and maintenance procedure or work instruction • Implement Emergency Preparedness and Response procedures. • Ensure that vehicles are equipped with the necessary emergency response equipment	1	1	2	4	1	4

Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Applicable	Risk rating (before mitigation)				
		Extent	Duration	Intensity	Significance	Probability	Risk				Extent	Duration	Intensity	Significance	Probability
Potential return water pipe bursts or leakages resulting in soil surface and groundwater pollution. The risk rating for the various alternatives is provided below:															
Alternatives 1 & 4: Return water spillages will occur within the Red dam catchment and will run back towards the Red dam. Therefore these Alternatives are considered to have a low impact in this regard.		1	2	1	4	2	8			1	2	1	4	1	4
Alternatives 2 & 3: Alternative 2 follows the contour and runs along the existing road. Return water spillages for this route as well as for Alternative 3 would be of a higher significance as it is located in close proximity to the clean (Blue) dam and could result in surface water pollution. Ponding of return water spillages is also anticipated.		1	2	3	6	3	18			1	1	2	4	2	8
Alternative P1: With Alternative P1, return water spillages will be contained within a launder and conveyed to the northern side of the valley.		1	2	2	5	2	10		• Implement an effective planned maintenance system for all critical pollution control equipment. • Implement an effective incident reporting and Emergency preparedness and response procedure • Contingency measures in case of power outages will include a designated lined sump for the containment of tailings spillages. This sump will have a solid concrete floor to stabilise the floor and allow for effective cleaning. Tailings from the sump area will be pumped back into the pump house balancing tank once power is restored, and from there the pumping process will return to normal operation. • Sumps will be constructed and maintained of sufficient capacity to contain spillages as well as rain water during a storm event during the Operational Phase.	1	2	1	4	2	8
Alternatives P2 & P3: In the case of a power failure, return water spillages will be contained within a sump area before being returned back to the pump house.		1	2	1	4	2	8			1	2	1	4	1	4
Potential tailings pipe bursts or spillages during power or pump failures resulting in soil, surface and groundwater pollution. The risk rating for the various alternatives is provided below:								Implement effective spill handling and planned maintenance systems							
Alternative 1 & 4: Tailings spillages will occur within the Red Dam catchment and will run back towards the Red Dam. This could result in increased siltation of the Red Dam and therefore a decrease in capacity of the dam.		2	3	2	7	2	14			1	2	1	4	2	8
Alternative 2 & 3: Alternative 2 follows the contour and runs along the existing road. Tailings spillages for this route as well as for Alternative 3 would be of a higher significance as it is located in close proximity to the clean (Blue) dam and could result in surface water pollution.		1	2	3	6	3	18			1	1	2	4	2	8
Alternative P1: With Alternative P1, tailings spillages will be contained within a launder and conveyed to the northern side of the valley.		1	2	2	5	2	10			1	2	1	4	2	8
Alternative P2 & P3: In the case of a power failure, tailings spillages will be contained within a sump area before returned back to the pump house.		1	2	1	4	2	8			1	2	1	4	1	4
Decommissioning Phase															
The operation and maintenance of equipment and infrastructure is not applicable to the Decommissioning Phase		N/A								N/A					

Activity: General activities during the Construction, Operational and Decommissioning Phases. This includes:
- The use of water
- The use of ablution facilities

Applicable Location Alternatives: 1, 2, 3, 4 & P1, P2, P3

Aspect: Inefficient and/or redundant use of a valuable resource

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							To prevent the wastage of a natural resource.	• Leaking water taps and hosepipes must be repaired immediately. • Running water taps and hosepipes must not be left unattended. • All hose and tap connections are to be fitted with correct and appropriate plumbing fittings. • Implement and awareness campaign regarding water use. • Incidents of sewage spillages / leakages will be dealt with through the incident reporting system and will be cleaned-up immediately. • Regular inspections will be conducted in order to check water- and sewage management systems.						
Potential wastage of water and depletion of water resource. *The existing source (treated water from the Rust de Winter dam) will continue to be used for domestic water purposes*		2	3	1	6	1	6			2	1	1	4	1	4
Operational Phase	X														
Environmental impacts related to wastage of water are similar as for the Construction Phase		2	3	1	6	1	6			2	1	1	4	1	4
Decommissioning Phase	X														
Environmental impacts are similar as for the Construction Phase		2	3	1	6	1	6			2	1	1	4	1	4

Aspect: Potential inadequate provision of ablution facilities on-site

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							To prevent the contamination of the soil, surface water and groundwater.	• Sufficient ablution facilities shall be provided. • The contractor's camp will be in close proximity to the ablution / toilet facilities. • Toilets should have properly closing doors and supplied with toilet paper. • The mine, as well as the contractor, is to ensure that no spillage occurs and that the contents are removed from site according to approved methods (where relevant)						
Potential soil, surface - and ground water pollution.. Potential health risks.		2	2	2	6	2	12			1	1	2	4	2	8
Operational Phase															
This activity is not relevant to the Operational Phase.		N/A								N/A					
Decommissioning Phase															
This activity is not relevant to the Decommissioning Phase.		N/A								N/A					

Refer to Section 8 below for a summary on the key findings related to the pipelines, Waste Rock Dump and associated infrastructure.

