



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT And ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT: FOUR RIVERS TRADING 263 (Pty)

TEL NO: 012 562 0078 / 082 901 0879

FAX NO:

POSTAL ADDRESS: PO Box 902024, Bon Accord, 0009

PHYSICAL ADDRESS: Four Rivers Trading 263 (Pty) Ltd
Portions 53, 127, 131 and 135
De Onderstepoort 300 JR
District of Pretoria
South Africa

FILE REFERENCE NUMBER SAMRAD: GP/30/5/1/2/2/(10009)MR /GP30/5/1/2/3/2/1(10009) EM

1. IMPORTANT NOTICE

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

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

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

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

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

un-interpreted information and that it unambiguously represents the interpretation of the applicant.

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

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

EXECUTIVE SUMMARY

Project Description

Four Rivers Trading 263 (Pty) has an approved Mining Right No. GP1009MR for the mining of sand, aggregate and gravel. The properties held under Mining Right No. GP1009MR were originally applied for in 2012. It was only in 2016 that the mining right was issued and execution took place in November 2016.

EcoPartners has been appointed by Four Rivers to update the existing EMP (compiled 2012) to ensure compliance with the EMP requirements specified in the EIA Regulations, 2014, as amended.

EMP content

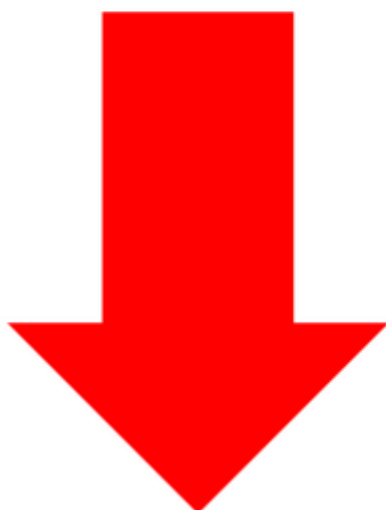
This document details the findings of the amendment of the EMP for the Four Rivers project on De Onderstepoort 300 JR in the Gauteng Province and is presented in the template prescribed by the DMR.

Findings & Recommendations



POSITIVE IMPLICATIONS:

- * Employment opportunities for 25 employees
- * Rehabilitation of historic mine to improve land value
- * Construction of Water Management Systems
- * Limit the potential of alien invader plant species to encroach on the natural habitat
- * Generate opportunities for Small to Medium enterprises to grow
- * Train employees with transferrable skills that can be used in broader society
- * Improved security as the mining area is actively managed and the risk of squatters establishing is limited.
- * Development of the vacant land provides opportunities for growth in the area



NEGATIVE IMPLICATIONS AND RISKS

- * Risk of neighbours perceiving the mine could affect them negatively
- * Damage to the roads
- * Ponding of water due to voids could impact water quality
- * Groundwater levels within the site boundary might be affected
- * Pre-existing land use (Quarry) might affect the perceived value of the area
- * Loss of agricultural potential in terms of grazing capacity for the duration of the operating mine
- * Air quality can be affected if dust is not managed
- * Incorrect waste management could lead to contamination
- * Failure to consider adjacent land use as part of rehabilitation requirements might limit potential growth in the area.

Air Quality

- It is recommended that dustfall monitoring be conducted as part of the mine's air quality management plan, this should as a minimum adhere to the dust monitoring regulations. This should be undertaken throughout the life of mine to provide air quality trends.

Surface Water

- Adhere to stormwater management plan.
- A surface water monitoring programme should be implemented.
- The water balance should be updated once more specific domestic and process water reticulation volumes are known
- The water balance should be refined annually during the life of the mine.

Soils & Agricultural Potential

- Topsoil should be effectively stockpiled and managed.
- Minimise the period of exposure of soil surfaces through dedicated planning.
- Monitor the condition of all unpaved roads due to rainfall and potential of water run-off and erosion on unpaved roads, especially during rainy season

Fauna & Flora

- Establish a fire break.
- The remaining natural areas should be managed to prevent further degradation.
- Continuous rehabilitation of the area should take place.
- A management plan for control of invasive/exotic plant species needs to be implemented.

Freshwater

- No untreated water may be discharged to fresh surface water sources, the quality of the water discharged at the operation must be closely monitored.

Socio-economic

- The local jobs created should be linked to a skills development programme for permanent employment as per the SLP.
- Establish a grievance mechanism that will specify procedures for lodging and registering complaints – by external parties, employees and contractors – and for responses to them including time limits for responding and addressing the complaint, and recording of same.

Noise

- The mine should develop and implement a noise measurement programme

Visual

- Maintain the general appearance of the facility as a whole.

Blasting & Vibration

- It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community blasting dates and times.
- A monitoring programme for recording blasting operations is recommended.

Traffic

- Monitor the condition of the roads used.
- Repair the road where it becomes damaged due to mine traffic.

Heritage

- Fence the graves at the entrance gate at Portion 131 in and have a management plan drafted by heritage expert for the sustainable preservation thereof.
- Identified historical sites of high significance should be preserved if possible and definitely mitigated if to be impacted by development actions
- Should subterranean presence of archaeological and/or historical sites, features or artefacts be discovered, further disturbance must be stopped and a qualified archaeologist must be called in to investigate the occurrence.

Waste Management

- Develop a Waste Management Procedure
- Promote reduce, re-use and recycling of waste.

TABLE OF CONTENTS

1	INTRODUCTION	1
2	EAP DETAILS	2
3	PROJECT DESCRIPTION	4
3.1	LOCATION DESCRIPTION	4
3.2	ACTIVITY DESCRIPTION	4
3.3	REGIONAL SETTING.....	5
3.3.1	<i>Magisterial District</i>	5
3.3.2	<i>Direction and distance from nearest towns</i>	6
3.3.3	<i>Surface Infrastructure</i>	6
3.3.4	<i>Land Tenure and Use of Immediate Adjacent Land</i>	6
3.3.5	<i>River Catchment</i>	6
3.4	MINING DESCRIPTION.....	7
3.4.1	<i>Mining Products</i>	7
3.4.2	<i>Estimated Reserves</i>	7
3.4.3	<i>Mining Method</i>	7
3.5	PLANNED PRODUCTION RATE	10
3.6	PLANNED DURATION OF THE PROPOSED MINING PROJECT.....	10
3.7	INFRASTRUCTURE	10
3.8	SOLID WASTE MANAGEMENT.....	11
3.9	WATER POLLUTION MANAGEMENT FACILITIES.....	11
3.10	POTABLE WATER PLANT	12
3.11	PROCESS WATER SUPPLY	12
3.12	MINERAL PROCESSING PLANT	12
3.13	WORKSHOPS AND BUILDINGS	12
3.14	TRANSPORT.....	12
3.15	DISTURBANCE OF WATER COURSES.....	12
3.16	STORM WATER	13
3.17	MINING PHASES	13
3.17.1	<i>Construction phase</i>	13
3.17.2	<i>Operational phase</i>	14
3.17.3	<i>Decommissioning phase</i>	15
3.17.4	<i>Water Balance</i>	16
4	POLICY AND LEGISLATIVE CONTEXT	19
5	NEED & DESIRABILITY	22
	SMALL BUSINESS OPPORTUNITIES	22
	EMPLOYMENT	22
	ENVIRONMENTAL IMPACT MANAGEMENT	22
	LOCAL ECONOMIC DEVELOPMENT.....	23
	REHABILITATION CAPACITY OF HISTORICALLY DISTURBED SITES.....	23
6	ALTERNATIVES	24
6.1	PROPERTY OR LOCATION.....	28
6.2	TYPE OF ACTIVITY.....	28
6.3	DESIGN OR LAYOUT	28
6.4	TECHNOLOGY	29
6.5	OPERATIONAL ASPECTS	29
6.5.1	<i>Explosives Management</i>	29
6.5.2	<i>Water Supply & Use</i>	29
6.5.3	<i>Access road</i>	30
6.5.4	<i>Weighbridge</i>	30
6.6	NO-GO	30
7	PUBLIC PARTICIPATION PROCESS	31

7.1	IDENTIFICATION OF I&APS.....	31
7.2	NOTIFICATION OF I&AP	31
7.2.1	<i>Initial Project Notification</i>	31
7.3	AMENDMENT REPORT FOR COMMENT	32
7.4	PUBLIC MEETING	32
7.5	SUMMARY OF ISSUES RAISED BY THE I&APS	32
8	BASELINE ENVIRONMENT DESCRIPTION	37
8.1	GEOLOGY	37
8.1.1	<i>Regional Geological Setting</i>	37
8.1.2	<i>Local Geology</i>	37
8.2	TOPOGRAPHY	38
8.2.1	<i>Local topography</i>	38
8.2.2	<i>The topography of the proposed mining area will be altered as outlined below.</i>	39
8.3	CLIMATE.....	40
8.3.1	<i>Regional Climate</i>	40
8.4	AIR QUALITY	42
8.4.1	<i>Regional air quality</i>	42
8.4.2	<i>Local air quality</i>	43
8.5	GROUNDWATER.....	43
8.6	SURFACE WATER	44
8.6.1	<i>Catchment Boundaries</i>	44
8.6.2	<i>Mean Annual Runoff</i>	44
8.6.3	<i>Surface water quality</i>	44
8.6.4	<i>Freshwater (Wetlands)</i>	45
8.7	SOILS & AGRICULTURAL POTENTIAL.....	45
8.8	BIODIVERSITY	46
8.8.1	<i>Vegetation</i>	47
8.8.2	<i>Fauna</i>	50
8.9	SOCIO-ECONOMIC	53
8.10	NOISE	57
8.11	GROUND VIBRATION AND AIR BLAST	58
8.12	VISUAL.....	59
8.13	HERITAGE	60
8.13.1	<i>Graves</i>	60
8.13.2	<i>Historical residential remains and buildings</i>	60
8.13.3	<i>Late Iron Age (LIA) Features</i>	61
8.14	SENSITIVE LANDSCAPES.....	61
8.15	LAND USE	61
8.16	GEOLOGY.....	63
8.17	GROUND VIBRATION AND AIR BLAST	64
8.18	TOPOGRAPHY	64
8.19	AIR QUALITY	65
8.19.1	<i>Construction Phase</i>	65
8.19.2	<i>Operational Phase</i>	65
8.20	SURFACE WATER.....	65
8.21	SOILS & AGRICULTURAL POTENTIAL	65
8.22	BIODIVERSITY.....	65
8.23	SOCIO-ECONOMIC	66
8.24	VISUAL	66
8.25	TRAFFIC.....	66
8.26	BLASTING & VIBRATION.....	67
8.27	LAND USE	67
8.28	IMPACT ASSESSMENT METHODOLOGY.....	68
8.29	IMPACTS OF ALTERNATIVES.....	70
8.29.1	<i>Possible mitigation measures</i>	71
8.29.2	<i>Preferred Alternative</i>	71

8.29.3	<i>Significance Determination</i>	71
8.30	ASSESSMENT OF SIGNIFICANT IMPACTS	74
8.31	RECOMMENDATIONS FROM SPECIALISTS	89
9	ENVIRONMENTAL IMPACT STATEMENT	90
10	CONDITIONS OF AUTHORISATION AND EMPr	93
10.1	ASSUMPTIONS & GAPS IN KNOWLEDGE.....	97
10.2	REASONED OPINION	98
11	UNDERTAKING	103
12	FINANCIAL PROVISION	103
13	OTHER INFORMATION	104
13.1	DEVIATIONS FROM SCOPING AND PLAN OF STUDY	104
13.2	SOCIO-ECONOMIC (DIRECTLY AFFECTED PERSONS)	104
13.3	HERITAGE IMPACTS.....	105
13.4	OTHER MATTERS.....	105

LIST OF TABLES

TABLE 1-1: ACRONYMS & ABBREVIATIONS..... II

TABLE 1-2: DOCUMENT ROADMAP..... V

TABLE 1-3: CONTENT OF EMPR..... VIII

TABLE 2-1: EAP DETAILS..... 2

TABLE 3-1: PROPERTY DESCRIPTION 4

TABLE 3-2: LISTED AND SPECIFIED ACTIVITIES 5

TABLE 3-3: DETAILS OF LANDOWNERS ADJACENT TO FOUR RIVERS 6

TABLE 3-4: ESTIMATED WASTEWATER QUALITY..... 17

TABLE 3-5: TARGET TREATED AND DISCHARGE WATER QUALITY 17

TABLE 4-1: POLICY AND LEGISLATIVE CONTEXT 19

TABLE 8-1: STRUCTURES/FACILITIES THAT WILL ALTER TOPOGRAPHY..... 39

TABLE 8-2: MEAN RAINFALL MEASURED AT WONDERBOOM AIRPORT WEATHER STATION..... 40

TABLE 8-3: THE MEAN MAXIMUM AND MINIMUM TEMPERATURES 41

TABLE 8-4: AVERAGE WIND SPEED AND DIRECTION 42

TABLE 8-5: ACCEPTABLE DUST FALL RATES..... 43

TABLE 8-6 PLANT/FLORAL SPECIES OF GENERAL OCCURRENCE: 48

TABLE 8-7: ALIEN INVASIVE SPECIES..... 49

TABLE 8-8 EVALUATION OF THE POTENTIAL FOR OCCURRENCE OF RED DATA FLORA SPECIES ON-SITE. 50

TABLE 8-9 RED DATA SPECIES OCCURRING IN THE 2528CA 50

TABLE 8-10 KEY STATISTICS FOR TSHWANE METROPOLITAN MUNICIPALITY 53

TABLE 8-11 EDUCATION LEVELS (CITY OF TSHWANE AND WARD 96) 55

TABLE 8-12: ALTERATION OF TOPOGRAPHY 64

TABLE 8-13: IMPACT ASSESSMENT TABLE 68

TABLE 8-14: SIGNIFICANCE RATINGS..... 73

TABLE 8-15: POTENTIALLY SIGNIFICANT IMPACT AND RISK 74

TABLE 8-16: SUMMARY OF SPECIALIST REPORTS..... 89

TABLE 9-1: SUMMARY OF KEY FINDINGS 90

LIST OF FIGURES

FIGURE 3-1: SAND AND STONE AGGREGATE PROCESS FLOW	8
FIGURE 3-2: SATELLITE IMAGE OF MINING RIGHT AREA AND SURROUNDS.....	9
FIGURE 3-3: GENERAL SITE LAYOUT- WESTERN SECTION	9
FIGURE 3-4: GENERAL SITE LAYOUT- EASTERN SECTION	10
FIGURE 3-5: TYPICAL WEIGHBRIDGE.....	11
FIGURE 6-1: ALTERNATIVE CONSIDERATION DECISION TREE METHODOLOGY	24
FIGURE 6-2 AREA TO BE PROFILED INSIDE THE QUARRY (SHOWN IN BLUE).....	29
FIGURE 6-3: TYPICAL WEIGHBRIDGE.....	30
FIGURE 7-1: SUMMARY OF ISSUES RAISED BY I&APS (ONLY COMPLETED AFTER PPP).....	34
FIGURE 8-1: REGIONAL GEOLOGY (2528 PRETORIA)	38
FIGURE 8-2: LOCAL TOPOGRAPHY	39
FIGURE 8-3: AVERAGE TEMPERATURES AND PRECIPITATION.....	41
FIGURE 8-4: WIND STATISTICS	42
FIGURE 8-5: NFEPA WETLANDS MAP	45
FIGURE 8-6: BIODIVERSITY- CBA MAP.....	47
FIGURE 8-7: REPRESENTATIVE EXAMPLE OF VEGETATION ON SITE (EAST).....	47
FIGURE 8-8: OPUNTIA TUNA (TURKSVY)	48
FIGURE 8-9 TSHWANE MM POPULATION GROUPS.....	54
FIGURE 8-10 WARD 96 POPULATION GROUPS	55
FIGURE 8-11 TSHWANE MM EDUCATION LEVEL	56
FIGURE 8-12 WARD 96 EDUCATION LEVEL	56
FIGURE 8-13 TSHWANE MM EMPLOYMENT STATUS	57
FIGURE 8-14 WARD 96 EMPLOYMENT STATUS.....	57
FIGURE 8-15: ASSOCIATION BETWEEN EXPOSURE AND DISTANCE	59
FIGURE 8-16 CURRENT LAND USE (MAPS)	63
FIGURE 8-17: INTEGRATION OF INTERRELATED ENVIRONMENTAL FACTORS	72
FIGURE 9-1: SUMMARY OF POSITIVE AND NEGATIVE IMPLICATIONS AND RISKS.....	92
FIGURE 10-1: ALTERNATIVE TO USING WATER AS DUST SUPPRESSION, GRAVEL WAS PUT ON AREAS TO REDUCE DUST	100

Table 1-1: Acronyms & Abbreviations

Acronym / Abbreviation	Description / Full text
µg/m ³	One-millionth of a gram per cubic meter air
Aquifer	Aquifer
ADT	Average Daily Traffic
AMD	Acid Mine Drainage
APP	Air Pressure Pulse
AQSR	Air Quality Sensitive Receptors (AQSRs)
ASTM	American Society for Testing and Materials
BH	Borehole
BIC	Bushveld Igneous Complex
CA	Competent Authority
CH ₄	Methane
CITES	Convention on International Trade in Endangered Species
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CV	Curriculum Vitae
Depth	Depth
dB	Decibel
DE	Diesel Exhaust
DMR	Department of Mineral Resources
DAFF	Department of Agriculture, Forestry and Fisheries
DEM	Digital Elevation Model
DFA	Development Facilitation Act
DWAF	Department of Water Affairs & Forestry
Dr.	Doctor
DWS	Department of Water and Sanitation
DWRC	Directorate Water Resource Classification
dBA	Decibel
e.g	Like
EAP	Environmental Assessment Practitioner
ESA	Ecological Support Area
ECA	Environment Conservation Act (Act 78 of 1989)
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Plan
EMPR	Environmental Management Programme Report
Etc.	Et cetera
FEPA	Freshwater Ecosystem Protective Area
GPS	Global Positioning System
GDP-R	Gross Domestic Product per Region
GNR	Government Notice Regulation
GN	Government Notice
GRP	Gas Release Pulse
GQM	Groundwater Quality Management
GIS	Geographical Information Systems
Ha	Hectares
HCs	Hydrocarbons
HGU	Hydrogeomorphic units
Hz	Hertz
I	Impact of vadose zone
IAPs	Interested and Affected Parties
i.e.	that is
IDW	Inverse Distance Weighting

Acronym / Abbreviation	Description / Full text
IRMA	Responsible Mining Assurance
IUA	Integrated Units of Analysis
IUCN	International Union for Conservation of Nature and Natural Resources
IWWMP	Integrated Water and Waste Management Plan
Kl	Kiloliter
kg/m ³	Kilograms per cubic meter
Km	Kilometers
Kt	Kilo tonnes
L	Liter
LC	Least Concern
LC	Leachable Concentration
LCT	Leachable Concentration Threshold
LDV's	Light Delivery Vehicles
LOS	Level of Service
LoM	Life of Mine
LPG	Liquefied Petroleum Gas
l/s	Litre per second
M	Meters (measurement of distance)
m ²	Square meter (measurement of area)
m ³	Cubic meter (measurement of volume)
Mamsl	Meters above mean sea level
MAP	Mean Annual Precipitation
MBDL	Meter Below Datum Level
MBGL	Meter Below Ground Level (i.e. depth)
mg/m ²	Milligram per square meter
mm	Millimeter
MR	Mining Right
MPRDA	Mineral and Petroleum Resource Development Act
m/s	Meter per second
Mt	Megatonnes
Mtpa	Million Tons per Annum
MWP	Mine Work Programme
NAAQS	National Ambient Air Quality Standards (South Africa)
NBA	National Biodiversity Assessment
NDCR	National Dust Control Regulations
NEM:AQA	National Environmental Management: Air Quality Act
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NFEPA	National Freshwater Ecological Priority Area
NGO	Non-profit organizations
NO _x	Nitrogen oxide
NO ₂	Nitrogen Dioxide
NMT	Non-Motorised Transport
NTU	Turbidity Units
NPAES	National Protected Area Expansion Strategy
NSD	Noise-Sensitive Development
NWA	National Water Act
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PES	Present Ecological Status
PM	Particulate matter
PM2.5	Particulate matter 2.5
PM10	Particulate matter 10
POI	Points of Interest

Acronym / Abbreviation	Description / Full text
POSA	Plants of Southern Africa
Pa	Pascal
PPP	Public Participation Process
PR	Prospecting Right
QCA	Quaternary Catchment Area
QDS	Quarter Degree Squares
R	Net recharge
RI	Recurrence Interval
RLMA	L-Moment Algorithm
RPP	Rock Pressure Pulse
ROM	Run-of-Mine
S	Storativity
SA	South Africa
SAHRA	South African Heritage Resource Act
SANAS	South African National Accreditation System
SANBI	South African Biodiversity Institute
SANRAL	South African National Road Agency
SANS	South African National Standards
SAWS	South African Weather Services
SHEQ	Safety Health and Environmental Quality
SEIA	Social and Economic Impact Assessment
SLP	Social Labour Plan
SMS	Short Message Services
SO ₂	Sulphur Dioxide
SWMP	Storm Water Management Plan
t/day	Tonnes per day
t/yr	Tonnes per year
T	Transmissivity
TB	Tuberculosis
TC	Total Concentration
TCT	Total Concentration Threshold
ToPS	Threatened or Protected Species List as part of the National
TSP	Total Suspended Particulates
VAC	Visual Absorption Capacity
VOC(s)	Volatile organic compound(s)
Vpd	Vehicles per day
Vph	Vehicles per hour
WMA	Water Management Area
WULA	Water Use License Application
Yr	Year