7.3.1.4 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.

As the pipeline and associated infrastructure will be situated within the confines of an operational mine, its environmental impacts, though decreased after mitigation measures have been applied, will add to the existing impacts of the mine. The different environmental impacts of the mine can be seen as having cumulative impacts on each other, thereby increasing the overall impact of the mine on the environment.

An identified cumulative impact is the potential emergency situation as a result of dam wall failure at the Blue Dam. It should be noted that this is a potential impact resulting from current activities (i.e. storage of clean water in the Blue Dam). However if not managed appropriately this could increase the significance of the identified impacts of the pipeline project.

7.3.2 Waste Rock Dump

7.3.2.1 Construction phase

An area of approximately 75 hectares was identified next to the current operational tailings facilities to be used for waste rock as well as stockpiling of marginal non-ores with a maximum capacity of 28 million tons / 11 million m3. Deposition of waste rock will be done as per the deposition plan as illustrated in Figure 1.

This phase includes the clearance of vegetation as per deposition plan. The haul/access roads will be constructed in a phased approach. Excavated material removed from the areas site will be used to construct berms to serve as storm water management structures. Paddocks will be constructed on the south-western boundary of the waste rock dump to retain water, which will evaporate.

The following machinery will be used:

- Dozer,
- Excavator, and
- haul trucks.

7.3.2.2 Operational phase

This phase consists of haul trucks depositing waste rock on the waste rock dump as per the deposition plan. The storm water structures and paddocks will have to be maintained.

7.3.2.3 Decommissioning phase

This phase will consist of sloping and levelling, planting of endemic vegetation, re-vegetate with grass mix as per ecological report. Storm water management structures such as paddocks will be removed to encourage free drainage. All internal roads on the waste rock dump will be sloped for free drainage and rehabilitated.

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Table 47: Environmental risk assessment for the proposed Waste Rock Dump and associated activities

Activity: Design and planning of the proposed Waste Rock Dump and associated infrastructure
Applicable Location Alternatives: Preferred Alternative and Alternative 1
Aspect: Potential inadequate planning and design

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Planning and Design Phase	X							To effectively plan and design the WRD and associated infrastructure taking the on-site environment into consideration.	• Site selection for the proposed activities must include consideration of the following: ➢ Sloping / gradient factors. ➢ Design and construction of surface water management and erosion control measures as per environmental legislation. ➢ Access to and from the proposed site. ➢ The location of nearby drainage systems, watercourses and sensitive landscapes. ➢ The habitats of fauna and flora species. ➢ Protected plant and tree species. ➢ Available water supplies. ➢ Security and general service facilities in the area. ➢ Future expansions / phases. ➢ General housekeeping practices. ➢ Existing mine procedures, Government Authority requirements and permit conditions. ➢ Possible heritage or archaeological resources on-site. ➢ Soil types and land capability. ➢ Surface- and groundwater quality (pre-project status) and possible impacts that would result from proposed activities. *The above listed information must be recorded before the construction at the site commences and should be used for future monitoring purposes.*						
Impacts on the environment that could potentially have been avoided.		2	3	2	7	3	21			1	2	1	4	2	8
Construction Phase															
The activity is not applicable to the Operational Phase		N/A								N/A					
Operational Phase															
The activity is not applicable to the Operational Phase		N/A								N/A					
Decommissioning Phase															
The activity is not applicable to the Decommissioning Phase		N/A								N/A					

Activity: Use and maintenance of vehicles and equipment for:

- The construction of berms and surface water management measures in preparation for the disposal of waste rock during the Construction Phase,
- The maintenance of structures and surface water management measures at the Waste Rock Dump as well as the hauling of waste rock during the Operational Phase, and
- The removal of storm water management measures as part of Decommissioning