Table 1-2: Document Roadmap

	Scope of assessment and content of environmental impact assessment reports	Report reference
(a)	EAP details	Section 2: Appendix 1 & 2
	(i) the EAP who prepared the report; and	
	(ii) the expertise of the EAP, including a curriculum vitae;	Section 3.1
(b)	the location of the activity, including-	
	(i) the 21 digit Surveyor General code of each cadastral land parcel;	
	(ii) the physical address and farm name;	Appendix 4
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c)	a plan which locates the proposed activities applied for at an appropriate scale,	
	or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	Section 3.2 - Section 3.10
	or, if it is- (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d)	a description of the scope of the proposed activity, including-	Section 4
	(i) all listed and specified activities triggered;	
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Section 5
(e)	a description of the policy and legislative context within which the development is proposed including an identification of all	
	legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments;	
	that are applicable to this activity and are to be considered in the assessment process	Section 6
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	
(g)	a motivation for the preferred development footprint within the approved site;	Section 6
(h)	a full description of the process followed to reach the proposed preferred activity, site and location within the site, including -	
	(i) details of all the alternatives considered;	Section 6
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 7
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Table 7-1;
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 8
	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-	Section 8 & 9
	(aa) can be reversed;	
	(bb) may cause irreplaceable loss of resources; and	
	(cc) can be avoided, managed or mitigated;	Section 8.28
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected	Section 9

	Scope of assessment and content of environmental impact assessment reports	Report reference
	focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 8.29.1 & Part B
	(ix) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	
	(x) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 9
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-	Section 8.29
	(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Section 8.29
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 8.30
(j)	an assessment of each identified potentially significant impact and risk, including-	Section 8.30 & 9
	(i) cumulative impacts;	
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be mitigated;	
(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Section 10
(l)	an environmental impact statement which contains-	Section 9
	(i) a summary of the key findings of the environmental impact assessment;	Table 10-1.
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m)	based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Section 9-1
(n)	the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Section 9
(o)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	Section 8.31
(p)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 10.1
(q)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions	Section 10.2

	Scope of assessment and content of environmental impact assessment reports	Report reference
	that should be made in respect of that authorisation;	
(r)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	Section 11.3
(s)	an undertaking under oath or affirmation by the EAP in relation to: (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Section 12
(t)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Section 13
(u)	an indication of any deviation from the approved scoping report, including the plan of study, including- (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	Section 14.1
(v)	any specific information that may be required by the competent authority; and	Section 14.2 & 14.3
(w)	(any other matters required in terms of section 24(4)(a) and (b) of the Act.	Section 14.4

Table 1-3: Content of EMPr

	Content of environmental management programme (EMPr)	Report reference
(a)	EAP details	Part A & Part B Section 1
	(i) the EAP who prepared the report; and	
	(ii) the expertise of the EAP, including a curriculum vitae;	
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Part A: Section 3
(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	Appendix 4 & 8
(d)	a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including- (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Part B
(e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	Part B
(f)	a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Part B Tables in Section 1.5
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Tables in Section 1.5
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 1.5.
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Tables in Section 1.5.
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Tables in Section 1.5.
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Tables in Section 1.5.
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 1.5
(m)	an environmental awareness plan describing the manner in which- (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Section 1.9 & 1.10

	Content of environmental management programme (EMPr)	Report reference
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(n)	any specific information that may be required by the competent authority.	Part Section 13

1 INTRODUCTION

Four Rivers Trading 263 (Pty) has an approved Mining Right No. GP1009MR for the mining of sand, aggregate and gravel. The properties held under Mining Right No. GP1009MR were originally applied for in 2012. It was only in 2016 that the mining right was issued and execution took place in November 2016.

EcoPartners has been appointed by Four Rivers to update the existing EMP (compiled 2012) to ensure compliance with the EMP requirements specified in the EIA Regulations, 2014, as amended.

This document fulfils the requirements of Appendix 3 and Appendix 4 of the NEMA EIA Regulations of 2014, as amended. This EIR_EMP document has been compiled in a diligent, comprehensive and independent manner, and includes the following:

- 1 Introduction
- 2 EAP Details
- 3 Project Description
- 4 Policy and Legislative Context
- 5 Need & Desirability
- 6 Alternatives
- 7 Public Participation Process
- 8 Baseline Environment Description
- 9 Impact Assessment
- 10 Environmental Impact Statement
- 11 Conditions of Authorisation and EMPR
- 12 Undertaking
- 13 Financial Provision
- 14 Other Information
- 15 Environmental Management Programme

This document details the findings of the impact phase for the Four Rivers project on De Onderstepoort 300 JR in the Gauteng Province and is presented in the template prescribed by the DMR. **Text in brown** is the text from the DMR template and the **black text** is information inserted to populate the DMR document based on the specific requirements prescribed.

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

2 EAP DETAILS

1) Contact Person and correspondence address

a) Details of:

i) The EAP who reviewed the report

Name of The Practitioner: Charlaine Baartjes

Tel No.: 011 431 2251

Fax No. : 086 539 6127

e-mail address: charlaine@ecopartners.co.za

ii) The EAP who prepared the report

Name of The Practitioner: Jansie Cornelius

Tel No.: 011 431 2251

Fax No. : 086 539 6127

e-mail address: jansie@ecopartners.co.za

iii) Expertise of the EAP.

(1) The qualifications of the EAP

(With evidence attached as **Appendix 1**).

Table 2-1: EAP Details

Project Consultant:	EcoPartners (Pty) Ltd
Contact person:	Charlaine Baartjes / Jansie Cornelius
Postal address:	PO Box 73513, Fairland, Johannesburg, 2030
Telephone:	011 431 2251
E-mail:	charlaine@ecopartners.co.za / jansie@ecopartners.co.za
Fax:	086 539 6127
Experience:	Refer CV (Appendix 2)
Qualifications:	MBA; MSc., BSc(Ed)IV; Cert. (Tax) / BTech. (Environmental Management)

Please refer to Qualifications in **Appendix 1**.

(2) Summary of the EAP's past experience.

(Attach the EAP's curriculum vitae as **Appendix 2**)

Charlaine Baartjes has applied for more than thirty authorisations ranging from Section 20 and 21 Applications in terms of Environment Conservation Act, Section 24 Applications in terms of the National Environmental Management Act to Section 39 (regulation 52) Applications in terms of the Mineral and Petroleum Resources Development Act. She has 20 years applied experience on environmental matters.

Jansie Cornelius has more than 10 years' experience in the environmental field. She has experience in the Industrial, Para-statal, and consulting fields. In her career she has applied for a number of authorisations ranging from Section 24 Applications in terms of the National Environmental Management Act and Section 39 (regulation 52) Applications in terms of the Mineral and Petroleum Resources Development Act.

Please refer to CV's in **Appendix 2**.

3 PROJECT DESCRIPTION

3.1 LOCATION DESCRIPTION

a) Description of the property.

Table 3-1: Property Description

Farm Name:	De Onderstepoort 300 JR
Application area (Ha)	98.75 hectares
Magisterial district:	City of Tshwane Metropolitan Municipality
Distance and direction from nearest town	Approximately 10 km North of Pretoria
21 digit Surveyor General Code for each farm portion	Portion 53: T0JR00000000030000053 Portion 127: T0JR00000000030000127 Portion 131: T0JR00000000030000131 Portion 135: T0JR00000000030000135 Portion 158 T0JR00000000030000158 Portion 283: T0JR00000000030000283

b) Locality map

(show nearest town, scale not smaller than 1:250000 attached as **Appendix 3**).

Locality Map, please refer to Map in Appendix 3

3.2 ACTIVITY DESCRIPTION

c) Description of the scope of the proposed overall activity.

i) Listed and specified activities

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site and attach as **Appendix 4**

Proposed site layout plan, please refer to Appendix 4

Table 3-2: Listed and specified activities

NAME OF ACTIVITY (All activities including activities not listed) (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)	Aerial extent of the Activity Ha	LISTED ACTIVITY Mark with an X where applicable or affected.	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546) /NOT LISTED
Opencast Mining (sand, gravel and stone aggregate) (Eastern & Western Mining Activity)	98.75 Ha	X	GN 984 Listing Notice 2 Activity 17
Infrastructure (Vegetation Clearance):	2 Ha		
1. Access roads (exist)		Not Listed	Not Listed
2. Haul roads	0.30 Ha	X	GN 985 Listing Notice 3 Activity 4(c)(iv)
3. Weighbridge	0.008 Ha	Not Listed	Not listed
4. Water Management facilities		Not Listed	
5. Crushing and Screening plant	0.02 Ha	X	GN 984 Listing Notice 2 Activity 17
6. Material Stockpiles (Depend on location Eastern Section)	10 Ha	X	GN 985 Listing Notice 3 Activity 12(c)(ii)
7. Topsoil stockpiles			
8. Offices and toilets (existing) Western Section		Not Listed	
9. Offices and toilets (proposed) Eastern Section (ESA)	0.004 Ha	X	GN 985 Listing Notice 3 Activity 12(c)(ii)
10. Product Stockpiles (Mining activity)		X	GN 985 Listing Notice 3 Activity 12(c)(ii)
11. Conveyor (Vegetation clearance)		X	GN 985 Listing Notice 3 Activity 12(c)(ii)
12. ROM Pad (Eastern Section) (Mining / Processing)			GN 985 Listing Notice 3 Activity 12(c)(ii)
13. ROM Pad (Western Section) (Mining / Processing activity)			GN 985 Listing Notice 3 Activity 12(c)(ii)

(i) Description of the activities to be undertaken

(Describe Methodology or technology to be employed, including the type of commodity to be mined and for a linear activity, a description of the route of the activity)

3.3 REGIONAL SETTING

The Four Rivers operation is situated on Portions 53, 127, 131, 135, 158 and 283 of the farm De Onderstepoort 300 JR, approximately 10km north of Pretoria. Refer to Appendix 3 for the regional setting of the operation.

3.3.1 Magisterial District

Province: Gauteng

Magisterial District: Pretoria

3.3.2 Direction and distance from nearest towns

Pretoria: 10 km South

Soshanguve: 15 km West

3.3.3 Surface Infrastructure

The mining right covers an area of approximately 98.75 Ha. The surrounding areas have a number of land owners and range from agricultural to mining land uses. Infrastructure such as roads (secondary and provincial roads), power lines, telecommunication lines are already present on the proposed mining area. No servitudes occur on the mining area.

3.3.4 Land Tenure and Use of Immediate Adjacent Land

Land tenure and surrounding land use is indicated in Table 7. Part of the land on which the mining area is situated was previously used for quarrying purposes.

Table 3-3: Details of Landowners Adjacent to Four Rivers

Farm	Portion	Owner	Contact Details
De Onderstepoort 330 JR	2	MC du Plessis	PO Box 31463, Pretoria, 0001
	10	City of Tshwane	PO Box 440, Pretoria, 0001
	25		
	72	MJ Raath	PO Box 259, Bon Accord, 0009
	75	BD van Niekerk	PO Box 314, Bon Accord, 0009
	76		
	77		
	78		
	132	Bon Accord Irrigation Board	PO Box 37, Bon Accord, 0009
	158	BD van Niekerk	PO Box 314, Bon Accord, 0009
283			

3.3.5 River Catchment

The De Onderstepoort mining right area falls within the Limpopo River catchment. Within this tertiary region, the proposed mine falls in the A23E quaternary drainage region.

3.4 MINING DESCRIPTION

3.4.1 Mining Products

The mineral to be mined is sand and stone aggregate. The products that will be sold from the mine will have the following estimated composition:

- 13mm crushed stone
- 19mm crushed stone
- Crusher mix

3.4.2 Estimated Reserves

The Project entails a reserve of approximately 6 000 000 m³ of sand and stone aggregate. This will be mined at 25 000 m³/month and 300 000 m³/annum. This will give the proposed project a life of 20 years.

3.4.3 Mining Method

Opencast mining

The mine method is based on current mining practices in the area. It is assumed that the sand and stone aggregate will be mined utilising a conventional rollover opencast truck and shovel mining method with crushing and screening taking place on the current Four Rivers mining site.

The area to be mined will first be cleared by means of dozers to enable survey control and ground levels to be established. Topsoil will be stripped by means of dozing into stockpile berms on the highwall side as well as the outcrop side of the pit. Topsoil that cannot be economically dozed will be removed to stockpile by load and haul using an excavator and dump trucks. Grass and natural vegetation will be removed separately as this material will be required for the natural re-seeding of the rehabilitated areas.

Blasting process description

The blasting process, consists of four categories, which in concept stay the same, but differ with regards to technical detail. There is no existing quarry on the Eastern side, a box cut will therefore be made.

The process entails the following:

1. Cleanup and identification of competent material between the topsoil and ore.
2. A box-cut pattern blast will be done to create the first hole, once competent material is found,.

3. The hole is expanded using the same concept as bench blasting.

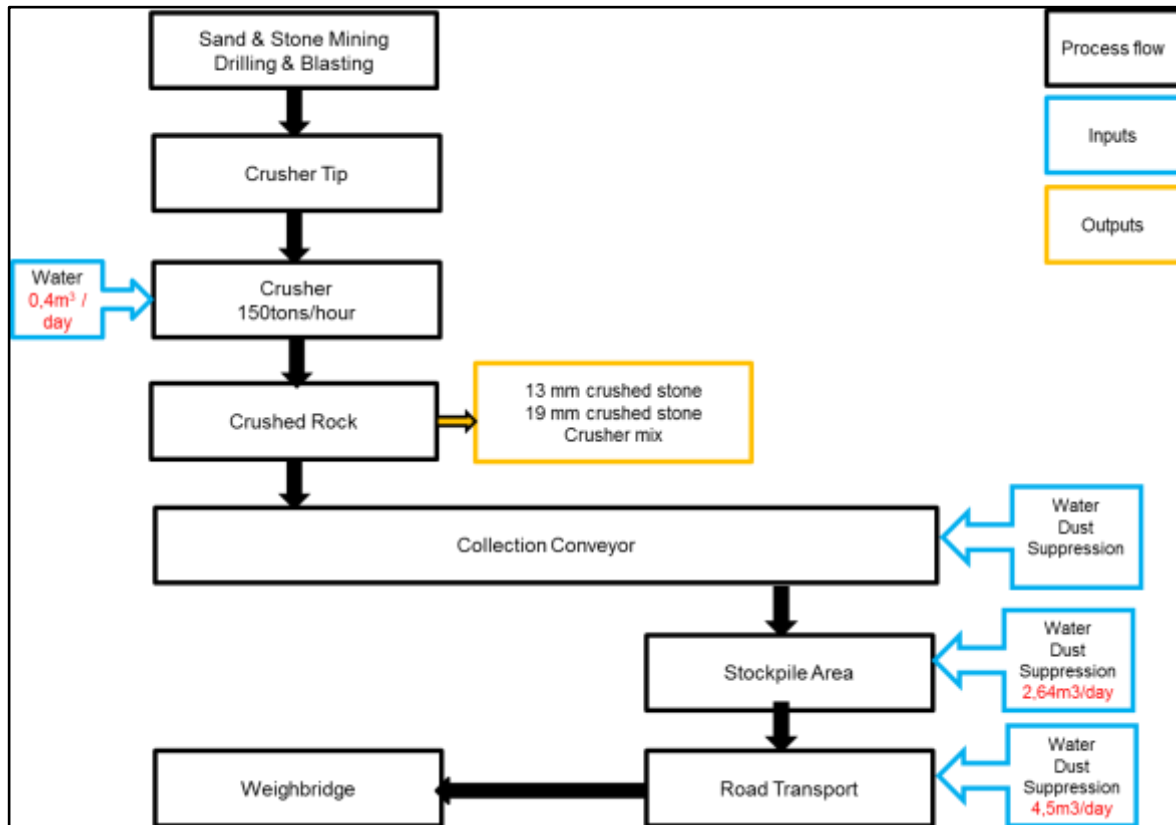
The quarry will grow in size, using this methodology.

The most effective blasting option / alternative is bench blasting, as is done at the Western side.

The process of bench blasting constitutes: (Short discription)

1. Bench identification.
2. Bench survey, quantity- and quality estimation by a quantity surveyor.
3. Drilling operations commence.
4. Explosives are supplied, charged and detonated, as regulations specifies in the MHSA.
5. Creating crushable material.

Figure 3-1: Sand and Stone Aggregate Process Flow



The layout of the proposed mining development is presented in Figure 3-2 and attached as Appendix 4.

Figure 3-2: Satellite image of mining right area and surrounds



Figure 3-3: General Site Layout- Western Section



Also please refer to Appendix 4

Figure 3-4: General Site Layout- Eastern Section

Also please refer to Appendix 4

3.5 PLANNED PRODUCTION RATE

An initial production rate of 25 000 m³ run of mine tonnes per month is planned.

3.6 PLANNED DURATION OF THE PROPOSED MINING PROJECT

Based on the quantity of sand and stone within the proposed mining area and the production rate, the life of mine is estimated to be approximately 20 years.

The following is the predicted timing for each of the phases:

- Construction phase – Year 1
- Operation phase – Year 2 – Year 20
- Decommissioning – Year 22 – Year 22
- Post closure – Year 22 – Year 25

3.7 INFRASTRUCTURE

The mine surface infrastructure will comprise of the following:

- Access roads.
- Haul roads.
- Water management facilities. Wash bay, with oil separators

- Storing water in 2 / 3 10 000l JOJO tanks, and reticulation.
- Drinking water is supplied by the municipality.
- Material stockpiles. (Run of Mine)
- Mining Pit and access ramp.
- Mobile Crushing and screening plants.
- Portable temporary office, toilets and water tank.
- Weighbridge.

Figure 3-5: Typical weighbridge



Refer to Mine Surface Infrastructure Layout Plan for more details attached as **Appendix 4** (See Figure 3-3 and Figure 3-4)

3.8 SOLID WASTE MANAGEMENT

Four Rivers will collect and remove domestic waste from the mining operation to licenced municipal waste disposal sites. The waste will be sorted before disposal, and paper and cardboard will be separated out and sent for recycling.

Industrial waste arising from the mine (classified as hazardous waste – old paint tins, degreaser containers, oily rags, etc.) will be collected in an allocated waste collection system and disposed of by a contractor to a licenced hazardous waste site or recycling facility. Batteries, tyres, old conveyor belts, used oil drums and waste metal will be collected around the mine, transported to the Four Rivers' salvage yard and sorted. The waste will then be sold to licenced scrap and recycling companies. Registration for Norms and Standards will be applied for.

3.9 WATER POLLUTION MANAGEMENT FACILITIES

Four Rivers will operate on the strategy of maximising the utilisation of “grey water” in the mining area and will have a policy of zero discharge of contaminated water. Rain water will naturally accumulate in the quarry. The water from the quarry (mine pit) will be utilized to suppress dust on the haul roads.

The contaminated water from the wash bay will be discharged to an oil-water separator system before being reused on the site.

3.10 POTABLE WATER PLANT

There will be no potable water treatment plant at Four Rivers. Drinking water will be obtained from the existing municipal reticulation system.

3.11 PROCESS WATER SUPPLY

For Portion 131 (Western Mine Area)

Water from the quarry will be utilised in the crushing and screening plant, if authorised by relevant Competent Authority. If a shortfall exists it will be obtained from the Bon Accord dam or through the municipal water system.

For Portion 135 (Eastern Mine Portion)

Currently, there is no water access at 135. In the future, a borehole might be developed for water access.

3.12 MINERAL PROCESSING PLANT

A crushing and screening plant will be erected as a first phase of mineral processing.

3.13 WORKSHOPS AND BUILDINGS

The Four Rivers infrastructure is indicated on the Surface Infrastructure Layout Plan. Surface infrastructure includes ROM stockpiles, small office, etc. The infrastructure on the proposed opencast mining areas will include the haul roads, weighbridge, mining pit and access ramp, overburden stockpiling areas, office and staff ablutions.

No workshop facilities will be located on the mining area. Machinery will be maintained at workshop facilities off site.

3.14 TRANSPORT

All mine employees will use their own vehicles for all transport requirements.

3.15 DISTURBANCE OF WATER COURSES

No disturbance of watercourses will result from the proposed mining project. No mining will be undertaken within one hundred meters of water courses or within a 1:100 year flood line.