Applicable Location Alternatives: Preferred Alternative and Alternative 1

Aspect: Potential ineffective maintenance of vehicles and machinery

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							Implement effective spill handling and planned maintenance systems	• Implement an effective planned maintenance system for vehicles and equipment. • Implement an effective spill management procedure for the clean-up of leakages and spillages of hydrocarbons. • Implement an emergency preparedness and response procedure in case of reportable incidents to Authorities.						
Soil, surface and / or groundwater pollution resulting from leakages from vehicles and machinery. This impact is however anticipated to be localised within the site boundaries and of a small volume.		1	2	1	3	2	6			1	1	1	3	2	6
Construction Phase impacts on air pollution would be limited to vehicle-related emissions during the Construction Phase resulting in air pollution.		2	2	1	5	3	15			2	1	2	4	2	8
Potential depletion of a natural resource (fuel / diesel).		2	2	1	5	3	15			2	1	1	4	2	8
Operational Phase	X														
Soil, surface and / or groundwater pollution resulting from leakages from vehicles and machinery. This impact is however anticipated to be localised within the site boundaries and of a small volume.		1	2	1	4	2	8			1	1	1	3	2	6
Emissions from vehicles used during the Operational Phase resulting in air pollution.		2	2	1	5	3	15			2	1	2	4	2	8
Potential depletion of a natural resource (fuel / diesel).		2	3	1	6	3	18			2	1	1	4	2	8
Decommissioning Phase	X														
Soil, surface and / or groundwater pollution resulting from leakages from vehicles and machinery. This impact is however anticipated to be localised within the site boundaries and of a small volume.		1	2	1	4	2	8			1	1	1	3	2	6
Emissions from vehicles used during the Decommissioning Phase resulting in air pollution.		2	2	1	5	3	15			2	1	2	4	2	8
Potential depletion of a natural resource (fuel / diesel)		**2**	**2**	**1**	**5**	**3**	**15**			2	1	1	4	2	8

Aspect: Generation of dust as a result of the use of vehicles for hauling of waste rock during the Operational Phase

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X														
Generation of dust from vehicles and machinery during the Construction Phase is certain to occur. However, as per the Air Quality Impact Study conducted (refer to **Appendix G11**), it is unlikely that this will contribute significantly to the overall dust impact of the mine, if current mitigation measures at the mine (such as dust suppression) are implemented for this activity.		2	1	2	5	3	15			1	1	1	3	2	6
Operational phase	X														
The new waste rock stockpile site is expected to increase dust generation from the Vergenoeg Mine (refer to the Air Quality Impact Assessment in **Appendix G11**). The main reason for this is the increase in the distance over which the waste rock will be hauled. This will include hauling waste from the pit to the waste rock dump and use of vehicles for engineering purposes on-site. Given the limited impact on air quality outside of the mine boundary, while mitigation measures are in place, and the fact that there are few (if any) sensitive receptors in the impact zone, the current dust fall monitoring programme undertaken by the mine is sufficient.		2	3	1	6	3	18	Implement an effective Air Quality Management Programme	• Document and implement a dust monitoring procedure • Continue with the current dust monitoring programme • Implement dust suppression measures on the main roads on a daily basis • Implement strict speed limits on roads	1	3	1	4	2	8
Decommissioning phase	X														
Dust generation is anticipated to occur during the Decommissioning Phase as a result of the use of vehicles and machinery for rehabilitation purposes, the removal of surface structures and sloping practices.		**2**	**1**	**2**	**5**	**3**	15			1	1	1	3	2	6

Aspect: Generation of potential nuisance (environmental) noise to surrounding communities as a result of the use of vehicles and machinery

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							Ensure that potential environmental noise levels are controlled.	• Implement an environmental noise monitoring programme. • Ensure effective maintenance of vehicles and machinery. • Equip machinery (where possible) with silencers. • Ensure the availability of a complaints register for the recording of complaints relating to noise). The complaints register must 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.						
Potential generation of environmental noise as a result of the use of vehicles and machinery during the Construction Phase activities.		2	1	1	4	2	8			1	1	1	3	2	6
Operational Phase	X														
An increase in environmental noise is anticipated as a result of increased vehicle movement for hauling of waste rock during the Operational Phase.		2	3	1	6	2	12			1	3	1	4	2	8
Decommissioning Phase	X														
Potential generation of environmental noise as a result of the use of vehicles and machinery for sloping and rehabilitation work conducted during the Decommissioning Phase.		**2**	**1**	**1**	**4**	**2**	**8**			1	1	1	3	2	6

Aspect: Increase in traffic on haul roads due to the use of the new Waste Rock Dump