3.16 STORM WATER

Storm water management measures will be necessary for the proposed mining project. Four Rivers will practice a policy of clean and dirty water separation where dirty water is contained in the mine quarry and wash water diverted to an oil-water separator system for re-use on the haul roads and material stockpiles

3.17 MINING PHASES

3.17.1 Construction phase

During the construction phase, the following activities, which may impact detrimentally on the health of people or the environment, will be conducted:

- Construction of mine infrastructure, i.e. haul roads, weighbridge, crushing and screening plant, offices, etc.
- Preparation of the topsoil, subsoil and overburden stockpiling area.
- Construction of the storm water diversion trenches.
- Excavation of initial box-cuts.
- Formation of the topsoil, subsoil and overburden stockpiles.

Construction of mine infrastructure

Access roads already exist, but haul roads will be constructed to transport sand and stone from the ROM stockpile to the markets. The haul roads will be 6 m wide and cover a distance of approximately 500 m. The topsoil stripped from the construction of these haul roads will be utilized to form berms alongside these roads. The haul roads will cover a total area of approximately 0.30 ha. A temporary office (eastern mine area) will be placed on site to serve as administration facilities.

Preparation of subsoil and overburden stockpiling areas

Topsoil from the subsoil and overburden-stockpiling area will be stripped to a depth of 600mm, and stockpiled on the topsoil stockpile. This will be done to protect the topsoil from compaction by the overburden stockpiles.

Construction of the Storm water diversion trenches

The storm water diversion trench will have a horizontal width of 1,0m, to a maximum depth of 1,0m. The upslope side of the trench will be sloped at 1:4 and the downslope side at 1:1. All material excavated during the construction of the trench will be used to construct a 1,0m

high berm on the downslope side of the trench. This trench will divert all surface water runoff around the pit, infrastructure area and stockpiling area. The dirty water trench will be constructed with a 1,0m base to a depth of 1,0m. The upslope side of the trench will be sloped to 1:4 and the down slope side at 1:1. Material excavated from the trench will be used to construct a 1,0m high berm along the down slope side of the trench. This trench will divert surface runoff away from the opencast workings.

Excavation of the box-cuts

An initial box-cut will be constructed on the southern section of the reserve. The box-cut will be approximately 30m wide and 50m long. Topsoil will be stripped to a depth of 600mm, thus approximately 900 m³ will be removed to the topsoil stockpile. Subsoil will be stripped from the box-cut, and stockpiled separately. Approximately 3 000 m³ of subsoil will be removed from the box-cut. Finally, all sand and stone material will be drilled, blasted and removed.

3.17.2 Operational phase

The following activities, which may impact on the adjacent people and the environment, will occur at the proposed Four Rivers mining operations during the operational phase:

- Systematic removal of the sand and stone by opencast mining methods (refer to Mining Layout Plan).
- Transporting and Stockpiling of ROM.
- Disposal of mine affected water into the pollution control dams.
- Transporting of sand and stone products.
- Utilisation of mine infrastructure.

Systematic removal of the target sand and stone by the said mining methods

Mined sand and stone removed from the opencast workings is transported by dump trucks and stockpiled on a ROM stockpile.

Transporting and Stockpiling of ROM

The sand and stone from the opencast mining areas will be transported by dump trucks to the ROM stockpile.

Storage of mine affected water into the mine voids

An in-pit sump will be constructed on the lowest portion of the pit area. This sump will be used for the collection of runoff water from the pit area. Water from the sump will be used for dust suppression, if authorised by the relevant competent authority.

Transport of sand and stone products to local/regional markets

All sand and stone products will be transported from the Four Rivers mining area by trucks to the local market. All trucks will utilise existing roads to access provincial roads. This will result in an increase of trucks along these roads.

3.17.3 Decommissioning phase

The decommissioning phase is to commence once all economically exploitable sand and stone reserves have been extracted. This phase of the mining operations is expected to take not more than six months. This section attempts to identify all possible impacts that may arise as a result of activities to be conducted during the decommissioning phase.

Activities include:

- Removal of all mine infrastructure.
- Filling of voids and final shaping of the rehabilitated opencast pit.
- Removal of the hardened layer from the product stockpiling area and haul roads.
- Ripping of all infrastructure areas.
- Seeding of ripped and rehabilitated surfaces.

Removal of all infrastructure

All mine infrastructure will be removed and disturbed surfaces graded. The hardened build-up layer will be removed and thereafter ripped to recommended levels. The affected areas will be covered by a minimum 300mm layer of topsoil and shaped to conform to the pre-mining topography.

Filling of all remaining voids and final shaping of the rehabilitated opencast pits

It must be kept in mind that the quarry will not be completely backfilled, there will always be a quarry. Although backfilling and rehabilitation will be ongoing during the life of the mine, final shaping will be done during the decommissioning phase, to such an extent that ponding of water is avoided.

Removal of the hardened layer from the haul roads

All haul roads used at the mine will be graded and the hardened build-up removed. It will then be ripped to a depth of 250mm. The haul roads will be covered with a minimum 300mm layer topsoil from the topsoil stockpile, and shaped to conform to the pre-mining topography.

Seeding of ripped and rehabilitated surfaces

Following mechanical rehabilitation of the area, a seed mix will be applied to the rehabilitated areas to accelerate vegetation establishment.

3.17.4 Water Balance

An accurate water balance is considered to be one of the most important and fundamental water management tools available. The purpose of a water balance includes:

- Providing the necessary information that will assist the proponent in defining and driving water management strategies;
- Auditing and assessment of the water reticulation system, with the main focus on water usage, including identifying and quantifying points of high water consumption or wastage; and
- Assisting with the determination of maximum operation capacities of pollution control dams.

Haul Road Dust Suppression Water Use

Existing Western mine section will require approximately 7,49 m³ water per day for dust suppression of the roads, stockpiles, crushing and crusher area.

The water use at the Eastern Mine section to be confirmed when the site layout plan has been approved.

Potable Water Use

The estimated potable water consumption is around 4 m³/d and allows for the estimated 20 employees as well as gardening and office and kitchen related cleaning. The potable water supplied to Four Rivers is assumed to comply with the current SANS 241:2006 Edition 6-.1 Class I Standards.

Wastewater Production

The estimated domestic wastewater production from the change houses and office block ablution facilities, assuming 20 employees in total, of which 5 are primarily office based and 15 are mine, plant or maintenance based, is a total of 2.5 m³/d. Other flows, e.g. from vehicle wash bays may be added to this. However, for the water balance the estimated wastewater production is assumed to be 2.5 m³/d.

The estimated wastewater quality is assumed to be similar to the typical wastewater quality in South Africa and is listed in Table 3-4

Table 3-4: Estimated Wastewater Quality

Parameter	Unit	Value
COD	mg/l	650
Total Kjeldahl Nitrogen (TKN)	mg/l	58
Total Phosphorous (TP)	mg/l	13

Target Discharge and Treated Water Quality

The water quality target that should be met prior to any water being released from the Four Rivers mining site, should be within the ideal water quality range, as per the South African Water Quality Guidelines (second edition) volume 1: Domestic Use, Department of Water Affairs and Forestry, 1996. Ideally the specific catchment's Receiving Water Quality Objectives should be met for any discharged water, but the ideal water quality range will be close enough to the Receiving Water Quality Objectives for the purposes of this water balance. For the treated sewage the old special standard limits are used. The treated water quality targets are listed in Table 3-5.

Table 3-5: Target Treated and Discharge Water Quality

Parameter	Unit	Value
Mine Water	pH	6.0 – 9.0
TDS	mg/l	450
EC	mS/m	70
Cations		
Sodium, Na	mg/l	100
Potassium, K	mg/l	50
Calcium, Ca	mg/l	32
Magnesium, Mg	mg/l	30
Iron, Fe	mg/l	0.1
Aluminium, Al	mg/l	0.15

Parameter	Unit	Value
Manganese, Mn	mg/l	0.05
Anions		
Chloride, Cl	mg/l	100
Sulphate, SO ₄	mg/l	200
Alkalinity, CaCO ₃	mg/l	100
Fluoride	mg/l	1
Nitrate, NO ₃	mg/l	6
Ammonia, N	mg/l	1
Treated Sewage		
COD	mg/l	30
Ammonia, N	mg/l	1
Phosphorous, P	mg/l	1

The treated water quality standard listed in Table 15 above shows that the treated water quality is within the SANS 241:2006 standard for drinking water and the treated mine water can be re-used on site as potable water after appropriate stabilisation and disinfection treatment.

4 POLICY AND LEGISLATIVE CONTEXT

d) Policy and Legislative Context

Table 4-1: Policy and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process);	REFERENCE WHERE APPLIED (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g In terms of the National Water Act:-Water Use Licence has/has not been applied for).
The Constitution of the Republic of South Africa (Act No. 108 of 1996)	Impact identification	Application for authorisation for EIA Regulations, 2014 Listed Activities (This application)
Mineral and Petroleum Resources Development Act (Act 28 of 2002) as amended	Application	Application for a mining right (This application).
Regulations GN R 527 of 23 April 2004 in terms of the of the MPRDA	Impact Management & mitigation	Application for a mining right (This application) and compilation of EMPr.
The National Environmental Management Act (NEMA) (Act No. 107 of 1998) as amended	Impact Management & mitigation	Application for authorisation of listed activities.
Regulation 982 of 4 Dec 2014– EIA Regulations	Application, EIA Process, Identification of listed activities	Application for authorisation for EIA Regulations, 2014 Listed Activities (This application).
Regulation 983 of 4 Dec 2014- Regulations Listing Notice 1 – Activities that require a Basic Assessment Process	Identification of listed activities	Application for authorisation for EIA Regulations, 2014 Listing Notice 1 Activities (This application).
Regulation 984 of 4 Dec 2014 – Regulations Listing Notices 2 – Activities that require full EIA Process	Identification of listed activities	Application for authorisation for EIA Regulations, 2014 Listing Notice 2 Activities (This application).
Regulation 985 of 4 Dec 2014 – Regulation Listing Notice 3 – Activities in specific identified geographical areas that requires authorisation	Identification of listed activities	Application for authorisation for EIA Regulations, 2014 Listing Notice 3 Activities (This application).
National Environmental Management: Air Quality Act (AQA) (Act No. 39 of 2004) as amended	Air Quality management	Dust control mitigation measures proposed in EMP.
Listed Activities and Associated Minimum Emission Standards (Government Gazette No 33064 on 31 March 2010) Draft amended list of activities published on 23 November 2012 (Government Gazette No 35894)	Identification of listed activities	The application does not trigger a listed activity in terms of NEM:AQA
National ambient air quality standards of 24 December 2009	Air quality impact identification and management	Air Quality requirements

National dust control regulations for South Africa of 1 November 2013	Air quality impact identification and management	Dust control mitigation measures proposed in EMP.
National Environmental Management Waste Act (Act No. 59 of 2008) as amended	Waste management	The application does not trigger a listed activity in terms of NEM:WA
Regulations regarding the planning and management of residue stockpiles and residue deposits, GN 632, 24 July 2015	Management of residue stockpiles & deposits	Applicable to management of residue stockpiles and deposits
List of Waste Management Activities - GN 921 of 29 Nov 2013 as amended	Identification of listed activities	The application does not trigger a listed activity in terms of NEM:WA
Waste classification and management regulations - GNR 634 of 23 Aug 2013	Waste management requirements	Hazardous classification for liner purposes for residue stockpiles and deposits, included in this report
National Environmental Management Biodiversity Act (NEMBA: Act 10 Of 2004)	Description of the baseline environment	Considered in Fauna & Flora Assessment. Application for authorisation for EIA Regulations, 2014 Listing Notice 3 Activities (This application).
National Biodiversity Assessment (NBA; 2011)	Description of the baseline environment	Considered in Fauna & Flora Assessment.
National List of Threatened Terrestrial Ecosystems (2011)	Description of the baseline environment	Utilised in Fauna & Flora Assessment
Threatened or Protected Species List (ToPS List) – Government Gazette Notice No. 389 of 2013	Description of the baseline environment	Utilised in Fauna & Flora Assessment
Alien and Invasive Species List - Government Gazette Notice No. 599 of 2014	Description of the baseline environment	Utilised in Fauna & Flora Assessment
National Veld And Forest Act (Act 101 of 1998)	Ecological management	Considered in Fauna & Flora Assessment
The National Forest Act (Act 84 of 1998)	Description and management of trees	Considered in Fauna & Flora Assessment
The Environment Conservation Act (“ECA”) (Act No. 73 of 1989)		
Noise Control Regulations (GN R154 in <i>Government Gazette</i> No. 13717 dated 10 January 1992)	Noise impact determination	Utilised in Noise Assessment
National Water Act (Act No. 36 of 1998) as amended	Description of surface & Ground water, Water management requirements	A Water Use Licence will be applied for.

Use of Water for Mining and Related Activities Regulations GN 704 NWA (1999)	Water use requirements & management	Utilised in storm water management assessment
National Freshwater Ecosystems Priority Atlas	Description of the baseline environment	Utilised in Freshwater Assessment
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	Description and management of soils	Utilised in Soil & Agricultural Potential Assessment
National Environmental Management Protected Areas Act (Act 57 of 2003)	Description of the baseline environment	Considered in Flora Assessment
Focus Areas for Protected Area Expansion – NPAES (2008)	Description of the baseline environment	Considered in Fauna & Flora Assessment
Hazardous Substances Act (Act No.15 of 1979)	Mitigation and management options in terms of hazardous substances storage, use, transport and handling	
National Heritage Resources Act (Act No 25 of 1999)	Description and management of heritage resources	Utilised in Heritage Assessment.
National Land Transport Act 5 of 2009	Traffic environment	Road transport
National Road Traffic Act 93 of 1996	Requirements in terms of traffic	Road transport
CITES	Description of the baseline environment	Considered in Fauna and Flora Assessment
IUCN Red Data List	Description of the baseline environment	Utilised in Fauna and Flora Assessment
SANBI Red List of South African Plants	Description of the baseline environment	Utilised Flora Assessment

5 NEED & DESIRABILITY

f) Need and desirability of the proposed activities.

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

The primary impact area is the region around Lavender Road, Bon Accord that is located close to Graaf Street. It is bound by a series of industrial areas, residences and the Bon Accord Dam. Sanral and Transnet road and rail links pass close by. The needs and desirability can be identified in various aspects including the impact on

- Small business opportunities
- Employment
- Environmental Impact Management
- Raw Material Feedstock to Tshwane Metropolitan
- Local Economic Development and
- Rehabilitation Capacity of Historically Disturbed Sites

SMALL BUSINESS OPPORTUNITIES

Some opportunities may arise from products and services required by the proposed mine development (Eastern Mine section) directly, as well as opportunities for products and services required by the employees, working for the proposed mine. Opportunities will start during the construction process already and will persist throughout the life of the mine.

Small operators, particularly in the construction sector, who are in need of aggregate and have to do their own collections of can acquire these close to the Tshwane Metropolitan limits. As a low value commodity transport costs can become very high and the location of this operation is ideal to support these SME's

From the western mine section, products and services already exists and new opportunities will be limited. The eastern mine section will only extend the longevity of these opportunities.

EMPLOYMENT

The area where the mine is located is already an economically depressed area. The proposed mine development will lead to short term jobs for skilled and unskilled workers related to the construction phase. These jobs will ultimately be replaced by longer term jobs for skilled workers working at and for the active areas and proposed mine. The employment profile of the Local Municipality is not expected to change dramatically, as the mine (western section) and proposed mine (eastern section) will have limited number of permanent staff.

ENVIRONMENTAL IMPACT MANAGEMENT

The impacts on the environment were evaluated as part of the assessment phase of the project. Environmental impacts are being successfully mitigated and it is desirable then that the operator has the knowledge and experience in place to manage environmental impacts

RAW MATERIAL FEEDSTOCK TO TSHWANE

The quarry here is one of a series of small quarries that are located on the farm De Ondestepoort. With the Tshwane area rapidly expanding, these quarries which existed outside of the city limits are now becoming enveloped and remain the nearest and most cost effective source of raw aggregate feedstock required by various projects around the Tshwane Metropolitan. The municipality's own quarries cannot operate as effectively and cannot provide material at a low enough price and so the Metropolitan, as well as private operators large and small, can purchase material here and from other authorised quarries within the limits of the Metropolitan. The project, already approved is a substantial contributor of aggregate to the rehabilitation projects along the N1 north and south and will remain available to supply feedstock to the N4 highway running east-west near the mine site. The need for material is already demonstrated.

LOCAL ECONOMIC DEVELOPMENT

The project has already commenced under its existing authorisations. It has identified a primary school in the area which it will involve itself with in the continuous upgrading and development. This project is in a position to contribute positively to ongoing local economic development which is sorely needed in this part of Tshwane Metro.

REHABILITATION CAPACITY OF HISTORICALLY DISTURBED SITES

It is preferable to avoid disturbing pristine areas foremost. The area under application has in many places been transformed by various activities including mining. The mine on the western side is more than 70 years old. It is an already disturbed area that has had a series of former owners. The focus of the mine being on this already disturbed area makes it desirable to rather focus on disturbed areas than to move to undisturbed areas. The sites chosen have been shown, and known by all in the construction sector of Tshwane Metropolitan, to be a long existing mine. The project applicant has indicated and demonstrated a willingness and ability to make financial provision for rehabilitation of the project area.

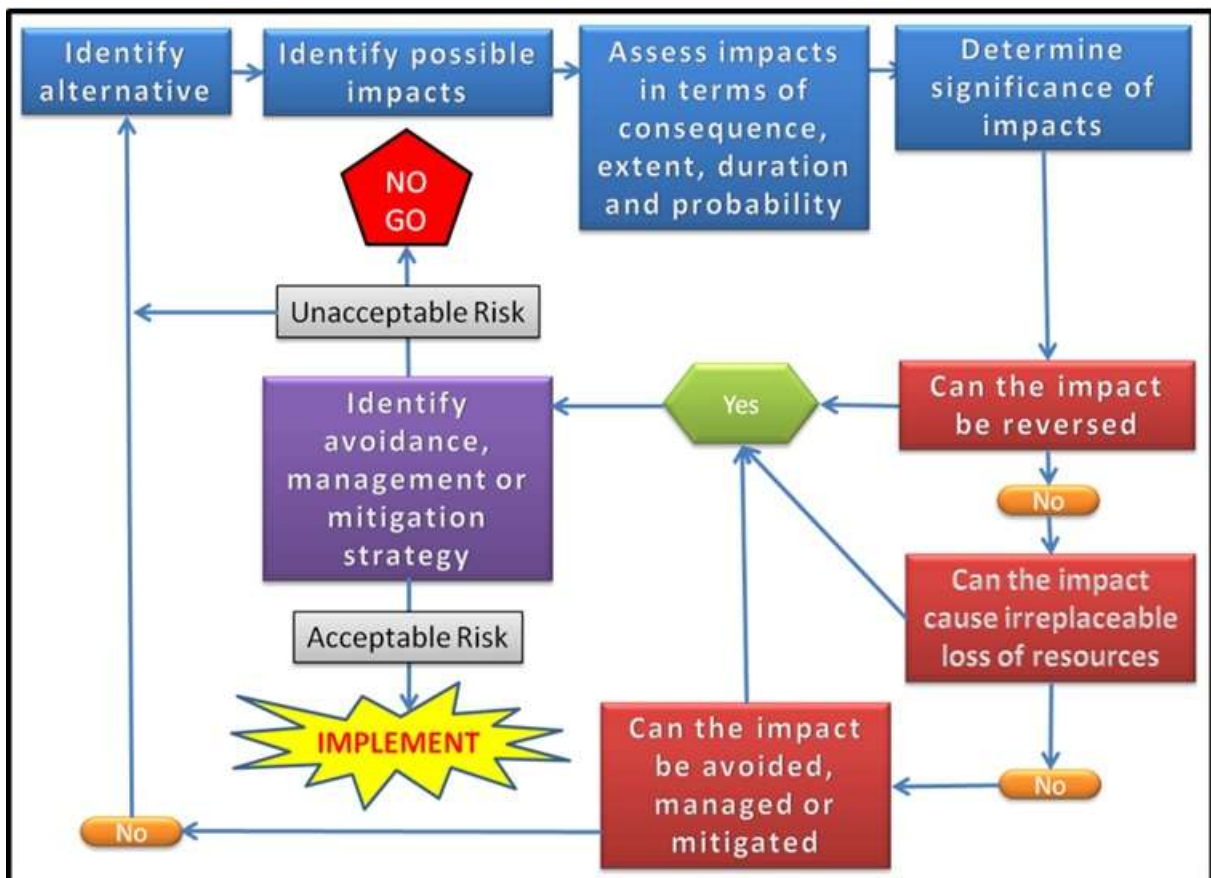
6 ALTERNATIVES

- e) **Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved site.**

NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

Please see the diagram below for the process that was followed in assessing the alternatives.

Figure 6-1: Alternative Consideration Decision tree Methodology



Source: EcoPartners, 2015

Environmental, cultural and socio-economic aspects needs to be considered when land use considerations are made. Mining and agricultural land uses are often played off against one another, yet the determination of the resource whether mineral or soil value is not considered to be the primary determinant in many cases.

The Constitution of South Africa states in section 24 that amongst other things everyone has the right:

“24.b.to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that

- iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

Land use decisions therefore needs to be evaluated in terms of ecologically sustainable development and use of natural resources, including minerals and soil, whilst promoting justifiable economic and social development. In short environmental, economic and social issues needs to be weighed up.