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							Implement a traffic control and safety procedure	• Educate employees on the safety precautions on haul roads as part of an awareness programme. • Place signage to create awareness on-site. • Implement an emergency preparedness and response procedure.						
The haulage of waste rock is not applicable to the Construction Phase. Therefore, no impacts are anticipated in terms of traffic within the mine boundary.		N/A								N/A					
Operational Phase	X														
Traffic within the mine boundary area will increase during the Operational Phase due to the haulage of waste rock to the new proposed waste rock dump. Potential safety impacts associated with this aspect relate to potential vehicle accidents.		1	2	2	5	2	10			1	1	2	4	2	8
Decommissioning Phase	X														
The haulage of waste rock is not applicable to the Decommissioning Phase. Therefore, no further impacts are anticipated in terms of traffic within the mine boundary.		N/A								N/A					

Activity: Deposition of waste rock

Applicable Location Alternatives: Preferred Alternative and Alternative 1

Aspect: Change in topography as a result of the deposition of waste rock during the Operational Phase

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase															
The deposition of waste rock is not relevant to the Construction Phase.		N/A								N/A					
Operational Phase	X														
The deposition of waste will result in a change in topography which may increase the existing visual impact of the mine operations. The waste rock dump will however be situated within the existing mine boundary area (Preferred Alternative: west of the existing tailings storage facilities; and Alternative 1: north of the existing tailings storage facilities). Both the alternatives are considered be of a low visual impact due to the absorption capacity of the area being high with Bushveld trees and shrubs camouflaging the activities in the area.		1	3	1	5	1	5	Implement the measures as contained in the Storm Water Management Plan, dated July 2013.	• Make use of visual screening berms or other structures or trees (where possible) in areas where there are sensitive receptors. • Comply with, and implement the measures as contained in the Storm Water Management Plan, dated July 2013 (refer to **Appendix G12**). I.e. proper storm water management measures to be implemented around the proposed Waste Rock Dump to ensure the containment and diversion of surface water runoff from the Waste Rock Dump. This includes cut-off berms and evaporation paddocks on the western and southern sides of the facility. • The site water balance will be refined on an ongoing basis with the input of actual flow volumes and used as decision-making tool for water management on the mine. • Conduct regular site inspections at the waste r, access roads and storm water management. • Large space to allow for a long operational life rock dump in order to verify the effectiveness and capacity of the storm water management measures and the need for maintenance on surface water management structures.	1	3	1	5	1	5
Surface water flow patterns will be altered as a result of the change in topography due to waste rock deposition activities. An increase in surface water flow will occur resulting in possible siltation of surrounding water courses or management structures. A Storm Water Management Plan (SWMP) was developed for Vergenoeg Mining Company by Shangoni Management Services. The mentioned plan indicates the measures that will be implemented in terms of the storm water management surrounding the proposed Waste Rock Dump. Refer to **Appendix G12**.		2	3	3	8	3	24			1	3	2	5	2	10
Decommissioning Phase	X														
Although the deposition of waste rock is not relevant to the Decommissioning Phase, the effects thereof will result in a permanent change in topography, as rehabilitation and re-sloping of the WRD will be done *in situ*. Refer also to the nature of impacts during Operational Phase.		1	3	1	5	1	5			1	3	1	5	1	5

Aspect: Potential inadequate management of storm water around or on the Waste Rock Dump

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase								Implement an effective surface water management, monitoring and erosion control system in order to comply with GN704, dated 1999 in terms of the separation of clean and dirty water management areas.	• Comply with the requirements of GN 704, dated 1999, and implement the measures as contained in the Storm Water Management Plan, dated July 2013 (refer to **Appendix G12**) from Construction through to Decommissioning Phase. I.e. proper storm water management measures to be constructed and maintained around the proposed Waste Rock Dump to ensure the separation of clean- and dirty water management areas. This includes cut-off berms and evaporation paddocks on the western and southern sides of the facility. • Infrastructure will be constructed and operated so as to comply with the requirements contained in the National Water Act (NWA) (Act 36 of 1998) and the GN704, dated June 1999. This includes the following requirements: • Construct the necessary erosion control measures (e.g. grass, cement, rock, appropriate benches on the side walls of WRD), to control surface water run-off from the area. • Conduct regular site inspections at the Waste Rock Dump in order to verify the effectiveness of the water separation system and to identify possible erosion. • Monitor surface water quality on a monthly basis, including the quality of the Blue (clean water) Dam.						
Although the potential exists for the storm water management measures to be constructed incorrectly during the Construction Phase, the impact will be visible during the Operational Phase. Therefore, the impact has been rated under the Operational Phase, below.		Refer below								Refer below					
Operational Phase	X														
If not managed adequately, clean and dirty water, management areas will not be separated effectively and could result in the contamination of surrounding clean water areas.		3	3	2	8	2	16			1	3	1	4	2	8
The change in surface water flow patterns may result in increased erosion conditions, if not managed appropriately. This could lead to increased solids in water systems and subsequent siltation of the surrounding watercourses or water management systems (drainage channels).		2	3	2	7	3	21			1	3	1	4	2	8
Decommissioning Phase	X														
A change in surface water flow patterns during the Decommissioning Phase (as a result of sloping activities and changes to storm water management measures to re-instate a free-draining environment as part of rehabilitation) could result in an increase in suspended solids and subsequent contamination of surface water or siltation of watercourses and surrounding drainage channels.		2	2	2	6	2	12			1	2	1	4	2	8