In terms of alternatives for a new development of an area, it is required to consider the alternatives available to ensure that the development is justifiable in terms of the economic and social aspects. In the Bon Accord area, current land uses include residential, crops, grazing, waste disposal, recycling, industrial (mining) and animal farming. Mining is a temporary land use whereby the existing land use is altered for a period of time.

There is an existing quarry on the same farm called Bon Accord Klipgroef, which is owned by the City Council of Tshwane (now Tshwane Metro). This quarry is immediately to the east of the R101 and is also on the De Ondersterpoort farm.

The following developments are found in the area:

- Established roads such as the N4 and R101;
- Waste disposal facility;
- Industrial business (including brickworks, brick depots, panel beaters)
- Quarry to the east of the site.

There are three feasible alternatives to the proposed land use for the Four Rivers project operation.

The first alternative is to continue to use the old mining area for agriculture, mainly for grazing as the area is against a hill making crop production difficult.

The second land use alternative is tourism. Tourism can be considered as a viable current land use in the region. The area includes guest houses and tourism activities. This option remains a viable alternative once the mineral resources has been effectively removed.,

The third land use alternative is Industrial. Waste disposal can be considered as a viable land use in the region, as the available opportunities for waste disposal close to the City of Tshwane is filling up. The area can be reached by rail and road and there is an existing void on the property.

There is potential for additional growth in the area and thus activities that are considered as alternatives to mining, might well be used after the mining resource has been removed. Mining is a temporary land use and it is possible that all of the above options can be pursued in conjunction with mining and after mining has ceased..

Agriculture

Stock farming and crop farming are land uses in the region. Agriculture is an important producer of food for the nation and without local producers, South Africa

would have to rely on imports. Current, South African agricultural land uses include maize, beans, fruit, dairy and livestock farming.

There are, however, a number of impacts that farming may have on the environment. Vegetation disturbance and damage can be caused by animals physically damaging the plants by eating, bruising and breaking them. If there is overgrazing, this disturbance to plants could subsequently lead to erosion in the form of dongas. Another impact is that of soil disturbance. Animals alter the structure of soils by chipping or loosening the soil surface or they may compact the soil, depending on its moisture content. Though the loosening of the soil can be advantageous, excessive soil loosening can cause soil loss through wind and water erosion.

Soil is a limited resource in South Africa. When soils are moist, soil can easily be compacted through hoof action. This causes a loss of soil structure, which causes the reduction in infiltration, aeration and water holding capacity. General conditions for plant growth will become less favourable. These impacts are likely to be insignificant if correct management measures are applied. Crop farming results in whole areas of natural vegetation and the fauna dependant on them being destroyed for the areas under cultivation. The impacts may spread from the site if pesticides and herbicides are used which may wash off the area. It is likely that a few years after crop farming has ceased that the vegetation diversity will recover and return to its former state over time if excessive erosion has not occurred. Topographical disturbance may occur if contour drains are constructed.

Dust can also be generated from agriculture during the ploughing season. This impact, however, is seasonal. Another impact is water use for agriculture. Often small farm dams are constructed without the necessary permits, which has downstream impacts. These dams are used for stock watering or irrigation. The use of this land for stock farming and crop farming compared to mining is less economical as mining produces greater value, far quicker than stock farming per unit area of land.

Agriculture, is more long term thus economically sustainable over the long term. Stock farming is extensive with large amounts of land needed to sustain the livestock, this not only means that more land will be subject to the impacts associated with this type of farming but also that it will be using more land than the mining operations with less economical gain per hectare used. Farming, however, is more sustainable if the land is managed correctly, and if resources, such as water and soil, can recover. In terms of the social environment, agriculture employs a workforce, however these numbers are usually low per hectare as opposed to mining where employment is higher and more services are used, but again it is a temporary impact.

The cumulative impact on the environment from agricultural activities can be highly significant. The use of fertilisers and pesticides can impact on local water sources and cause contamination. Dust and noise during ploughing and planting can be a nuisance factor, particularly with other agricultural or mining activities in the area. If more areas are used for agriculture, there will be a loss of natural habitats and biodiversity. If large scale irrigation is used, water resources are pressurised and if no archaeological assessments are complete prior to clearing fields, sites of cultural history may be destroyed. Agriculture provides produce for consumption which, when considered cumulatively, is positive in that the population is growing and will always require staple foods.

Tourism

Tourism involves guesthouses, eco-lodges, hunting and activities which promote the local biodiversity and cultural history of an area and generate income for the area. Recreation activities have been included under tourism as often the activities are of a similar nature.

Activities, however, need to be managed so that they do not impact negatively on the natural environment. Recreation activities which are likely to occur in the area include hiking, bird watching, cycling, 4X4 trails, fishing, abseiling, and heritage tours. Currently tourism potential is growing in the Gauteng area generally but not in this specific area.

Tourism activities are less intensive on the environment, if properly managed, and thus are an attractive alternative. Regional planning and infrastructure development is required prior to tourism activities taking place. Tourism has the potential to uplift the local communities as well as preserve important heritage sites, however these activities must be planned in a regional context and will require input from a number of stakeholders to ensure the venture is a success.

Impacts which could result in negative consequences include introduction of alien fauna and flora (eg trout into rivers for fishing) and over utilisation of natural resources such as water. Some activities such as quad biking and clay pigeon shooting can also result in a nuisance noise factor and requires planning to minimise impacts.

Tourism, if controlled effectively, has a positive economic benefit for an area with minimal disturbance to the environment. Overall, the cumulative impacts of tourism are minimal and generally positive.

Tourism is also a sustainable alternative if it promotes the development of the natural cultural diversity of the area and helps to develop the local economy. Economically, tourism does not generate as much income as mining or agriculture, but it is more sustainable in the long term. Tourism has the potential to impact cumulatively on the social environment if the local communities are engaged and involved i.e. making products to sell at local guest houses.

Summary of alternative land uses

It can be concluded that tourism activities have the least environmental impact in the area, however do not contribute significantly to the social environment. Agriculture does, however, provide food for the nation and tourism helps to preserve important cultural sites. Mining is a temporary land use and will have an impact on the environment, however the benefits of mining include social upliftment, provision of jobs, earner of foreign currency and local economic development.

Low density residential development (after mine closure and rehabilitation) can contribute to a sustainable long term outlook.

i) Details of the development footprint alternatives considered.

With reference to the site plan provided as Appendix 4 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

6.1 PROPERTY OR LOCATION

Please note that no location alternatives were considered. This is due to the fact that the preferred site is dictated by the location of the mineral resource to be mined.

6.2 TYPE OF ACTIVITY

The following activity alternatives were considered:

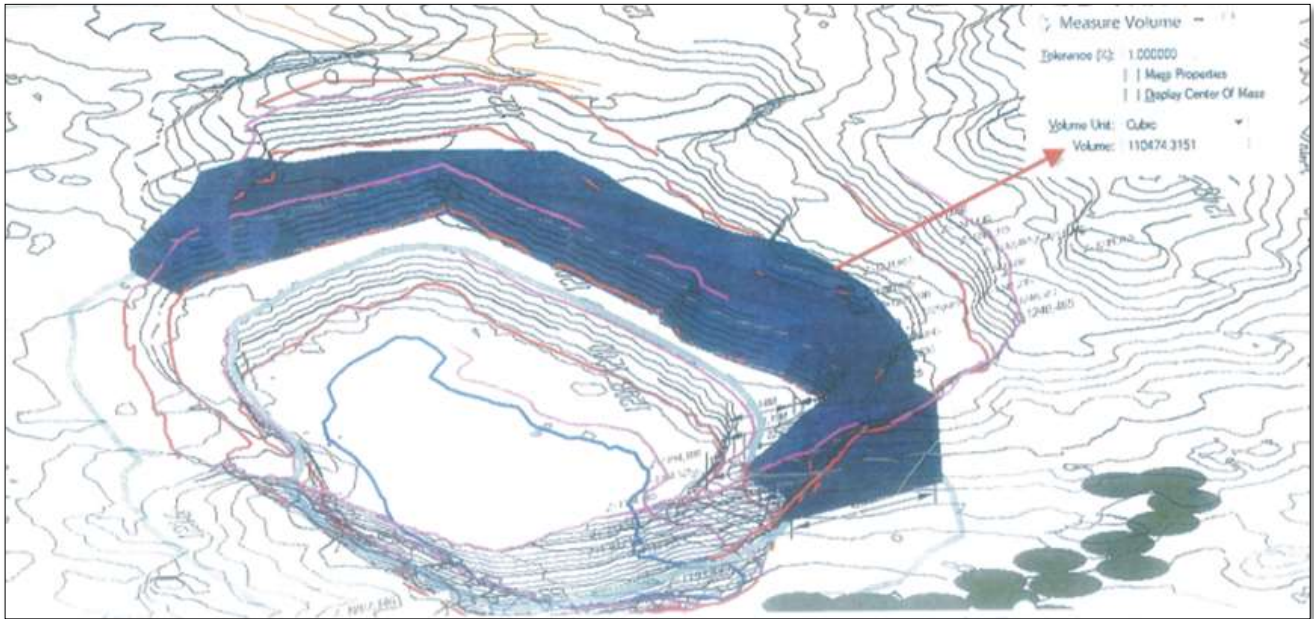
The sand and stone aggregate will be mined utilising a conventional rollover opencast truck and shovel mining method with crushing and screening taking place on the current Four Rivers mining site.

The area to be mined will first be cleared by means of dozers to enable survey control and ground levels to be established. Topsoil will be stripped by means of dozing into stockpile berms on the highwall side as well as the outcrop side of the pit. Topsoil that cannot be economically dozed will be removed to a stockpile by load and haul, using an excavator and dump trucks.

Grass and natural vegetation will be removed separately as this material will be required for the natural re-seeding of the rehabilitated areas.

6.3 DESIGN OR LAYOUT

Western Section: Design or layout alternatives considered for this section of the sand, aggregate and stone mine considers the historic mining activities and existing mine quarry, shaping and profiling it towards low density housing or alternatively tourism activities in the area.

Figure 6-2 Area to be profiled inside the quarry (shown in blue)

Source: Four Rivers

Eastern Section:

The design of the Eastern section considers a box cut, to excavate the minerals. This area might become an alternative for a waste management facility considering the sustainable needs of the community.

6.4 TECHNOLOGYBlasting technology alternatives considered.

Several different blasting technologies are under investigation to find the technology that most effectively address all the requirements.

6.5 OPERATIONAL ASPECTS**6.5.1 Explosives Management**

Explosives magazine vs Use of Contractor: A process that has changed, was the storage of explosives on site. Instead of commencing with an explosives magazine, it was decided to alternatively use a contractor to come onto site and charge up holes for blasting purposes. This would enable that the quantity of hazardous material stored at the property (for short and long periods) to be dramatically reduced.

6.5.2 Water Supply & Use

Several alternatives exist for Water use:

- Water from existing quarry
- Municipal supplied water
- Water from the Bon Accord dam
- Rain water harvested from the hardened surfaces

The various impacts for the different water uses were assessed.

Western Section: Water from the existing quarry can be used for dust suppression onsite.

6.5.3 Access road

Existing Access road

6.5.4 Weighbridge

The environmental impact of the construction of a weighbridge was considered. It is better to construct a weigh bridge in order to manage the loads of trucks. If trucks are over loaded it causes damage to the road infrastructure that requires maintenance in the form of asphalt and tar, that has an impact on the environment. If the trucks have too small a load more trucks must be used to deliver the same amount, that might cause damage to the road infrastructure, but it will also use more fossil fuels.

Figure 6-3: Typical weighbridge



6.6 No-Go

The no-go alternative is the option of not winning the sand, gravel and aggregate from the open cast mine near Bon Accord Dam in the Gauteng Province. This option would amount to there being no changes in the regional biophysical and socio-economic situation. The current land use is limited to grazing capacity as part of subsistence farming.

7 PUBLIC PARTICIPATION PROCESS

ii) Details of the Public Participation Process Followed

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

The Public Participation Process (PPP) mainly comprises the engagement with Interested and Affected Parties (I&APs) and is of utmost importance in any assessment process. The PPP, inter alia, involves the following:

- Inform, raise awareness and increase understanding of environmental issues or any other issues that might be affected by the mining process.
- Establish lines of communication between stakeholders, I&APs and the project team.
- Provide opportunity to all parties for the exchange of information and expression of views and concerns.
- Obtain contributions of stakeholders and I&AP and ensure that all views, issues, concerns and queries are documented.
- Identify the significant issues associated with the proposed project.

7.1 IDENTIFICATION OF I&APs

The first phase of the PPP is to identify I&APs. The landowners and the neighbours were identified using Windeed, this system allows EcoPartners to identify the last registered postal addresses of the land owners and where available their contact numbers. The last known legally registered address is the contact information used for notification purposes of landowners. Other I&APs that were notified, is the local municipality, including the local ward councillor, the State Departments and/or Organs of State which have jurisdiction in the area, and where applicable NGOs.

It is important to note that the identification and notification of potential stakeholders are an ongoing process throughout the PPP, as more information is gathered, and contact with people is established.

7.2 NOTIFICATION OF I&AP

I&APs were identified and were notified using various methods, each of these are described below:

- Initial Project Notification
- Notification of Reports
- Project Meeting
- Amended EMP

7.2.1 Initial Project Notification

Notification Letters via mail

Identified Interested and Affected Parties were supplied with a notification letter, informing them about the amendment application that had been submitted by the applicant, and explain where they can access the project documents. The notice invited comments on the amendment documents. The notification letter also had a registration form and a questionnaire attached to it, in order to get the input from the

I&APs as well as gather crucial information. These letters were sent via registered mail with the South African Post Office and sent by email.

Newspaper Notice

A notice was placed in 1 Local newspaper Die Beeld, one that circulates in the local municipality. This serves to notify those people who have an interest in the project and also for those whose contact details could not be obtained. The newspaper notices contained the details of the project as well as details of where additional information can be found and readers were invited to comments on the Amended EMP document.

Site Notices

A2 and A3 site notices were also put up in the area. At a minimum, one A2 site notice was placed on the fence of the application area and one in a public place close to the application area. The notice contained information on the project and where persons can access the project documents.

Hand Delivery of Notification

On the day that the site notices were put up, notification letters were taken along to be handed out to landowners and lawful occupiers that are found on the site. This opportunity is also used to identify I&APs that might not have been identified through other means. Neighbours and lawful occupiers are interviewed during this period in an attempt to identify others that has not yet been identified.

7.3 AMENDMENT REPORT FOR COMMENT

I&APs were sent a notification to their email addresses to inform them that the document is available for comment.

The Report for Comment & Appendices will be made available on the EcoPartners website for registered I&APs to view. This service is free, and is managed through a password system.

7.4 PUBLIC MEETING

A public participation meeting will be arranged.

All registered I&APs and stakeholders will be invited to the meeting.

The objective of the meeting as follows:

- ▶ Information sharing
 - On Process
 - On Project
- ▶ Feedback on amended EMP
 - To date
- ▶ Information gathering

7.5 SUMMARY OF ISSUES RAISED BY THE I&APS

EcoPartners will keep a register of all Registered I&APs. The I&AP Register will be available in the Public Participation **Appendix**.

Communication received during the PPP is included in the Public Participation Appendix. All comments are addressed in the comments and response sheet in the same appendix.

Please see the table below for a summary of the issues raised received during the Public Participation Processs from notification to EIR_EMPr.

iii) **Summary of issues raised by I&Aps**
 (Complete the table summarising comments and issues raised, and reaction to those responses)

Figure 7-1: Summary of issues raised by I&Aps (**Only completed after PPP**)

<p>Interested and Affected Parties</p> <p>List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.</p>	<p>Date</p> <p>Comments</p> <p>Received</p>	<p>Issues raised</p>	<p>EAPs response to issues as mandated by the applicant</p>	<p>Section and paragraph reference in this report where the issues and or response were incorporated.</p>
<u>AFFECTED PARTIES</u>				
Landowner/s				
Lawful occupier/s of the land				
Landowners or lawful occupiers on adjacent properties				

<p>Interested and Affected Parties</p> <p>List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.</p>	<p>Date Comments Received</p>	<p>Issues raised</p>	<p>EAPs response to issues as mandated by the applicant</p>	<p>Section and paragraph reference in this report where the issues and or response were incorporated.</p>
Municipal councillor				
Municipality				
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA e				
Communities				

<p>Interested and Affected Parties</p> <p>List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.</p>	<p>Date Comments Received</p>	<p>Issues raised</p>	<p>EAPs response to issues as mandated by the applicant</p>	<p>Section and paragraph reference in this report where the issues and or response were incorporated.</p>
<u>OTHER AFFECTED PARTIES</u>				
<u>INTERESTED PARTIES</u>				

8 BASELINE ENVIRONMENT DESCRIPTION

iv) The Environmental attributes associated with the development footprint alternatives. (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

(1) Baseline Environment

(a) Type of environment affected by the proposed activity.

(its current geographical, physical, biological, socio- economic, and cultural character).

8.1 GEOLOGY

8.1.1 Regional Geological Setting

Most of the Rosslyn, Akasia, Pretoria North, Wonderboom and Doornpoort area is underlain by Pretoria Group Andesite and Bushveld Gabbro-Norite. The Bushveld is a large layered intrusion with the world's largest reserves of platinum group metals. The area where the mine is located is on the lower western limb of the Bushveld Igneous Complex. According to the study by Soilkraft on a farm located west of the Bon Accord site, norite is regarded as a plutonic, intrusive, basic, igneous rock. The mineral assemblage consists predominantly of plagioclase and pyroxene. Norite is generally found in layered igneous intrusions formed by progressive crystal fractionation. (Imperial, n.d). Norite is dark grey to black in colour, with a veined and shiny appearance. It has a relatively high compressive strength (235 N/mm²) compared to other intrusive igneous rocks [Granite and Diorite (175-220 N/mm²)].

In an unweathered form norite can be described as a coarse grained, light grey to dark grey and often speckled white, very hard rock. The individual mineral grains can easily be discerned by the naked eye (Soilkraft, 2006). The soil derived from norite weathering is considered a problem soil by the department of Public Works as it yields an expansive clay that makes structures built on it prone to cracking (DPW, 2007)

8.1.2 Local Geology

Soil development in this area is rather limited and shallow rock and outcrops are common. The main geology of the site consists of norite of the Bushveld Complex. The soils, where it is developed, consist of a 1 – 1.5 meter layer of black clay overlain by weathered norite to a depth of 10 – 15 meters.

From the mining area adjacent to the proposed new mining area the geology consists mainly of the norite of the Bushveld Complex overlain by a yellow to brownish layer of weathered norite of an average depth of 10 meters, overlain by a 0.3 meter layer highly weathered norite, overlain by a 1–1.5 meter layer of black cotton soil. Locally it is called 'turf' by people living in the area. Turf is a problem soil to develop on and many residents would report soil-induced structural problems. The mine is prone to the same problems.

Figure 8-1: Regional Geology (2528 Pretoria)

Please refer to Appendix 5

Four Rivers will be utilizing opencast mining methods for the removal of sand and stone aggregates. The mining method requires blasting and hauling of overburden and underlying strata at planned intervals. The following geological impacts are expected:

- a) The alteration of the geology of the site. The impact is permanent and cannot be avoided. Drilling and blasting should be conducted by a certified blasting technician and, at all times, be in line with the approved mine plan.

8.2 TOPOGRAPHY

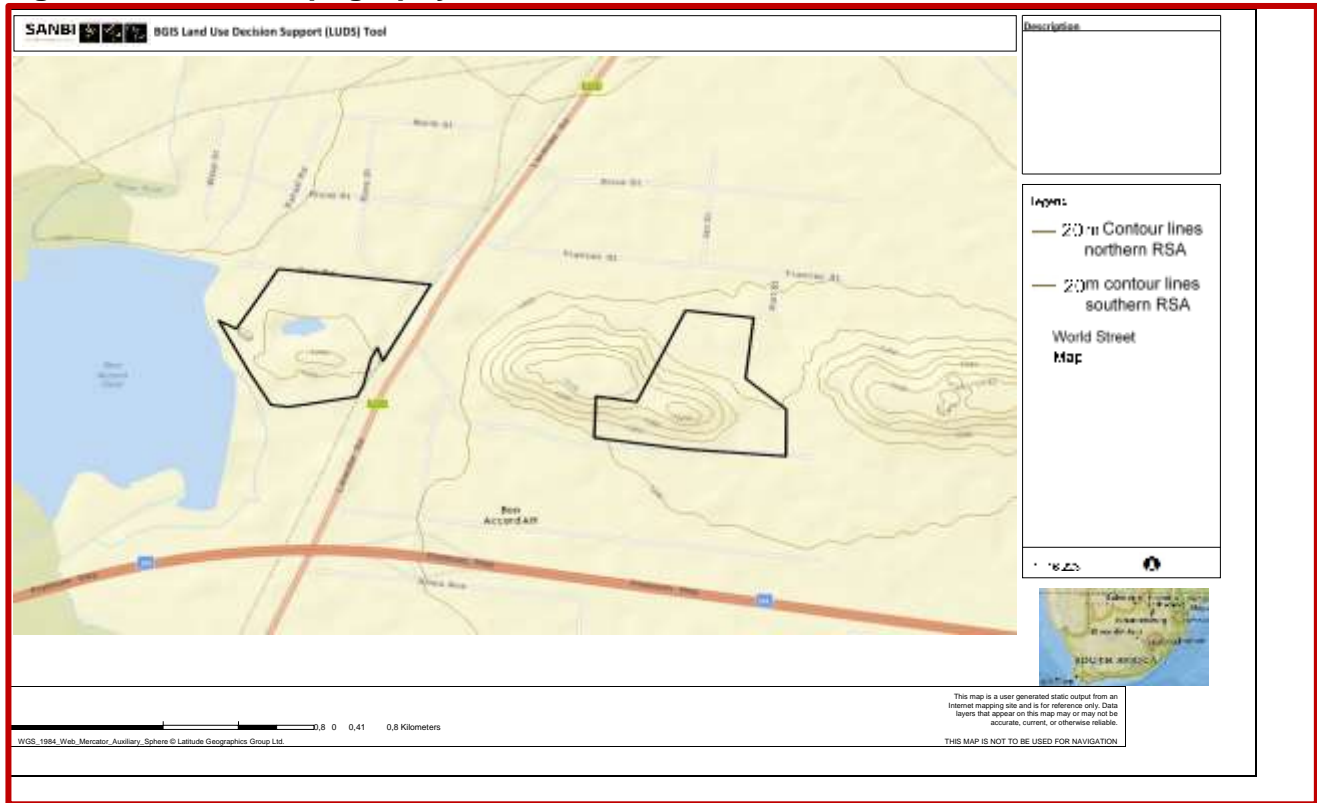
Four Rivers is situated in the Highveld of the Gauteng Province. This area is characterised by gently undulating plains and some lowland hills. Norite koppies are also a prominent feature of the topography.

8.2.1 Local topography

The study area is situated approximately 10 km north of Pretoria within the Gauteng Province. The topography of the area is characterised by gently undulating plains and norite koppies.

The area within the proposed mining area is characterised by a gentle undulating topography, supporting grazing and agricultural lands. The topography of the area is flat with a slope in a north-western direction towards the Apies River. The surface elevation of the proposed mining area ranges from 1 200 to 1 320 mamsl.

Figure 8-2: Local Topography



8.2.2 The topography of the proposed mining area will be altered as outlined below.

Table 8-1: Structures/facilities that will alter topography

Structure	Approximate height/depth (metres)	Permanent/Temporary
Mining Pit	30m	Permanent
Waste rock dumps	5m	Permanent
Waste dumps	5m	Temporary
Stockpiles	7m each (5 heaps)	Temporary
Reservoir	1m	Permanent
Mobile crushers and screens	5m each (3 x mobile crushers and 4 x screens)	Temporary
Weighbridge	1m	Temporary
Offices	8m	Permanent
Storage containers	3m	Temporary
Safety berms	1.5m in pit	Temporary
Power lines	6m (existing)	Permanent
Surface water pipes	1.5m	Temporary
Security gate	4m	Permanent
Topsoil stockpiles	3m	Temporary

Source: Derived from information provided by Four Rivers

8.3 CLIMATE

8.3.1 Regional Climate

The area falls under the Highveld climatic zone and is characterised by warm summers with rainfall. Winters tend to be mild to warm during the day to cold at night with sharp frosts.

Pretoria has an annual average of between 8 and 10 hours of sunshine per day.

Precipitation occurs as showers and thunderstorms and falls mainly from October to March with the maximum falls occurring in November, December and January. Rainstorms are often violent (up to 200 mm can occur in one day) with severe lightning and strong winds, sometimes accompanied by hail. The winter months are dry with the combined rainfall in June, July and August making up only 2.3 % of the annual total (681 mm).

Mean Monthly and Annual Rainfall and Precipitation

Precipitation occurs as showers and thunderstorms and falls mainly from October to March with the maximum falls occurring in November, December and January. Rainstorms are often.

Table 8-2: Mean rainfall measured at Wonderboom Airport weather station.

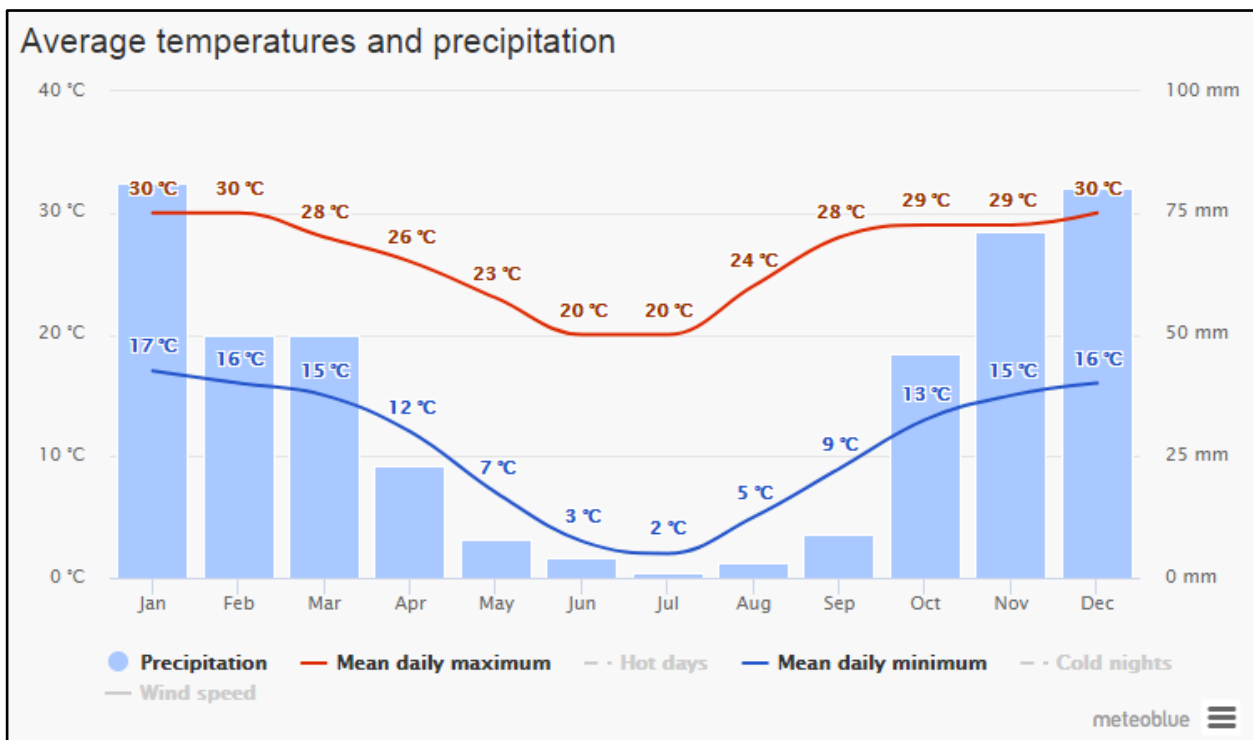
MONTH	MEAN RAINFALL (mm)
January	136
February	75
March	82
April	51
May	13
June	7
July	3
August	6
September	22
October	75
November	98
December	110
MEAN ANNUAL	675

Mean Monthly Maximum and Minimum Temperatures

The average daily maximum temperature in January (the hottest month) is 27.6 °C and in July (the coldest month) is 18.4 °C. The mean daily minimum in February is 14.5 °C and July 1.0 °C but extremes of -11 °C have occurred.

Table 8-3: The mean maximum and minimum temperatures

MONTH	MEAN (C)	DAILY MAX (C)	DAILY MIN (C)	EXTREME MAX (C)	EXTREME MIN (C)
January	20.0	27.6	14.1	34.4	3.3
February	19.8	25.8	14.5	35.0	4.4
March	18.5	24.8	12.3	32.8	0.0
April	16.3	23.2	9.4	30.0	-3.3
May	12.9	20.9	4.9	28.3	-6.8
June	9.2	18.8	1.5	25.0	-8.9
July	9.3	18.4	1.0	25.1	-11.1
August	12.5	20.3	4.7	29.4	-11.1
September	14.8	21.6	8.0	33.3	-6.8
October	16.9	23.7	10.1	34.4	-2.2
November	17.7	23.9	11.5	35.6	0.0
December	19.2	24.7	13.7	34.2	3.3
AVERAGE	15.6	22.4	8.76	30.5	-3.2

Figure 8-3: Average temperatures and precipitation

Source: https://www.meteoblue.com/en/weather/forecast/modelclimate/wonderboom-airport_south-africa_938159

Wind Direction and Speed at the Mine

Data for 2001 to 2008/2009 from the Wonderboom weather station was used. Wind speeds, averaged over a one hour period, ranged from 0m/s to 8.7m/s with a period average wind speed of between 0.5 and 3.5 m/s having been recorded. The wind speeds fluctuate from season to season with the strongest winds during the months of September to November. The predominant wind direction is South-East, East to East-South-East.

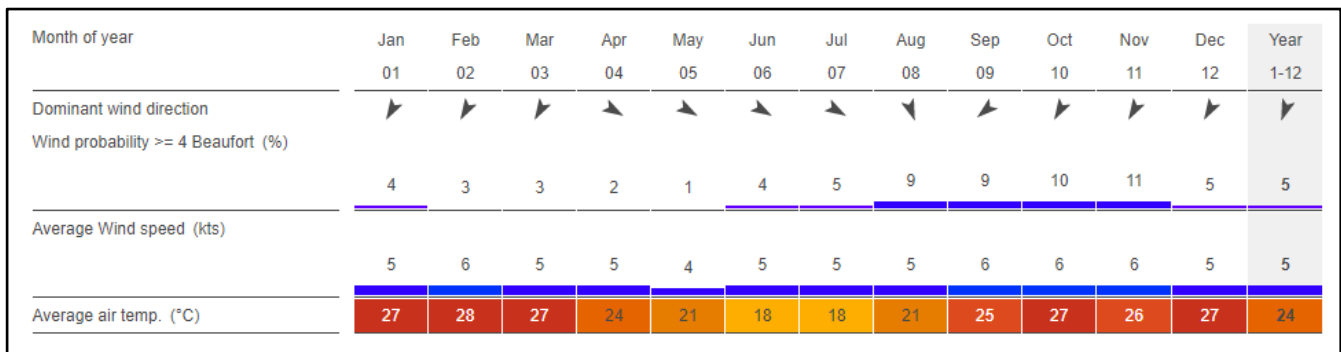
Table 8-4: Average wind speed and direction

MONTH	N		NE		E		SE		S		SW		W		NW	
	N	V	N	V	N	V	N	V	N	V	N	V	N	V	N	V
Jan	161	3.0	287	3.2	109	3.7	48	3.1	44	3.1	92	3.3	122	3.6	96	3.3
Feb	142	2.9	295	3.2	141	3.9	60	4.2	44	3.1	74	3.4	112	3.4	101	2.9
Mar	152	2.8	304	3.3	139	3.4	63	3.5	36	3.1	54	3.1	100	3.4	104	2.9
Apr	170	2.7	211	3.3	87	3.4	39	3.0	47	3.2	95	3.4	149	3.6	146	2.8
May	172	2.6	166	2.9	67	3.0	51	3.3	59	3.4	89	3.7	162	3.9	167	2.9
Jun	146	2.5	149	3.0	86	3.2	43	3.2	54	3.4	117	3.6	157	3.8	166	2.7
Jul	162	2.5	184	2.9	79	3.4	53	4.2	51	3.9	99	3.9	142	3.6	153	2.8
Aug	174	5.4	180	3.4	83	3.2	40	4.4	40	3.5	86	4.1	141	4.1	182	3.0
Sept	197	3.2	223	3.8	84	4.0	41	3.9	27	3.5	70	3.9	131	4.4	171	3.3
Oct	190	3.4	243	3.7	83	4.3	42	3.6	33	3.6	71	3.6	142	4.0	160	3.8
Nov	174	3.2	225	3.6	92	4.1	40	3.9	28	3.1	68	3.1	185	3.8	154	3.6
Dec	180	3.1	254	3.4	95	4.0	40	4.0	34	3.0	69	3.3	154	3.4	135	3.3
Avg	168	2.9	227	3.3	95	3.7	47	3.8	41	3.3	82	3.6	141	3.8	145	3.1

n = average direction frequency per thousand readings
 v = average velocity in meters per second
 Shaded areas indicate predominant wind directions

Wind Statistics from the Wonderboom Airport weather station: Statistics based on observations taken between 07/2014 - 08/2017 daily from 7am to 7pm local time please refer to graph below.

Figure 8-4: Wind statistics



Source: https://www.windfinder.com/windstatistics/wonderboom_airport

Extreme weather conditions

Thunderstorms occur frequently in summer and are usually accompanied by lightning, heavy rain, strong winds and occasional hail. Average of 13.8 hail incidents per annum can be expected at any particular site. Frost occurs in the winter months, peaking with an average occurrence of nine days in July.

8.4 AIR QUALITY

8.4.1 Regional air quality

Air quality is an issue of concern in Gauteng, as it is in many other parts of South Africa. A wide variety of air pollution exists in Gauteng, ranging from veld fires to industrial processes, agriculture, mining activities, power generation, paper and pulp processing, vehicle use and domestic use of fossil fuels. Different pollutants are associated with each activity, ranging from volatile organic compounds and heavy metals through to dust and odours.

8.4.2 Local air quality

Mining at the De Onderstepoort Project will be conducted by opencast mining methods. Hence this area may potentially contribute to dust generation. Locally, dust generation in the area is most likely to originate from:

- Mining activities
- Agricultural activities
- Vehicle movement
- Industrial activities
- Informal settlements

Table 8-5: Acceptable dust fall rates

Restriction Areas	Dustfall rate (D) (mg/m ² /day, 30-days average)	Permitted frequency of exceeding dust fall rate
Residential area	D < 600	Two within a year, not sequential months.
Non-residential area	600 < D < 1200	Two within a year, not sequential months.

Source: National Dust Regulations No. R. 827, 1 Nov 2013

8.5 GROUNDWATER

Under natural flow conditions, groundwater underlying the area will flow in a north-westerly direction towards the Apies River. Groundwater levels were measured between 30 and 40 meters below ground level. Groundwater is of a good quality. Un-weathered and solid gabbro not considered a potential aquifer as low borehole yields are normally encountered.

Hydrogeological Setting

According to the 1:50 000 scale geological map Pretoria 2528CA the site is underlain by gabbro, hyperite, norite, locally with pyroxenite and anorthosite bands all belonging to the Gabbro Unit of the Bushveld Igneous Complex. No geological structural features intersecting the quarry are shown on the geological map.

Based in the information in the DWS borehole database for the farm De Onderstepoort 300 JR, the average depth to the aquifer is 33m (depth ranges from 3m to 200m), while the average water level of these boreholes is 11m (depth ranges from 0.6m to 37m).

Groundwater use

Groundwater is mainly used for agricultural purposes. It is also used for domestic purposes as alternative to the municipal water supply scheme.

8.6 SURFACE WATER

8.6.1 Catchment Boundaries

The Four Rivers mining right area is located in the quaternary catchment number A23E in the Limpopo Water Management Area. The surface water catchment of the proposed mining area is 315 km².

No perennial streams or rivers exist within the mining area. A small non perennial stream occurs to the east of the mining area. There is however no clear stream channel for this stream.

8.6.2 Mean Annual Runoff

The Mean Annual Runoff (MAR) of catchment A23E in mm is estimated to be 35. The Mean Annual Precipitation (MAP) for X11A is 675mm. Thus, the ratio of the MAR to MAP is 5%. The Mean Annual Evaporation (MAE) is 1 650mm. Normal Dry Weather Flow Under natural conditions the dry weather flow in the unnamed tributaries of the Apies River would be zero.

8.6.2.1 *Bon Accord Dam*

The Bon Accord Dam is situated to the west of the mining area. It covers an area of 144 hectares and has a capacity of 4 380 000m³.

The water is mainly used for agricultural (irrigation) purposes. The Apies River is the only river supplying the dam with water.

8.6.2.2 *Apies River*

The Apies River flows in a northerly direction towards its confluence with the Pienaars River. The Apies River originates just south of the city at Erasmus Park. The river has been declared as a disaster area on numerous occasions due to deteriorating water quality.

8.6.3 Surface water quality

Mining at the Four Rivers operation uses opencast mining methods, which have a potential to influence the surface water environment especially the water quality of the affected streams. As previously stated, no perennial or non-perennial streams occur on the mining area.

8.6.3.1 *River diversions*

No river diversions are planned for the mining activities covered by this EIA report.

8.6.3.2 *Surface water use*

During a field survey it was determined that the surface water use within the affected catchments is mainly agricultural – irrigation.

The Apies River has multitude users ranging from agriculture, domestic, mining, industrial and recreational uses.

8.6.3.3 Water authority

The water authority is the Department of Water and Sanitation – Gauteng Region.

8.6.4 Freshwater (Wetlands)

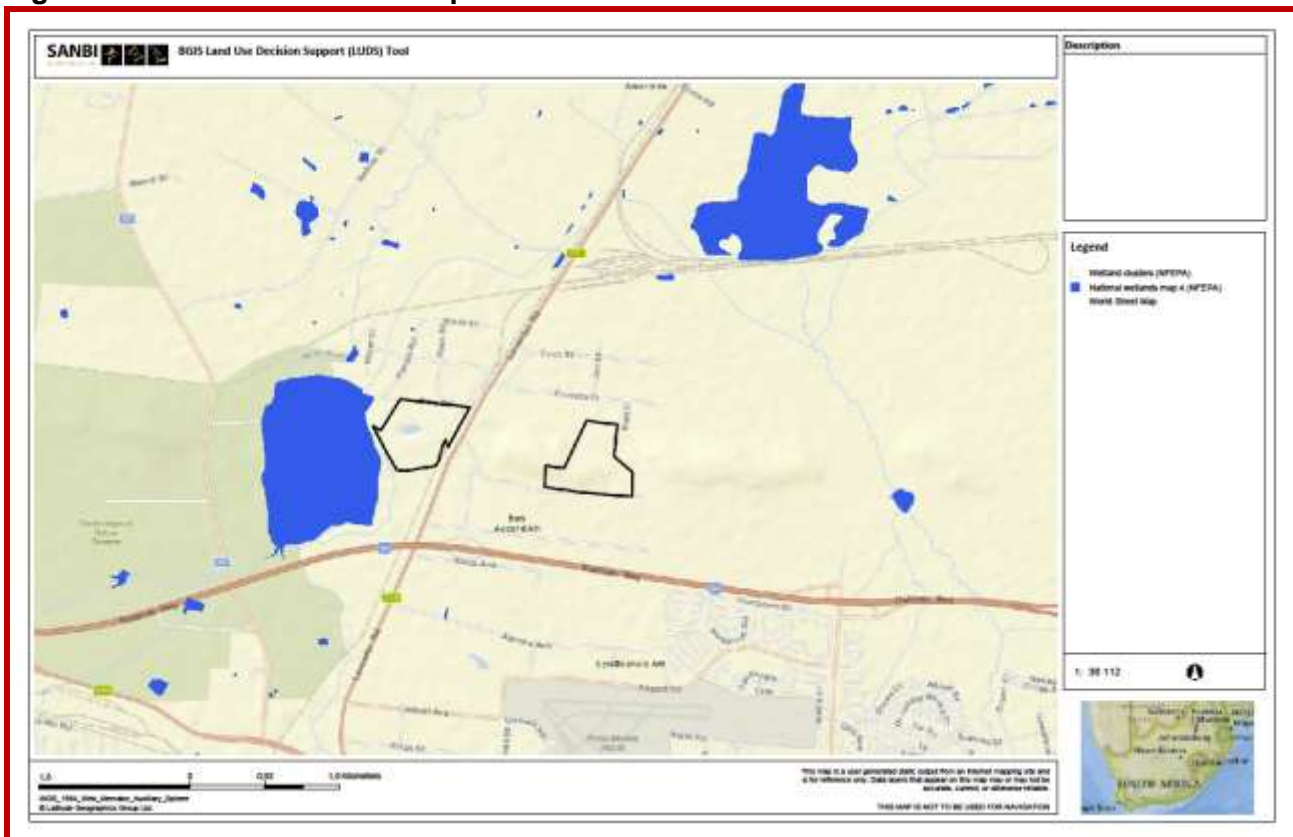
No wetlands were identified in close proximity to the mining area. Please refer to the NEFAPA Wetland Map in Figure...

No wetlands located on the proposed properties.

Western Part, Portion 131 is located next to the Bon Accord dam. The Bon Accord Dam is a human made dam located on the Apies River, some 15 km north of Pretoria. The dam comprises an earth embankment with a side spillway. The catchment area of the dam is 315 km². It was established in 1923 and its main purpose is irrigation (https://en.wikipedia.org/wiki/Bon_Accord_Dam)

No wetlands identified or located on Eastern Part, portion 135.