Aspect: Potential leaching from Waste Rock Dump

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase								Implement an effective water monitoring programme incident management system and pollution prevention measures.	• Vergenoeg Mining Company will comply with the NWA, 1998 and the GN704 Regulations, dated June 1999. The WRD and its associated infrastructure will be designed and operated so as to comply with the following principles: Pollution prevention through basic infrastructure design, Pollution prevention through maintenance of infrastructure, The required steps to enable containment and remediation of pollution incidents, and • Continue to monitor groundwater quality in terms of the existing groundwater-monitoring programme.						
The deposition of waste rock is not relevant to the Construction Phase.		N/A								N/A					
Operational Phase	X														
The potential exists for the leaching of contaminants to the groundwater regime. However, a geochemical characterisation of the waste rock (refer to **Appendix G8**), indicated that the waste rock is not acid forming, and limited leachate of salts into the groundwater is shown during worst case scenario with acid rain.		1	3	1	4	2	8			1	3	1	4	2	8
Decommissioning Phase															
The deposition of waste rock is not relevant to the Decommissioning Phase.		N/A								N/A					

Aspect: Loss of natural vegetation and ecological function as a result of waste rock deposition and the subsequent establishment of alien invasive vegetation

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase									• Habitat and sensitivity maps must be used as a decision tool to guide the proposed development. • The drainage line (*Combretum apiculatum – Dichrostachys cinerea woodland*) on the WRD site should be preserved. Access should be controlled at all times. • The mine, with the assistance of a qualified botanist (or qualified ECO), should familiarise themselves with the "declining", "near-threatened" and protected plant species occurring on the mine area or those occur likely to occur on the study site. • The site should be inspected in spring or in summer in order to identity individuals/populations that might have been previously missed; • All protected plant species should, where possible, be left *in situ*, but if threatened by the WRD development, be removed (with the relevant permits) and temporarily placed within an on-site nursery for re-establishment after construction; • If any faunal species of conservation concern is exposed during the development, all activities in the direct vicinity of the animal should be halted. The ECO shall be informed, who shall then issue instructions for its capture, translocation and safe release to adjacent suitable habitat (with the necessary permits and permission from the local authorities); Large trees (including dead tree) should be retained on site since these provide potential breeding and roosting habitat for Red-billed Oxpeckers. • All outside lighting should be directed away from important dispersal networks; • All labour or staff should be advised (induction) by means of environmental awareness training on the importance of the area, the intentional killing of any faunal species, harvesting of plant material and the feeding of animals, which is prohibited. • Signage should be applied to remind people of the dangers associated with feeding of wild animals. Proper animal-proof dustbins should be used. • Eradicate alien invasive species as per a detailed eradication programme and continued monitoring of the effectiveness of removal of alien invasive species. • Investigate the possibility of a biodiversity off-set project, which will take into account the size and conservation status of the area, the offset ration, evaluation of alternative offset sites, acceptability to key stakeholders, conservation importance, and distance from other mines and development activities.						
The deposition of waste rock is not relevant to the Construction Phase.		N/A								N/A					
Operational Phase	X														
Vegetation will be lost with the construction and operation of the waste rock dump. This will result definite loss of ecological function and biodiversity. An Ecological study was conducted for the Waste Rock Dump development. Refer to **Appendix G4** for more detail on the identified impacts and recommendations.		2	3	3	8	3	24	Establish and implement a Biodiversity Management Plan for the conservation of protected fauna and flora species and the eradication of alien invasive vegetation		2	3	1	6	1	6
The establishment of alien invasive vegetation, which may result in the following: • 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.		2	3	2	7	3	21			1	3	1	5	1	5
Decommissioning Phase															
The deposition of waste rock is not relevant to the Decommissioning Phase.		N/A								N/A					