Figure 8-5: NFEPA Wetlands Map



8.7 SOILS & AGRICULTURAL POTENTIAL

The specific soils identified in the immediate area of the proposed mining operations consist of the Mispah, Katspruit and Clovelly. Large areas could not be classified due to previous mining activities.

Potential impacts and mitigation: The site proposed for development was previously disturbed and used for mining purposes. The proposed project will have a low additional impact on the soils. The EMP proposes measures for the appropriate management of soils during stripping, handling and stockpiling. Suitable erosion control measures will also be implemented. Land capability and use Existing environment: The area surrounding the De Onderstepoort is used predominantly for housing on small holdings, light industrial activities and mining. The current land cover in the region indicates that extensive transformation and land degradation have occurred. There is widespread evidence of poor soil conservation practices, which have resulted in rapid soil erosion in some areas. Potential impacts and mitigation: The site proposed for development was previously disturbed and used for mining and industrial purposes. The proposed project will have a low additional impact on the land capability and use.

The assessment of the present (pre-mining) soil environment is an integral part of the compilation of an Environmental Management Programme Report (EMP) for the development of mining activities. Due to the pre-mining land capability and current land use over the proposed mining area which is mining, a comprehensive soil survey could not be conducted. Large areas are disturbed and unrehabilitated. Norite koppies also cover a large surface area of the proposed mining area with very little to no topsoil. Mainly vertic melanic clays with some dystrophic or mesotrophic plinthic catenas and some freely drained, deep soil types are found on the adjoining farm portions. Soil erodibility Losing soil organic matter through erosion, cultivation or losing recyclable vegetation through overgrazing, increases the erosion potential of soils. The veld in the surveyed area shows little signs of overgrazing which in addition to previous mining activities and a shallow soil profile, are probable causes of the observed erosion. The erosion process is still active and is busy cutting in the soil profile. The existence of erosion gullies clearly illustrates the importance of soil conservation approaches and measures in this area. Soil conservation was attempted during rehabilitation of the old quarries but monitoring and maintenance was neglected.

Soil depth

Koppies are generally occupied by shallow soils of the Glenrosa, Mispah, Glencoe and Dresden soil forms, typically 2cm – 5cm deep. Shallow topsoil is underlain by hard norite parent material in these landscape positions.

Soil utilization potential The utilization potential of deeper well drained soil is high, independent of how well the season goes.

The utilization potential of less well drained soils for example the vertic melanic soils, is dependent on the season. Drier than normal seasonal conditions favour utilization potential while wet seasons decrease the utilization potential.

8.8 BIODIVERSITY

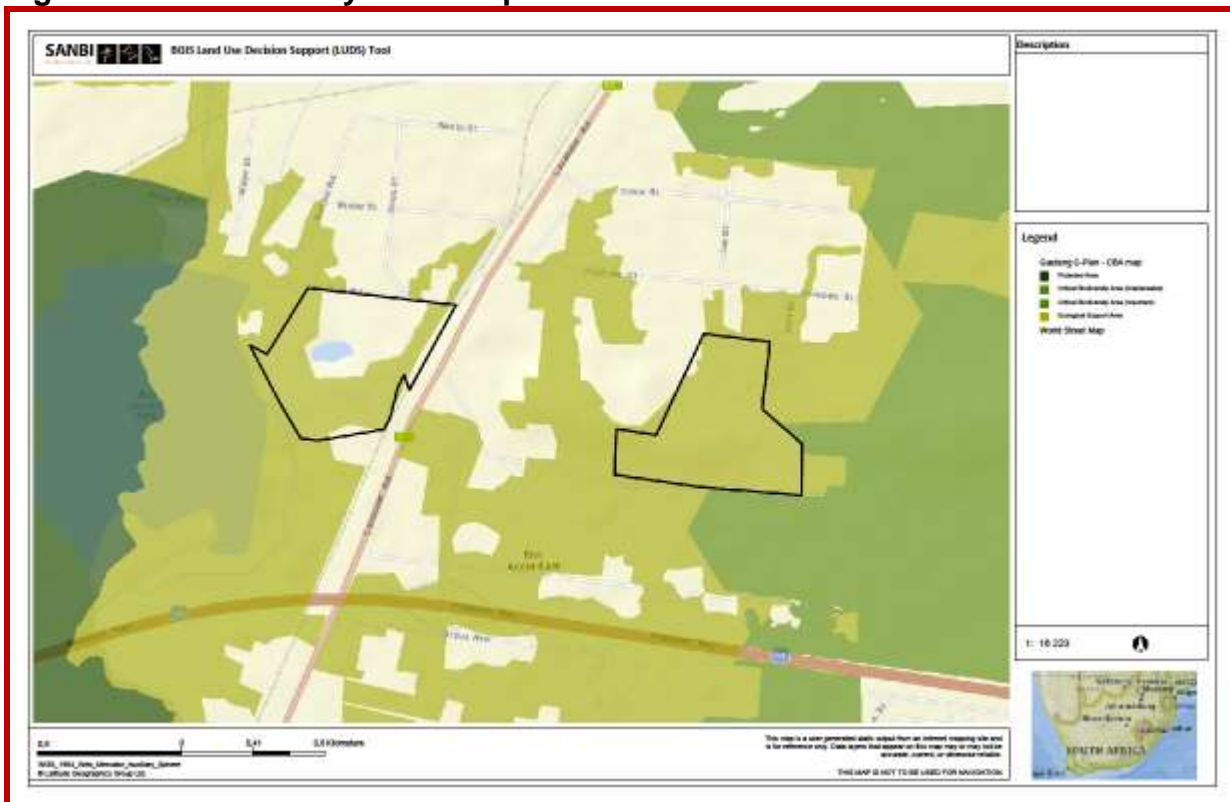
The Western and Eastern proposed mining areas are situated in the Savannah Biome which has the highest biodiversity in South Africa after the Fynbos biome (Driver et al, 2004). The Savanna Biome is the largest Biome in southern Africa, occupying 46% of its area, and over one-third the area of South Africa.

LUDS Info: Western Part – Southern and Western part of proposed site is located in an Ecological Support Area in terms of the Gauteng Conservation Plan (Gauteng C-Plan) identified Critical Biodiversity Areas (CBAs)

Area has been disturbed by historic sand mining activities. Alien invasion and alien invasion management plan has been compiled for this site.

Eastern Part – this proposed site is located in an Ecological Support area in terms of the Gauteng Conservation Plan (Gauteng C-Plan) identified Critical Biodiversity Areas (CBAs) Identified threatened ecosystems

Figure 8-6: Biodiversity- CBA Map



8.8.1 Vegetation

The area falls within the Marikana Thornveld (SVcb 6) and Norite Koppies Bushveld (SVcb 7) vegetation types within the Bushveld Biome (Mucina & Rutherford, 2006).

Figure 8-7: Representative example of vegetation on site (East)



Table 8-6 Plant/Floral species of general occurrence:

Species	Common name	Comment
Graminoids (Gras)		
<i>Aristida scabrivalvis</i>	Assegaaisteekgras	Least concern
<i>Elionurus muticus</i>	Wire Lemongrass	Least concern
<i>Fingerhuthia africana</i>	Thimble Grass	Least concern
<i>Eragrostis lehmanniana</i>	Knietjiesgras	Least concern
<i>Heteropogon contortus</i>	Spear Grass	Least concern
<i>Hyperthelia dissolute</i>	Boontjietamboekiegras	Least concern
<i>Melinis nerviglumis</i>	Ferweelgras	Least concern
<i>Themeda triandra</i>	Red grass	Least concern
<i>Seteria sphacelata</i>		
Herbs:		
<i>Hermannia depressa</i>	Itshesizwe (z), Moleko (ss), Rooiopslag (a),	Least concern
<i>Ipomoea obscura</i>	Wild Petunia	Least concern
<i>Ipomoea oblongata</i>	Ubhoqo	Least concern
<i>Barleria macrostegia</i>	-	Least concern
<i>Dianthus mooiensis</i>	Frilly Carnation	Least concern
<i>Vernonia oligocephala</i>	Bicoloured Vernonia	Least concern
Tall trees		
<i>Acacia burkei</i>	Black Monkey Thorn	Least concern
Small trees		
<i>Acacia caffra</i>		
<i>Acacia gerrardii</i>	Red Thorn	Least concern
<i>Acacia karoo</i>		
<i>Acacia nilotica</i>	Black Thorn (e), Lekkerruikpeul (a), Scented Thorn	Least concern
<i>Acacia tortilis</i>	Umbrella Thorn	Least concern
<i>Combretum molle</i>	Velvet Bushwillow	Least concern
<i>Rhus lancea</i>	Karee	Least concern
<i>Ziziphus mucronata</i>	Blinkblaar-wag-'n-bietjie	Least concern
<i>Celtis Africana</i>	White Stinkwood	Least concern
<i>Dombeya rotundifolia</i>	Wil Pear	Least concern
<i>Pappea capensis</i>	Jacket Plum	Least concern
Tall shrub		
<i>Euclea crispa</i>	Blue Guarri	Least concern
<i>Olea europaea</i>	African Olive	Least concern
<i>Rhus pyroides</i>	River Firethorn Currant	Least concern
<i>Diospyros lycioides</i>	Bessieboom (a), Jakkalsbessie (a), Muthala (v), Quilted Bluebush	Least concern
<i>Ehretia rigida</i>	Puzzle Bush	Least concern
<i>Euclea undulate</i>	Common Guarri	Least concern
<i>Grewia flava</i>	Velvet Raisin	Least concern
<i>Pavetta gardeniifolia</i>	Stink-leaf Brides-bush	Least concern
Low shrub		
<i>Asparagus cooperi</i>	Haakdoring	Least concern
<i>Rhynchosia nitens</i>	Ferweelboontjie (a), Vaalboontjie (a)	Least concern
<i>Indigofera zeyheri</i>	Leeuhout	Least concern
<i>Justicia flava</i>	Geelgarnaalbos (a), Impela (z), Yellow Justicia (e)	Least concern

Source: EIA and EMP (2013)

Alien invasive species such as *Acacia mearnsii* (Black wattle), *Tagetes minuta* (Kakiebos) and *Opuntia tuna* (Turksvy) are widely distributed throughout the area of interest and the site provides ample chance for establishment of alien invasive plants.

Alien Invasive Plants found on site (Western Section)

Figure 8-8: *Opuntia tuna* (Turksvy)



Table 8-7: Alien Invasive species

Genus	Species	Common names	NEM:BA Category	CARA Category	Distribution on site
<i>Ricinus</i>	<i>communis</i> var. <i>communis</i>	Caster-oil plant	1b	2	Widespread, mostly on topsoil stockpile
<i>Solanum</i>	<i>nigrum</i>	Nightshade	Category 1b	X3	Widespread
<i>Flaveria</i>	<i>bidentis</i>	Smelter's bush	Category 1b	-	Widespread
<i>Argemone</i>	<i>Ochroleuca</i> subs. <i>ochroleuca</i>	Mexican poppy	Category 1b	Category 1	Topsoil stockpiles
<i>Morus</i>	<i>alba</i>	Common mulberry	Category 3	Category 3	Small tree shrub occurred close to offices
<i>Nicotiana</i>	<i>glauca</i>	Wild tobacco	Category 1b	Category 1	Widespread
<i>Alanthus</i>	<i>altissima</i>	Tree of hell/ tree of heaven	Category 1b	Category 3	Widespread over the site
<i>Ipomoea</i>	<i>purpurea</i>	Common morning glory	Category 1b	Category 3	Topsoil stockpile and other isolated sites
<i>Tipuana</i>	<i>Tipu</i>	Tipu tree	Category 3	Category 3	South and western sides, also on the border fence in the northern side
<i>Datura</i>	<i>stramonium</i> / <i>ferox</i>	Common thorn-apple / large thorn-apple	Category 1b	Category 1	Western bush area
<i>Lantana</i>	<i>camara</i>	Common lantana	Category 1b	Category 1	Widespread
<i>Cestrum</i>	<i>laevigatum</i>	Ink berry	Category 1b	Category 1	Northern border
<i>Cereus</i>	<i>jamacara</i>	Queen of the night	Category 1b	Category 1	Western side of the site
<i>Melia</i>	<i>azedarach</i>	Syringa	Category 3 in Urban Areas	Category 3	Close to offices and in the southern side of the site
<i>Solanum</i>	<i>mauritianum</i>	Bugweed	Category 1b	Category 1	Western Section
<i>Opuntia</i>	<i>Ficus-indica</i>	Sweet prickly pear	Category 1b	Category 1	Western border
<i>Robinia</i>	<i>pseudoacacia</i>	Black locust	Category 1b	Category 2	Widespread
<i>Pennisetum</i>	<i>setaceum</i>	Fountain grass	Category 1b	Category 1	Topsoil stockpile, widespread

Source: Enviflora, Alien Invasive Plant Management Plan, Jul 2017

Red data plant species

An analysis of the potential for each species to occur on the property is provided in Table 8-2. Although no species specific impacts are being considered, the overall impact and proposed management measures are presented below.

Table 8-8 Evaluation of the potential for occurrence of red data flora species on-site.

SCIENTIFIC NAME	HABITAT SUITABILITY	LIKELY TO OCCUR ON SITE
<i>Aloe peglerae</i>	Yes	Highly likely – on ridge.
<i>Bowiea volubilis</i>	Yes	Highly likely – on ridge.
<i>Brachiaria subulifolia</i>	Low	Low – no seepage areas within the prospecting area.
<i>Ceropegia deciduas</i> <i>subsp. pretoriensis</i>	Yes	Highly likely – on ridge.
<i>Cumcumis humifructis</i>	Low	Low
<i>Delosperma vogtsii</i>	Low	Low – no open grassland on south-facing slope.
<i>Eulophia leachii</i>	Low	Low – no known black heavy soils within prospecting area.
<i>Holothrix randii</i>	Yes	Moderate – on rocky ledges on the ridge. No grassy slopes.
<i>Macledium pretoriense</i>	Yes	Moderate – on ridge.
<i>Trachyandra erythrorrhiza</i>	No	Low – no marshy areas within the prospecting area.

8.8.2 Fauna

The mining area falls within the quarter degree square 2528CA. Given that the southern section of the property (section of a ridge) is largely undisturbed, the faunal diversity in this section of the mine area is expected to be representative of a ridge ecosystem. The northern section of the property has been disturbed through previous mining activities, therefore the faunal diversity of this section of the mine area is considered to be low.

Given the diversity of fauna anticipated on the ridge and any undisturbed area of the property, it is not possible to assess the impacts on each species. Therefore, attention has been paid to the red data species anticipated to occur on the property, based information obtained from the GDACE Gap Analysis database for the quarter degree square 2528CA, as well as priority species for the province.

A full list of these species is provided in Table 8-3 below.

Table 8-9 Red Data species occurring in the 2528CA

Species	Common name	Conservation / RED DATA status	Within Distribution Range	Suitable Habitat on site	Likelihood of occurrence
MAMMALS					
<i>Cleotis percivall</i>	Short-eared trident bat	Critically endangered	Yes	No Suitable cover	Low
<i>Mystromys albicaudatus</i>	White-tailed rat	Endangered	Yes	No	Low
<i>Damaliscus lunatus</i> <i>lanatus</i>	Tsessebe	Endangered	Yes	No	Do not occur outside protected areas
<i>Ourebia ourebi</i>	Oribi	Endangered	Yes	No	Do not occur outside protected areas
<i>Neamblysomus julianae</i>	Juliana's golden mole	Vulnerable	Yes	No	Low
<i>Rhinolophus blasii</i>	Peak-saddle horseshoe	Vulnerable	Yes	No suitable	Low

Species	Common name	Conservation / RED DATA status	Within Distribution Range	Suitable Habitat on site	Likelihood of occurrence
	bat			cover and not savannah	
Hippotragus niger	Sable antelope	Vulnerable	Yes	No	Do not occur outside protected areas
Atelerix frontalis	South African hedgehog	Near Threatened	Yes	Minimal	Low – sparse grass cover
Myotis welwitschii	Welwitsch's hairy bat	Near Threatened	Yes	No savannah habitat	Low
Myotis tricolor	Temminck's hairy bat	Near Threatened	Yes	No suitable cover and not savannah	Low
Pipistrellus rusticus	Rusty bat	Near Threatened	Yes	No savannah habitat	Low
Miniopterus schreibersii	Schreiber's long fingered bat	Near Threatened	Yes	No suitable cover	Low
Rhinolophus clivosus	Geoffrey's horseshoe bat	Near Threatened	Yes	No suitable cover and not savannah	Low
Rhinolophus darlingi	Darling's horseshoe bat	Near Threatened	Yes	No suitable cover and not savannah	Low
Dasymys incomtus	Water rat	Near Threatened	Yes	No	No
Hyaena brunnea	Brown hyaena	Near Threatened	Yes	Yes	Likely to visit site periodically
Leptailurus serval	Serval	Near Threatened	Yes	Yes	Likely to visit site periodically
Lutra maculicollis	Spotted-necked otter	Near Threatened	Yes	No	No
Mellivora capensis	Honey badger	Near Threatened	Yes	Yes	Likely to visit site periodically
Birds					

Species	Common name	Conservation / RED DATA status	Within Distribution Range	Suitable Habitat on site	Likelihood of occurrence
Grosachus leuconotus	Whitebacked Night Heron	Vulnerable	No	No	None
Gyps coprotheres	Cape Vulture	Vulnerable	Yes	Yes	Moderate – dependant on food availability
Polemaetus bellicosus	Martial Eagle	Vulnerable	No	Yes	Highly likely
Aquila rapax	Tawny Eagle	Vulnerable	Yes	Yes	Likely
Cirus ranivorus	African Marsh Harrier	Vulnerable	Yes	No	Low
Falco naumanni	Lesser Kestrel	Vulnerable	Yes	Low	Low
Anthropoids paradiseus	Blue Crane	Vulnerable	Yes	No	Low
Podica senegalensis	African Finfoot	Vulnerable	No	No	None
Eupodotis cafra	Whitebellied Korhaan	Vulnerable	No	No	Low
Tyto capensis	Grass Owl	Vulnerable	No	No	None
Ciconia nigra	Black Stork	Near Threatened	Yes (<2%)	Low	Low
Phoenicopterus ruber	Greater Flamingo	Near Threatened	Yes (<2%)	No	None
Phoenicopterus minor	Lesser Flamingo	Near Threatened	No	No	None
Asagittarius serpentarius	Secretary Bird	Near Threatened	Yes (<2%)	Low	Moderate
Alcedo semitorquata	Halfcollared Kingfisher	Near Threatened	Yes (<2%)	no	None
Mirafra cheniana	Melodius Lark	Near Threatened	No	Low	Low – grassland area disturbed
Buphagus erythrorhynchus	Redbilled oxpecker	Near Threatened	No	Low	Low
Amphibians None					
Reptiles					
Python sebae natalensis	African Rock Python	Vulnerable	No	Yes	Likely
Homosorelaps dorsalis	Striped harlequin snake	Rare	No	Low	Low – grassland are disturbed

Glossary:

Critically endangered: A taxon is Critically Endangered when available scientific evidence indicates that it meets any criteria for the IUCN threatened categories and is therefore considered to be facing an extremely high risk of extinction in the wild.

Endangered: Taxa in immediate danger of extinction if the factors causing decline continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level

Species	Common name	Conservation / RED DATA status	Within Distribution Range	Suitable Habitat on site	Likelihood of occurrence
or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.					
Near Threatened: Taxa which have been assessed against the criteria but do not currently qualify for Critically Endangered, Endangered or Vulnerable, but is close to qualifying or is likely to become Vulnerable in the near future. Also included here are taxa that are the focus of continuing taxon-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories within a period of five years.					
Rare: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline.					
Vulnerable: Taxa believed likely to move into the Endangered category in the near future if the factors causing decline continue operating.					

Source: EIA and EMP (2013)

8.9 SOCIO-ECONOMIC

The mine site is located in Ward 96 of the City of Tshwane Metropolitan Municipality (Tshwane MM). The City of Tshwane has a population of 2 921 488, according to the Census data 2011. Ward 96 has an estimated population of 30,113, according to WaziMap 2014. The gender ratio for male and females is 1:1 for the City of Tshwane and ward 96 has a male to female ratio of 1:0.96, which is similar to the Municipality.

Below is a summarized outlook on the socio-economic context of the area based on Census 2011 and Wazimap 2014.

Table 8-10 Key statistics for Tshwane Metropolitan Municipality

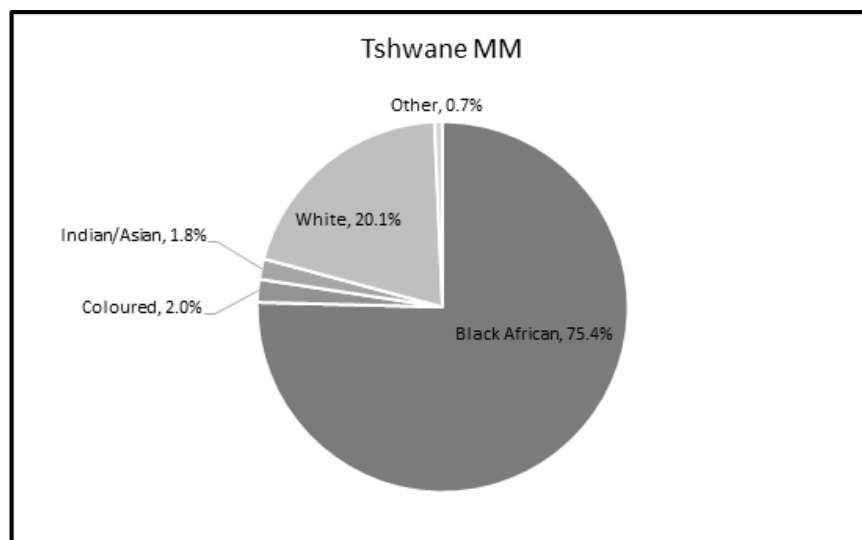
Description	2011	2001
Total population	2,921,488	2,142,322
Young (0-14)	23.2%	24.6%
Working Age (15-64)	71.9%	71.9%
Elderly (65+)	4.9%	4.4%
Population density (persons/km²)	446	
Unemployment rate	24.2%	31.6%
Youth unemployment rate	32.6%	40.5%
No schooling aged 20+	4.2%	9.1%
Higher education aged 20+	23.4%	16.9%
Matric aged 20+	34%	30.7%
Number of households	911,536	606,025
Number of Agricultural households	84,516	
Average household size	3	3,3

Description	2011	2001
Female headed households	35.8%	35.4%
Formal dwellings	80.7%	74,9%
Housing owned/paying off	52%	61,8%
Flush toilet connected to sewerage	76.6%	68.4%
Weekly refuse removal	80,7%	75.2%
Piped water inside dwelling	64.2%	46.9%
Electricity for lighting	88.6%	79.2%

Source: Statistics South Africa, 2011

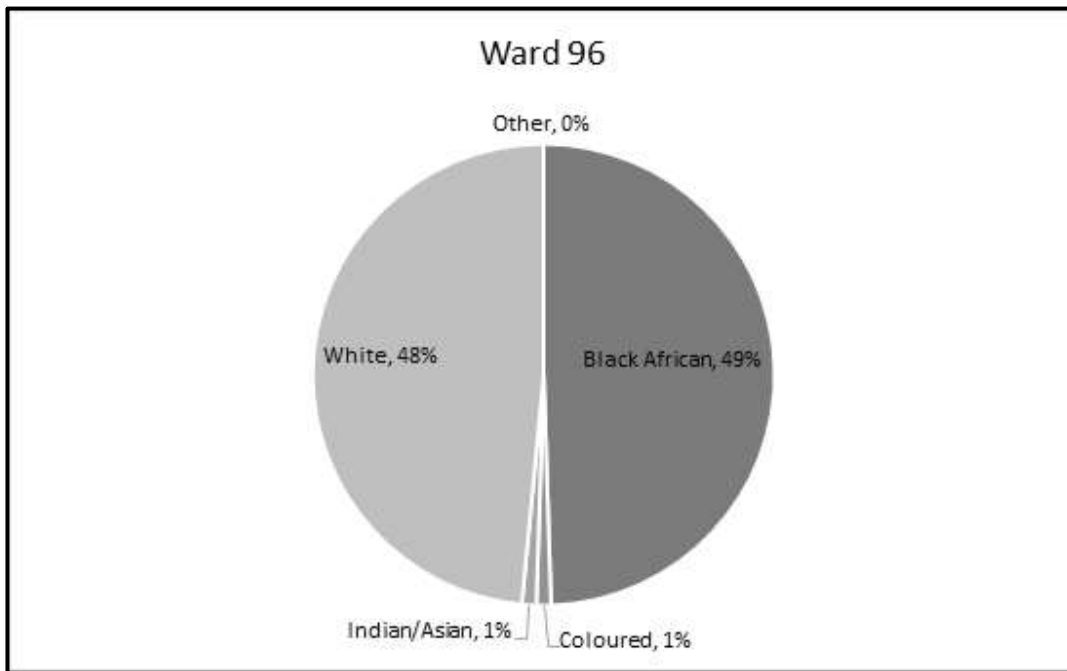
According to the 2011 Census, Tshwane Metropolitan Municipality has a total population of 2,921,488 people, of which 75.4% are black African, 20.1% are white, with the other population groups making up the remaining 4.5 %.

Figure 8-9 Tshwane MM Population Groups



Source: Statistics South Africa, 2011

Ward 96 has a population size of 30 113 people. The split amongst the population groups are presented below (Statistics South Africa, 2011).

Figure 8-10 Ward 96 Population Groups

Source: Wazimap, 2014

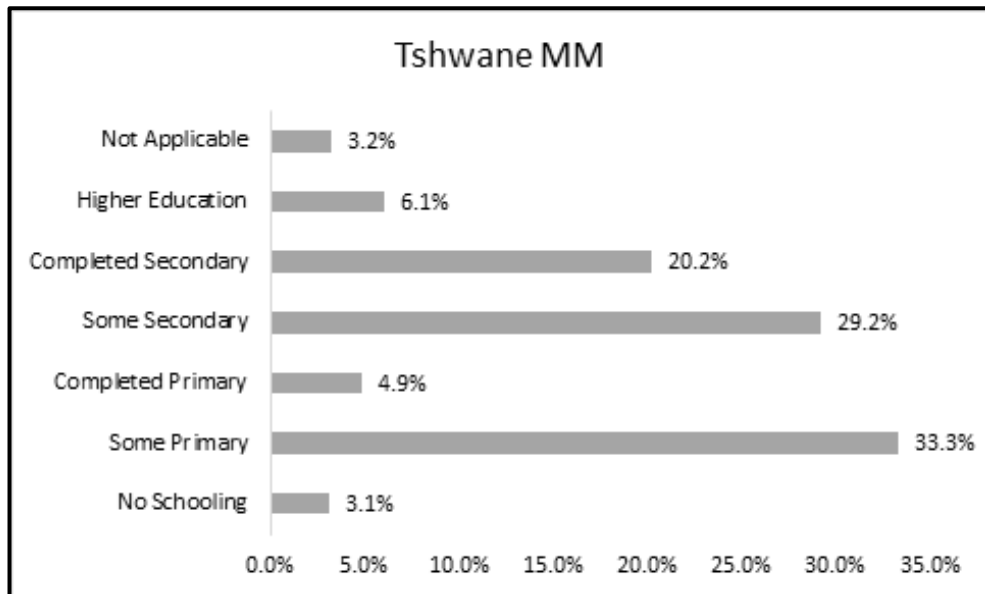
Education

In the municipality, of those aged 20 years and older, 3.1% have no schooling, 33.3% have some primary school education, 29.2% have some secondary education, 20.2% have completed matric, and 6.1% have some form of higher education (Statistics South Africa, 2011).

The table below lists the number of people with their highest level of education in the Tshwane Metropolitan Municipality and Ward 96. As well as the percentages of the highest level of education compared to population size.

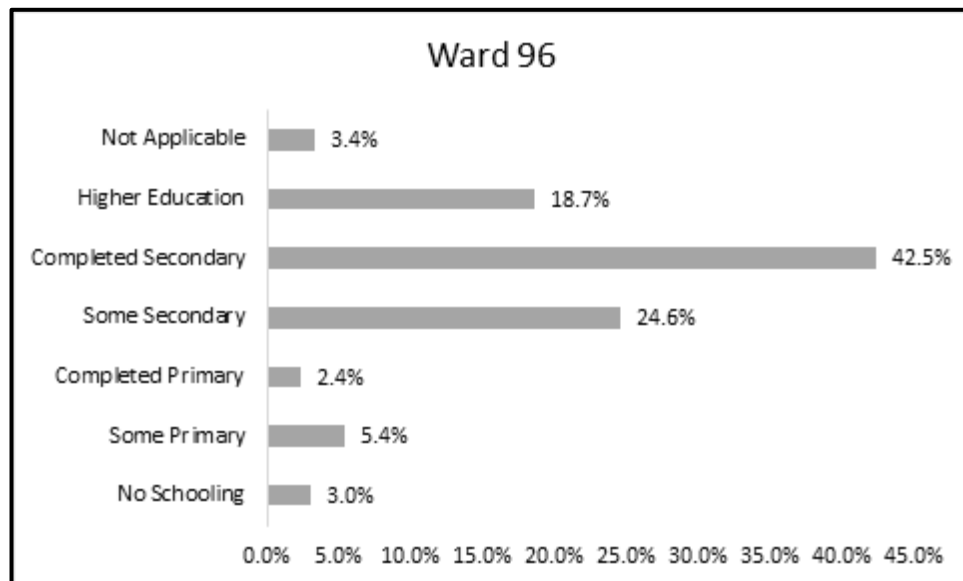
Table 8-11 Education levels (City of Tshwane and Ward 96)

Highest educational level	City of Tshwane	City of Tshwane (Percentage)	Ward 96	Ward 96 (percentage)
No Schooling	81,273	4%	632	3%
Some Primary	131,568	6.5%	1,145	5.4%
Completed Primary	55,602	2.8%	501	2.4%
Some Secondary	552,510	27.4%	5,197	24.6%
Completed Secondary	815,043	40.4%	8,967	42.5%
Higher Education	296,106	14.7%	3,942	18.7%
Other	11,547	0.6%	240	1.1%
Not applicable	72,147	3.6%	488	2.3%

Figure 8-11 Tshwane MM Education level

Source: Statistics South Africa, 2011

In Ward 96, 2.4% of the population has completed primary school, 42.5% has completed secondary education and 18.7% has some form of higher education.

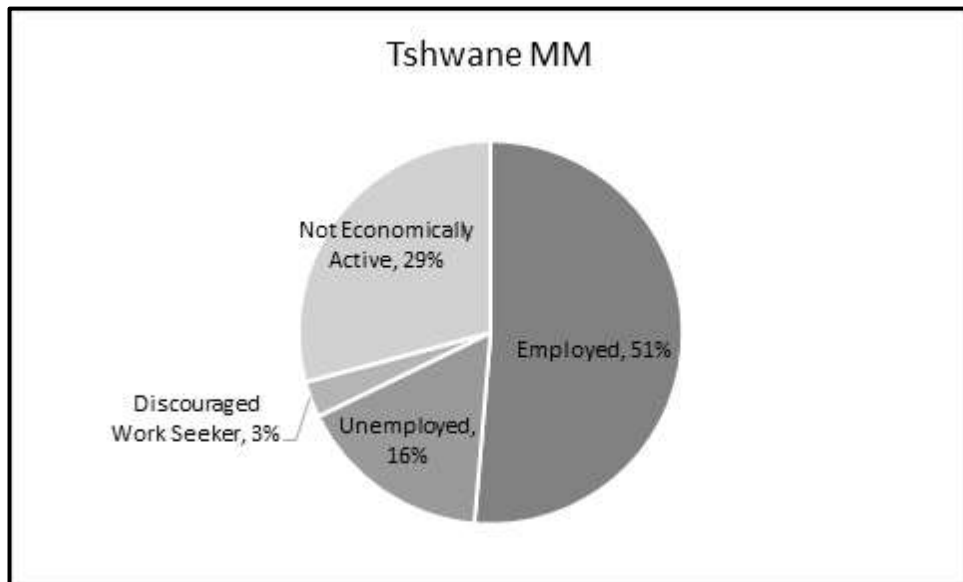
Figure 8-12 Ward 96 Education Level

Source: Wazimap, 2014

Employment

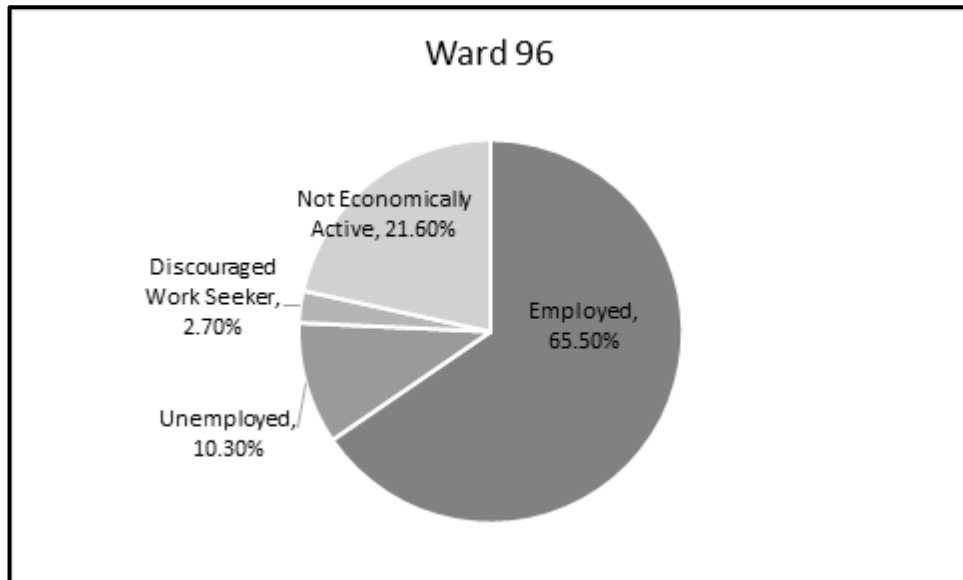
In the Tshwane MM 51% of the population between the ages of 15-65 is employed and in ward 96 the employment rate is slightly higher at 65.5%.

Figure 8-13 Tshwane MM Employment Status



Source: Statistics South Africa, 2011

Figure 8-14 Ward 96 Employment Status



Source: Wazimap, 2014

Living Conditions

There are 911,536 households in the municipality, with an average household size of 3 persons per household. 64.2% of households have access to piped water either in their dwellings. 89.9% of the households have access to electricity for lighting.

In Tshwane MM the main source for the water is from regional or local service provider (90.6%) and in ward 96 the 76.8% of the water is from a regional or local service provider and 19.3% from boreholes.

8.10 NOISE

Regional noise

Regional noise originates from traffic on the N4 National Road, the R 101 Provincial Road, secondary roads, mining, industrial activities, domestic noise and agricultural activities. Mining is a major contributor to environmental noise pollution, with noise sources such as blasting and machinery used during construction, operation and decommissioning. These noise sources impact on the local ambient noise levels. There are three major categories of noise sources associated with mining.

They are:

- Fixed equipment or process operations (generators, pumps, electrical equipment);
- Mobile equipment or process operations (haulage, service operations); and
- The transport of products, raw material or waste (truck traffic).

8.11 GROUND VIBRATION AND AIR BLAST

Air Blasting and Ground Vibration

Explosives are used to break rock through the shock waves and gasses yielded from the explosion.

Ground vibration is a natural result from blasting activities. The far field vibrations are inevitable, but un-desirable by products of blasting operations may occur (such as damage to structures). The shock wave energy that travels beyond the zone of rock breakage is wasted and could cause damage and annoyance. The level or intensity of these far field vibration is however dependant on various factors.

Some of these factors can be controlled to yield desired level of ground vibration and still produce enough rock breakage energy. Factors influencing ground vibration are the charge mass per blast, distance from the blast, the delay period and the geometry of the blast.

These factors are controlled by planned design and proper blast preparation.

- The larger the charge mass per blast - not the total mass of the blast, the greater the vibration energy yielded. Blasts are timed to produce effective relief and rock movement for successful breakage of the rock. A certain quantity of holes will detonate within the same time frame or delay and it is the maximum total explosive mass per such delay that will have the greatest influence. All calculations are based on the maximum charge detonating on a specific delay.
- The distance between the blast and the point of interest/concern. Ground vibrations attenuate over distance at a rate determined by the mass per delay, timing and geology. Each geological interface a shock wave encounters will reduce the vibration energy due to reflections of the shock wave. Closer to the blast will yield high levels and further from the blast will yield lower levels.

The geology of the blast medium and surroundings also has an influence. High density materials have high shock wave transferability where low density materials have low transferability of the shock waves. Solid rock i.e. norite will yield higher levels of ground vibration than sand for the same distance and charge mass. The precise geology in the path of a shock wave cannot be observed easily, but can be tested for if necessary in typical signature trace studies - which are discussed shortly below

Blast Management and Consulting ground vibration and air blast monitoring at various points in and around the site on 27 September 2016, 27 October 2016 and 10 March 2017.

All three reports concluded that the ground vibration levels recorded were within the set limits of and safe blasting criteria. Air blast levels recorded were within the accepted levels at the structures monitored. The possibility of damage is unlikely due to ground vibration

and / or air blast at the surrounding structures / buildings. No damage was observed or reported after the blast

8.12 VISUAL

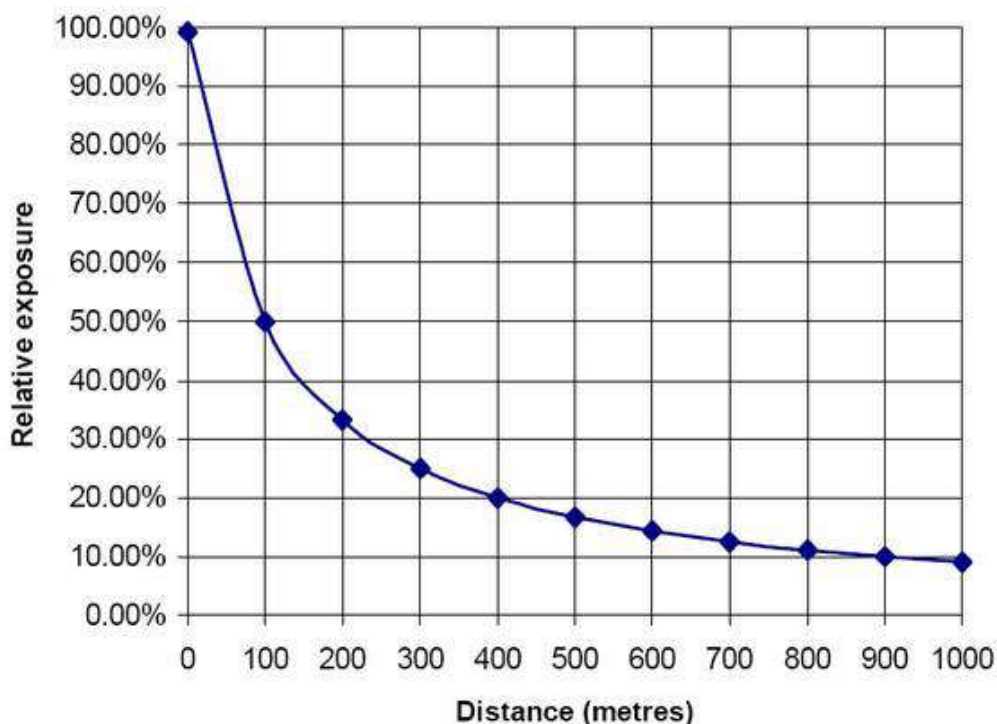
The areas with possible visibility of the infrastructure are large, due to the pit and infrastructure being positioned at a prominent elevation. The infrastructure includes a crushing plant, offices and a workshop, the height of the crushing plant is estimated to be approximately 20m, which will further accentuate the visual disturbance.

The association between exposure and distance is applied in order to determine the core area of influence of the mine infrastructure and open pit. The graph above illustrates the relative exposure of an object at increasing distance from a viewing location. At 100m from the viewing location the relative exposure decreases to 50%, and decreases to 25% at a distance of 300m.

The nature of the mining infrastructure compared to the surrounding environment does create a significant contrast due to the surrounding areas land use consisting mainly of agriculture. For this reason the mine infrastructure could possibly have the following visual prominence:

- 0m – 500m. Short distance where the infrastructure will dominate the immediate landscape and constitute a very high visual prominence;
- 500m – 1000m. Medium distance where the infrastructure would be easily and comfortable visible and constitute a high visual prominence;
- 1km – 2km. Medium to longer distance where the infrastructure would become part of the visual environment, but would still be visible and recognizable. This zone constitutes a medium visual prominence; and
- Greater than 2km. Long distance view of the infrastructure where it would still be visible but not as easily recognizable. This constitutes a low visual prominence.

Figure 8-15: Association between exposure and distance



Within a 2km radius of the mine infrastructure the land use consists of agricultural, mining, residential, transportation and natural grassland. The presence of overburden dumps and stock piles will significantly alter the topography and as a result will considerably increase the visual presence of the mine. The accumulation of mines within the region has contributed to a visually unappealing environment, which will have impacts on motorists travelling through or near the region. This visual disturbance of this mine however does not lie over any main transportation routes, and as a result will have no direct visual impact to large number of motorists. The visual disturbance will, however, also affect a few residents in the immediate vicinity.

8.13 HERITAGE

APelser Archaeological Consulting (APAC) was appointed by EcoPartners, on behalf of Four Rivers Trading 263 (Pty) Ltd to undertake a Phase 1 HIA on Portions 53, 127, 131 & 135 of the farm De Onderstepoort 300JR, in the Pretoria Magisterial District area of Tshwane in Gauteng. The heritage description is taken from the report. The Heritage Impact Report is attached as **Appendix 6**.

A number of known cultural heritage (archaeological and historical) sites exist in the larger geographical area within which the study area falls, while some sites and features were also identified in the specific study areas. The sites and features recorded date mainly to the Late Iron Age (LIA), although there are some recent historical features as well. This included a known recent historical graveyard.