Aspect: Potential destruction of heritage or archaeological resources

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-Construction and Construction Phase	X							Establish and implement a Heritage Resources procedure or work instruction	• Develop a Heritage Resources procedure with instructions in the case heritage resources are found on-site. Also make reference to the applicable legislative requirements (e.g. permit applications) Implement an awareness campaign on the above-mentioned instructions.						
The heritage impact assessment (**Appendix G13**) indicates that no sites of heritage or archaeological importance were found on-site during the assessment. However, it is possible that some might be uncovered during the proposed development and future expansions. This will include low stone packed or unmarked graves.		1	3	2	6	2	12			1	3	1	5	1	5
Operational Phase	X														
Environmental impacts are similar as for the Construction Phase.		1	3	2	6	2	12			1	3	1	5	1	5
Decommissioning Phase	X														
Environmental impacts are similar as for the Construction Phase.		1	3	2	6	2	12			1	3	1	5	1	5

Aspect: Potential incorrect deposition of waste rock resulting in instability of WRD

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase								Implement a self evaluation programme in order to verify compliance with legislative requirements, conditions, and mine procedures in terms of waste rock deposition	• Ensure that safety aspects are taken into consideration during the initial stages of waste rock deposition planning. • Conduct regular site inspections in order to verify the correct waste rock deposition methods / phases as well as in relation to the approved footprint area. • Implement strict access control in the vicinity of the WRD.						
The deposition of waste rock is not relevant to the Construction Phase.		N/A								N/A					
Operational Phase	X														
Potential instability of the WRD resulting from potential incorrect deposition of waste rock, could subsequently lead to rock falls and safety impacts for employees, visitors, community members etc.		1	3	2	6	2	12			1	3	2	5	1	5
The potential deposition of waste rock beyond the footprint boundaries of the WRD could result in a larger area being impacted on in terms of ecological functioning and contamination of the surrounding environment.		1	3	3	7	2	14			1	3	1	5	1	5
Decommissioning Phase															
The deposition of waste rock is not relevant to the Decommissioning Phase.		N/A								N/A					

Aspect: Potential dust generation from Waste Rock Dump

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	(Risk rating after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase								Implement an effective Air Quality Management Programme	• Document and implement a dust monitoring procedure • Continue with the current dust monitoring programme in order to verify the mine's dust sources and compliance to legislative limits						
The deposition of waste rock is not relevant to the Construction Phase.		N/A								N/A					
Operational Phase	X														
From the figures presented in the Air Quality Impact Assessment (refer to **Annexure G10**), haul roads and open pit operations are the largest causes of particulate emissions. The new WRD, while it will have a substantially larger capacity, will not generate significantly more dust than the existing waste rock stockpile. Compared with emissions from current mining activities at the Vergenoeg Mine the main increase in emissions resulting from the new WRD are caused by its location – the haulage vehicles will be required to travel a greater distance, thereby creating increased fugitive dust emissions.		1	3	1	5	2	10			1	2	1	4	2	8
Decommissioning Phase															
The deposition of waste rock is not relevant to the Decommissioning Phase.		N/A								N/A					

Activity: Re-sloping and rehabilitation of Waste Rock Dump

Applicable Location Alternatives: Preferred Alternative and Alternative 1

Aspect: Potential ineffective rehabilitation and re-sloping practices such as:

Nature and significance of environmental impact															
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase								Develop and implement an effective rehabilitation strategy for the WRD	• Set rehabilitation objectives with regards to the Waste Rock Dump area and develop an effective and detailed rehabilitation plan for the Waste Rock Dump area, including the following: ➢ Soil usage, ➢ Vegetation establishment, ➢ Removal of infrastructure, ➢ Sloping methods ➢ End land use requirements. ➢ Long-term erosion prevention ➢ Confirmatory monitoring • Rehabilitation will be undertaken to the natural angle of repose. • *Note*: Consider final rehabilitation goals in the Operational Phase.						
The rehabilitation and re-sloping activities are not relevant to the Construction Phase.		N/A								N/A					
Operational Phase															
The rehabilitation and re-sloping activities are not relevant to the Construction Phase.		N/A								N/A					
Decommissioning Phase	X														
Should an inadequate amount or no organic material be worked into soil used for re-sloping / rehabilitation practices during the Decommissioning Phase, this could result in the ineffective settling of vegetation on the slopes of the Waste Rock Dump.		1	3	2	5	2	10			1	3	1	4	2	8
The incorrect sloping of the Waste Rock Dump surface could result in increased or decreased (ponding) surface water flow patterns resulting in subsequent erosion on the side walls of the Waste Rock Dump. This could ultimately limit the growth of vegetation as part of rehabilitation, increase dust generation from the rehabilitated WRD and / or increase the runoff of suspended solids into surrounding surface water sources.		1	3	2	5	2	10			1	3	1	4	2	8

Activity: Generation, storage and disposal of waste

Applicable Location Alternatives: Preferred Alternative and Alternative 1

Aspect: Potential incorrect disposal of general waste (including domestic waste and building rubble) generated during the various phases

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							Implement an effective waste management system.	• Establish a waste separation system at the mine. • Provide the relevant waste telecons or bins for the temporary waste storage on site prior to removal off-site. • Appropriate equipment to deal with fire incidents is to be readily available on site. Soil contaminated with hazardous substances, fuel or oil shall be treated as hazardous waste and removed from site. • Make use of registered waste transporters and licensed waste disposal landfill sites. • Implement a waste awareness training programme. • Obtain and keep on file safe disposal certificates for waste disposed off site. • Adherence to the mine's waste procedure. • All building rubble will be disposed of at the mine's waste rock dump. This proposed activity needs to be communicated and discussed with the relevant Government Authority beforehand. • Access will be restricted to the mine's employees who have access to the pit area which is adjacent to the Waste Rock Dump.						
Types of waste to be generated during the Construction Phase include: • Cement and other material from storm water structures constructed, • Domestic waste generated by employees and contractors, • Potential hazardous waste such as hydrocarbons or contaminated soil removed due to leaking vehicles or machinery. These waste types may be incorrectly separated or disposed of resulting in soil, surface water or groundwater pollution, depletion of a landfill space or the wastage of recyclable material.		2	2	1	5	2	10			1	3	1	4	2	8
Operational Phase	X														
Types of waste to be generated during the Operational Phase include: • Domestic waste generated by employees and contractors, • Potential hazardous waste such as hydrocarbons or contaminated soil removed due to leaking vehicles or machinery. These waste types may be incorrectly separated or disposed of resulting in soil, surface water or groundwater pollution, depletion of a landfill space or the wastage of recyclable material.		2	3	2	6	2	12			1	3	1	4	2	8
Decommissioning Phase	X														
Types of waste to be generated during the Decommissioning Phase include: • Building rubble from the removal of surface water structures, • Domestic waste generated by employees and contractors, • Potential hazardous waste such as hydrocarbons or contaminated soil removed due to leaking vehicles or machinery. These waste types may be incorrectly separated or disposed of resulting in soil, surface water or groundwater pollution, depletion of a landfill space or the wastage of recyclable material.		2	2	1	5	2	10			1	3	1	4	2	8

Activity: General activities during the Construction, Operational and Decommissioning Phases. This includes:
- The use of water

Applicable Location Alternatives: Preferred Alternative & Alternative 1

Aspect: Inefficient and/or redundant use of a valuable resource

Nature and significance of environmental impact																	
Impact per Project Phase	Applicable	Risk rating (before mitigation)						Environmental Objective	Mitigation Measures	Risk rating (after mitigation)					
		Extent	Duration	Intensity	Significance	Probability	Risk			Extent	Duration	Intensity	Significance	Probability	Risk
Pre-construction and Construction Phase	X							To prevent the wastage of a natural resource.	• Leaking water taps and hosepipes must be repaired immediately. • Running water taps and hosepipes must not be left unattended. • All hose and tap connections are to be fitted with correct and appropriate plumbing fittings. • Implement and awareness campaign regarding water use.						
Potential wastage of water and depletion of water resource. *The existing source (treated water from the Rust de Winter dam) will continue to be used for domestic water purposes*		2	3	1	6	1	6			2	1	1	4	1	4
Operational Phase	X														
Environmental impacts are similar as for the Construction Phase		2	3	1	6	1	6			2	1	1	4	1	4
Decommissioning Phase	X														
Environmental impacts are similar as for the Construction Phase		2	3	1	6	1	6			2	1	1	4	1	4

Refer to Section 8 below for a summary on the key findings related to the pipelines, Waste Rock Dump and associated infrastructure.

7.3.2.4 Cumulative impacts

The cumulative impacts can be described as dust generated from transporting waste rock to the proposed dump, reduction in water quality, the occurrence of invader plants, change in topography and loss of soil and surface areas.

Table 48: Cumulative impacts

ASPECT	IMPACT DESCRIPTION
Dust generation from transporting waste rock to the waste rock dump etc. Fluorspar generates a significant amount of dust.	Air pollution.
	Nuisance to community and neighbouring residents.
Reduction in water quality. Groundwater qualities are mostly restricted to compartments within the aquifer, however, the overall reduction in water quality increases when including that of the Vergenoeg mine.	Surface water and groundwater pollution
	Disturbance to aquatic vegetation and animal life due to polluted water.
Invader plants establishing on disturbed areas	Disturbance and destruction of natural vegetation
Change in topography due to waste rock dumps and mine infrastructure.	Visual aspect
The mining activities lead to the loss of soil and surface area.	Reduction in land capability.

8. ENVIRONMENTAL IMPACT STATEMENT

8.1 Summary of key findings

To ensure the future existence and operation of the mine, the applicant is proposing the construction of a pipeline to connect the current operations with the newly constructed tailings storage facility, as well as a designated area earmarked for waste rock deposition. It was found that the no-go alternative is not a recommended alternative as the activities are a critical necessity for the continued existence of the mine and would result in premature closure if not allowed to continue. All alternatives will have an impact on the environment to some extent. The following key findings are summarised for each proposed activity:

Pipeline and associated infrastructure

There are certain unavoidable constraints associated with the pipeline ranging from environmental, cost to engineering constraints. The pipeline route has to cross the valley of the Rhenosterspruit, the pumped pipeline must be between 2% and 6% gradient, power outages are inevitable, and the route requires an access road. Ideally, the disturbance of crossing the valley should be done in the already disturbed area of the return water dam (Red Dam). Power outages and leakages should be managed within the existing affected water catchment and the access road should be constructed using cut and fill techniques to limit disturbance as well as to optimise rehabilitation objectives.

The preferred route will have little impact on the valley as it is within the return water dam's disturbed buffer. Potential spillages will be conveyed to the return water dam via the new access road. Impacts associated with the access road include vegetation clearance and change of the topography, limited to the extent of the road. Potential impacts from the power line are negligible as it will not be visible beyond the property of the mine.

Waste rock dump

Vegetation will be lost with the construction of the waste rock dump. Rehabilitation of the waste rock dump will be able to re-establish some of the habitat over time. Haulage of waste rock is identified as the largest contributor of dust generation. Continued dust suppression on access roads will be adequate to mitigate ambient air quality from mining activities according to the air quality impact assessment. Geochemical characterisation of the waste rock indicated that the waste rock is not acid forming, and limited leachate of salts is shown during worst-case scenario with acid rain. Effective surface water control should reduce the potential impact of the waste rock dump on the surrounding water environment. Current water and air quality monitoring programmes must continue to identify and document actual impacts on the surrounding environment.

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 pipeline and waste rock dump activities. The positive and negative implications of each alternative are also described in Table 49. 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 49: Comparison of the proposed preferred activities and the no-go option

	Pipeline	Waste rock dump	No-go option (current situation)
Positive impacts	• Economical and sustainable operation of the mine with availability of tailings disposal capacity for at least 25 years. • Creation of additional employment opportunities during the construction and operational phases of the project. • Stimulation of the local economy.	• Economical and sustainable operation of the mine with availability of a designated area to dispose of waste rock. • Continual employment of mineworkers during the life of mine. • Stimulation of the local economy.	• No new or additional environmental impacts to those currently occurring at on the property of the mine.
Negative impacts	• Possible soil-, surface water- and/or groundwater-contamination. • Vegetation loss from clearance of service road during construction.	• Vegetation loss for the footprint of the waste rock dump. • Possible surface water- and/or groundwater-contamination. • Possible generation of dust.	• With no available facilities for waste streams, the mine is facing premature closure. • Major 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. The no-go option is clearly not a viable consideration as the mine is dependent on the environmental authorisation of the proposed activities to continue operations. The positive impact of the continuation of the mining activities outweighs the potential negative impacts of the preferred developments.

9. CONCLUSION

Information has been provided to GDARD and interested and affected parties during the Scoping Phase. Comments and concerns were received and integrated into the environmental impact assessment report. This document serves as the draft report to be considered by the registered I&APs and state departments for environmental authorisation. Should there be any comments received on this report within the notice period provided, these comments will be address in the final report that will be submitted to the competent authority, GDARD in this case, for final perusal.

Based on the information gathered from specialist studies and consultation with the client and appointed engineers, the proposed activities should have limited detrimental impact on the environment provided that the mitigation measures proposed in the environmental management plan are implemented. Successful rehabilitation of the impacted environment can still be aligned with the final land-use of the mine property.

Alternatives have been assessed in terms of activity, location, technology and design to find the most suitable option that addresses financial, engineering and environmental constraints. Responsible mining and consultation with departments and I&APs throughout the construction and operational phases of the activities is promoted. Environmental monitoring and evaluation as per the current monitoring programme should continue to identify potential changes in quality and significance of impact.

The positive social impacts of the proposed development outweigh the negative impacts. This project will lead to extending the life of mine, job creation, and skills development and contribute to alleviating poverty, not only among the employees but also within their families and the local community.