8.13.1 Graves

The recent historical graveyard site is located close to the entrance to Four Rivers and contains an unknown number of mostly stone-packed and unknown graves (in terms of age). There could be in excess of 50 graves located here. One of the graves has a granite headstone and dressing with a legible inscription on it. It is the grave of one Samuel Majozi who was born 15 July 1951 and who died on 2 June 1956. The grave is therefore older than 60 years of age and deemed as historical. It can be assumed that the other graves in the graveyard are of similar age. Although no development actions are planned close to or on the site where the graves are located, the site needs to be managed as part of the existing operations at Four Rivers. Currently the site is in a bad state of repair and completely overgrown. The old fence that used to surround the site has also collapsed. Graves always carry a High Significance rating and it is recommended that the site containing the graves be cleaned and kept clean and that a new fence be erected around it, with an access gate to the site as well. A sign indicating the presence of a cemetery here should also be erected.

8.13.2 Historical residential remains and buildings

This age of the Brickworks site remains is unknown and the site has been impacted on extensively over the years. No further development actions are envisaged here. It is however recommended that no further damage to or demolition to the site takes place and that it be left intact. If development is planned here then the site should be recorded in more detail before demolition and a permit obtained from SAHRA.

The recent historical (quarry related) site and features located on it is most likely not older than 60 years of age based on the bricks, asphalt and other refuse seen on the site. The heritage significance of these remains are seen as being low and no mitigation measures are required should development actions move into this area.

8.13.3 Late Iron Age (LIA) Features

A fairly large number of stone-walled features, including cattle kraals (enclosures), possible hut bays and agricultural terracing, were found in the study area (on all 4 farm portions). These features are located mostly around the foot of the large hill that dominates the area, as well as the saddles between hillocks and the larger hill. The dense vegetation made visibility and access difficult and it is possible that many more of these features are present in the area.

The sites are typical of the LIA Tswana settlements found in the larger geographical area for example at Pyramid Koppies near Onderstepoort and elsewhere, and possibly dating to between the late 17th and mid-19th centuries. From an archaeological perspective these sites are of high significance and should be preserved if possible and definitely mitigated if to be impacted by development actions. With the high likelihood of unmarked burials associated with these sites any development actions taken in the vicinity of these sites need to proceed with caution as well. With the sites carrying a High Significance rating a number of mitigation measures are recommended. If the sites are to be impacted the recommendations are that the sites be mapped and drawn in detail, archaeological excavations on sections of the sites be undertaken and finally that a demolition permit from SAHRA be obtained for these sites once mitigation measures have been implemented. The alternative is to avoid the sites in total and then preserve it in situ and to manage the site through a Cultural Heritage Management Plan

8.14 SENSITIVE LANDSCAPES

The Department of Environmental Affairs has identified the area as an ecological support area (ESA).

According to the Tshwane Open Space Framework the proposed site is not influenced by any open space typologies.

It is however close to the following approved Open Space typologies:

- A Green node, namely the Sensitive Site: De Onderstepoort Nature Reserve. Green nodes are the most important elements in the provisioning of environmental goods and services, the protection of biodiversity, endangered species and ecological systems, as well as eco-based activity. Green nodes must be protected for conservation purposes.
- A Blue Way, namely the Apies River and tributaries. Blue ways are the most important elements in the provisioning of environmental goods and services, the protection of biodiversity, endangered species and ecological systems, as well as eco-based activity. Blue Ways must be protected for conservation purposes.

8.15 LAND USE

(b) Description of the current land uses.

There is an existing quarry on the same farm called Bon Accord Klipgroef, which is owned by the City Council of Tshwane (now Tshwane Metro). This quarry is immediately to the east of the R101 and is also on the De Onderstepoort farm.

The following developments are found in the area:

- Established roads such as the N4 and R101;
- Waste disposal facility;
- Industrial business (including brickworks, brick depots, panel beaters)

- Quarry to the east of the site.

Within a 2km radius of the mine infrastructure the land use consists of agricultural, mining, residential, transportation and natural grassland.

In the Bon Accord area, present land use includes residential, crops, grazing, industrial (mining) and animal farming. Please refer to Appendix 3

(c) Description of specific environmental features and infrastructure on the site.

The following environmental features exist on or within close proximity to the proposed mining area. It is indicated on the Figure 2.

N4 National Road

This road runs in an east – west direction south of the mining area. It connects the Tshwane area with Rustenburg. The N4 is approximately 1 100 meters from the mining operations.

R 101 Provincial Road.

This road crosses the mining area in a north - south direction. The road connects the Tshwane area with Hammanskraal and Warmbad in the north. The R 101 is 250 meters away from the western section and 1 400 meters from the eastern section.

Railway line

A railway line passes east of the Western Section of the proposed mining area. This railway line is used for commuter and bulk transporting. The railway line is 220 meters away from the western section and 1 430 meters from the eastern section.

Apies River and Bon Accord Dam

The Apies River runs in a northern direction into the Bon Accord Dam and continues to join the Pienaars River in the north. The dam has a capacity of 4 380 000m³ and occupies an area of 144 hectares. They are situated in excess of 500 meters from the western quarry and more than two kilometres away from the eastern quarry. The Bon Accord Dam is 620 meters away from the mining operations and the Apies River 950 meters.

Housing

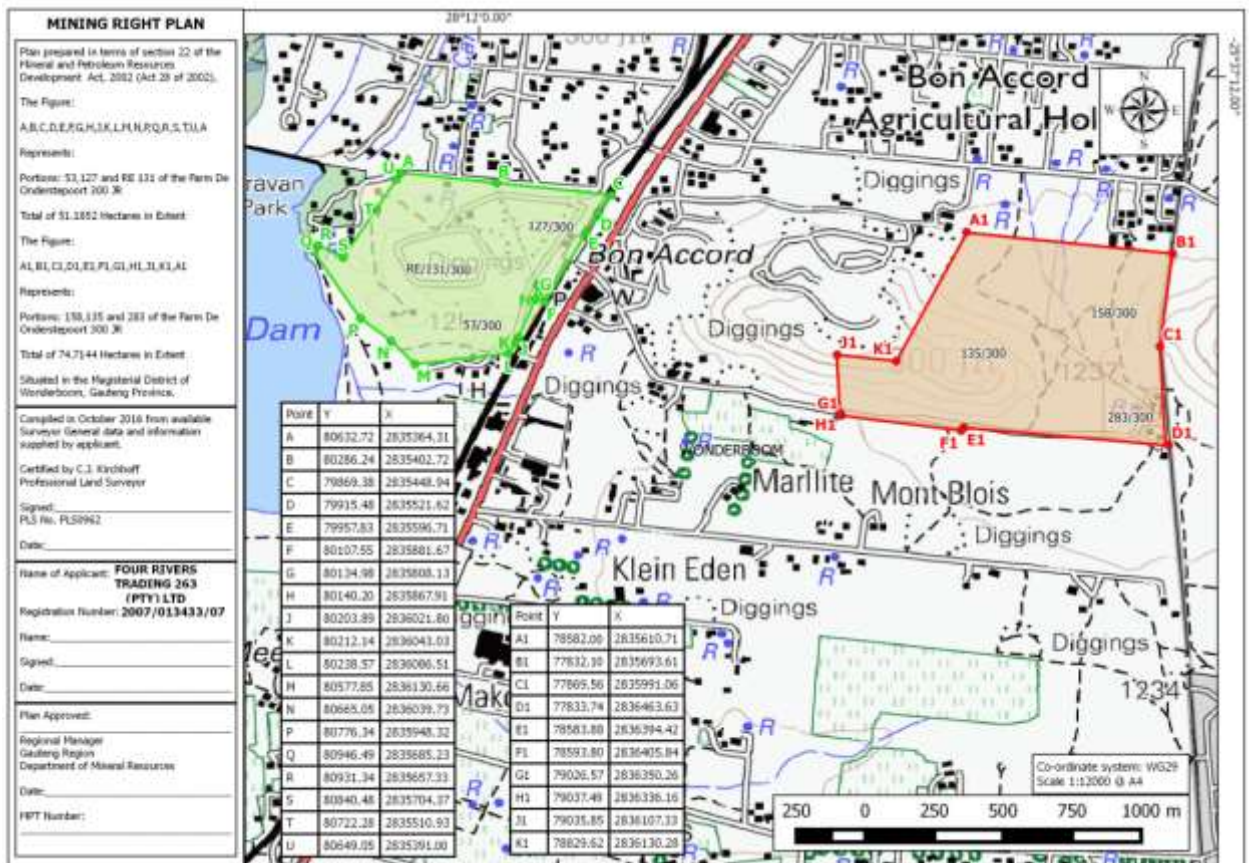
Several small holdings, houses, workers housing and its related infrastructure exist around the proposed mining area. The closest to the mining area is 180 meters away at the western section and 310 at the eastern section. These structures will be inspected once the Mining Right is granted and prior to mining commencing.

Urban development

The city of Pretoria and its suburbs, Soshanguwe and Rosslyn is situated in close proximity of the proposed mining operations.

(d) Environmental and current land use map. (Show all environmental, and current land use features)

Figure 8-16 Current land use (maps)



IMPACT ASSESSMENT

v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated).

Four Rivers will be utilizing opencast mining methods for the removal of sand and stone aggregates. The mining method requires blasting and hauling of overburden and underlying strata at planned intervals.

8.16 GEOLOGY

The following geological impacts are expected:

a) The alteration of the geology of the site. The impact is permanent and cannot be avoided. Drilling and blasting should be conducted by a certified blasting technician and, at all times, be in line with the approved mine plan.

The proposed mining development could have the following impact on geology:

Subsidence

The material used to backfill the hole will subside over time and will lead to local slumping. No structures can be placed over or close to these, in particular the area that is near the edge of the mine pit.

Soil Compaction

The soil where infrastructure is built and mine activities takes place, including the roads and storage areas will become compacted.

Soil Elimination

There is a risks that the post closure would impact on the soil profile, type and characteristics such that it is not the same as what was removed. The topsoil storage will ameliorate this to some extent but there will be a change in the soil profile including compaction for a short time while vegetation establishes in and close to the area.

8.17 GROUND VIBRATION AND AIR BLAST

Blast Management and Consulting ground vibration and air blast monitoring at various points in and around the site on 27 September 2016, 27 October 2016 and 10 March 2017.

All three reports concluded that the ground vibration levels recorded were within the set limits of and safe blasting criteria. Air blast levels recorded were within the accepted levels at the structures monitored. The possibility of damage is unlikely due to ground vibration and / or air blast at the surrounding structures / buildings. No damage was observed or reported after the blast.

8.18 TOPOGRAPHY

The topography of the proposed mining area will be altered as outlined below.

Table 8-12: Alteration of topography

Structure	Approximate height/depth (metres)	Permanent/Temporary
Mining Pit	30m	Permanent
Waste rock dumps	5m	Permanent
Waste dumps	5m	Temporary
Stockpiles	7m each (5 heaps)	Temporary
Reservoir	1m	Permanent
Mobile crushers and screens	5m each (3 x mobile crushers and 4 x screens)	Temporary
Weighbridge	1m	Temporary
Offices	8m	Permanent
Storage containers	3m	Temporary
Safety berms	1.5m in pit	Temporary
Power lines	6m (existing)	Permanent
Surface water pipes	1.5m	Temporary
Security gate	4m	Permanent
Topsoil stockpiles	3m	Temporary

Source: Derived from information provided by Four Rivers

8.19 AIR QUALITY

8.19.1 Construction Phase

Activities associated with the construction phase will comprise a series of operations including land clearing, topsoil removal, material loading and hauling, stockpiling, grading, bulldozing, compaction, etc. Each of these operations has its own duration and potential for dust generation. It is anticipated, therefore, that the extent of dust emissions would vary substantially from day to day depending on the level of activity, the specific operations, and the prevailing meteorological conditions.

8.19.2 Operational Phase

Sources of emission and associated pollutants considered in the emissions inventory for the operational phase include:

- Drilling, blasting and materials handling (stone and waste rock) – PM_{2.5}, PM₁₀, TSP
- Diesel engines emissions - CO, NO_x, PM_{2.5}, PM₁₀, SO₂ and VOC
- Windblown dust from material stockpile – PM_{2.5}, PM₁₀ and TSP
- Entrained dust from unpaved roads - PM_{2.5}, PM₁₀, and TSP
- Crushing and screening (stone aggregate) – PM_{2.5}, PM₁₀, TSP

8.20 SURFACE WATER

Mining activities could have the following impacts on surface water:

- Hydrocarbon spillages
- Surface water contamination due to contact with loose soil
- Reduction in surface water run-off due to containment in box-cut, pit and other excavations.
- Change in natural flow paths and ponding of clean surface water due to construction of road drainage systems and alteration of drainage patterns.
- The void left after mining will result in a permanent reduction in MAR in relation to pre-mining conditions.
- Oil water separator not maintained in good working order - discharge of oil contaminated water
- Water consumption and potential leaks

8.21 SOILS & AGRICULTURAL POTENTIAL

The impacts on soil as a result of mining activities:

- Compaction, surface crusting erosion and hard setting of soil
- The rehabilitation of the mining area will have a positive impact of restoring soil conditions and
- Compacted soil will be ripped during the rehabilitation phase

8.22 BIODIVERSITY

Impacts of Mining activities on Fauna and Flora:

Construction phase

- Clearing of vegetation

- Invasive plant species may increase.

Operational phase

- Removal of grazing land for Domestic Animals
- Disturbance of habitat, less prominent and slower decrease in biodiversity and degradation
- Mismanagement of waste could lead to contamination of soil, surface & groundwater, degradation of vegetation and disturbance or death of fauna
- Loss of habitat for animal life
- A positive impact is the lower risk of an increase in the invasive species found on site through the implementation of invasive species control programme

Closure and Rehabilitation Phase

- Positive Impact - Re-establishment of vegetation on rehabilitated areas.

8.23 SOCIO-ECONOMIC

Construction Phase

- Positive impact - Potential employment opportunities
- Dust and noise from construction activities impacting of health of surrounding community

Operational Phase

- Positive impact - Potential employment opportunities
- Dust and noise during operational phase impacting of health of surrounding community
- Impact on the way surrounding land is used and the value perceived, due to pre-existing land use
- Traffic - The local community, roads and associated infrastructure might be affected by the increase in heavy vehicles and traffic to the site
- A possible positive impact could be the availability of infrastructure (electricity, water, roads, fences, office facilities, etc.) available for future use

Rehabilitation and Closure Phase

- Loss of employment due to end of mining operations.

8.24 VISUAL

Construction and Operational phase

- Visual impact to surrounding landscape of the existing mine
- Visual impact of artificial lighting

Rehabilitation and Closure phase

- Positive Impact - Re-establishment of vegetation and removal of haul roads and positively impact on visual aesthetics

8.25 TRAFFIC

Operational Phase

- Impacts on traffic during the construction phase
- Ground vibration (blasting and mining) might impact on roads - gravel and tar
- Additional heavy vehicles on surrounding roads;
- Damage to existing roads & pavement structures

8.26 BLASTING & VIBRATION

Identified impacts that may be caused by blasting

- Temporary dust cloud may form over the site and surrounding areas.
- Ground vibration might Impact on boreholes
- Ground vibration might Impact on roads - gravel and tar
- Blasting noise, impacting neighbouring community
- Blasting - dust - neighbouring community
- Blasting vibration - neighbouring community

8.27 LAND USE

Mining activities will impact on current land use (Eastern Mine Section)

- Change in land use (Agriculture to Mining) (Eastern Mine Site)
- Positive Impact: Increased income per hectare
- Failure to manage land use to be compatible with surrounding land use

8.28 IMPACT ASSESSMENT METHODOLOGY

vi) Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision).

The generic criteria and systematic approach used to identify, describe and assess impacts as outlined in this report is stated under this section. In order to determine the significance of an activity each activity was rated. The following parameters were used:

Consequence

The factor of the Severity x Spatial Scale x Duration = the Consequence

Severity: - how severe is the impact that the activity has on the environment?

Spatial Scale: - over what area does the activity impact?

Duration: - for how long does the activity have a continuous impact?

Likelihood

The factor of the Occurrence of Activity x Certainty of Impact = the Likelihood.

Occurrence of activity: - what is the probability for the activity to occur?

Certainty of the Impact: - How often does the activity impact on the environment?

Each parameter is rated from 1 (Lowest risk) to 5 (Highest risk).

Table 8-13: Impact Assessment Table

CONSEQUENCE: Table 1, Table 2 and Table 3	
<i>TABLE 1 - SEVERITY</i>	
How severe does the activity impact on the Environment?	
Disturbance of degraded areas, which have little conservation value. Minor change in species occurrence or variety. (Low)	1
Historically disturbed area or brownfields area. Deep water tables (>30m). Plentiful and available renewable resources.	2
Disturbance of areas that have potential conservation value or are of use as resources. Complete change in species occurrence or variety. (Medium)	3
Sensitive. Threatened, protected and or endangered areas not in immediate proximity, but not far away. Close proximity of large water courses (within 1: 50 year flood line), very shallow water tables (<1m). Limited non-renewable resources.	4
Disturbance of pristine areas that have important conservation value. Destruction of rare or endangered species (High)	5
<i>TABLE 2 – SPATIAL SCALE</i>	
How big is the area that the activity is impacting on?	
Immediate Area	1
Only the site controlled by the organisation is affected. Within Site Boundary. (Low)	2
Beyond site boundary. Local area. Neighbours and surrounding properties are affected. (Medium)	3

Four Rivers Environmental Management Programme (EMPr)

Local/Regional. Impact of the substance is noticeable in the surrounding community or municipal region.	4
Widespread. Far beyond site boundary. National to global (High)	5
TABLE 3 - DURATION	
How long does the activity impact on the Environment?	
< Few days, no measurable sign of pollutant or its effects. Within one day there is no observable or detectable sign of the pollutant. The substance is no longer impacting on the environment.	1
Up to 1 month. Substance has dissipated or disappeared within a month of release. Minimal loss of resource, species, habitat.	2
Quickly reversible. Less than the project lifespan. Short term (0 – 5 years).	3
Reversible over time. Lifespan of the project. Medium term (5 – 15 years).	4
Permanent. Beyond decommissioning. Long term (More than 15 years).	5
LIKELIHOOD: Table 4 and Table 5	
TABLE 4 – OCCURRENCE	
What is the probability for the activity to occur?	
Negligible. Less than 1:20 chance of occurrence ($P < 0.05$).	1
Occasionally. Less than 1:30 chance of occurrence	2
Low Likelihood. Less than or equal to a 50:50 chance, but at least a 1:30 chance of occurrence ($P < 0.5$, but $> 1:30$).	3
High Likelihood Greater than 50:50 chance of occurrence ($P > 0.5$).	4
100% chance of occurring	5
TABLE 5 - CERTAINTY OF IMPACTS	
How <u>often</u> does the <u>activity impact</u> on the environment?	
Unsure. Less than 40% sure of a particular fact or the likelihood of an impact occurring. Rare (could happen but unlikely)	1
Possible. Only over 40% sure of a particular fact or of the likelihood of an impact occurring. Unlikely (has occurred somewhere)	2
Probable. Over 70% sure of a particular fact of the likelihood of that impact occurring. Likely (known to occur)	3
Almost certain (occurs often)	4
Definite. More than 90% sure of a particular fact. Substantial supportive data exist to verify the assessment. Inevitable (Expected to happen often)	5
TABLE 6 - MITIGATORY POTENTIAL	
What is the potential to <u>mitigate</u> the <u>activity impact</u> on the environment?	
Excellent	1
Adequate	2
Good	3
Poor	4
Nothing in place	5
CALCULATIONS	
Table 1 X Table 2 X Table 3 = Consequence Table 4 X Table 5 = Likelihood Consequence X Likelihood = Impact Impact x 5 = Uncontrolled Impact Rating	

Impact x Mitigatory potential = Significance if Mitigated

IMPACT SIGNIFICANCE	
How acceptable is the impact?	Impact Rating
Low (Acceptable). Low risk to public health; environment.	1 – 1214
Medium (Manageable). With regulatory controls. With project proponent's commitments.	1215 – 5119
High (Unacceptable). Redesign project to remove or avoid impact. Abandon project if no mitigation is possible	> 5120

Source: Developed from Combination of sources, including DEAT (2008) Guideline, Professional capacity

8.29 IMPACTS OF ALTERNATIVES

- vii) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.**

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

Layout alternatives were not considered as part of the assessment. The Western mine area is an existing mine area with existing infrastructure.

8.29.1 Possible mitigation measures

viii) The possible mitigation measures that could be applied and the level of risk.

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

The proposed mitigation measures are included in Section ... below. This will be updated after the public participation process.

ix) Motivation where no alternative sites were considered.

Please note that no property or location alternatives were assessed as part of this amendment application.

8.29.2 Preferred Alternative

x) Statement motivating the alternative development location within the overall site. (Provide a statement motivating the final site layout that is proposed)

Please note that no property or location alternatives were assessed as part of this amendment application.

8.29.3 Significance Determination

a. Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity. (Including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.)

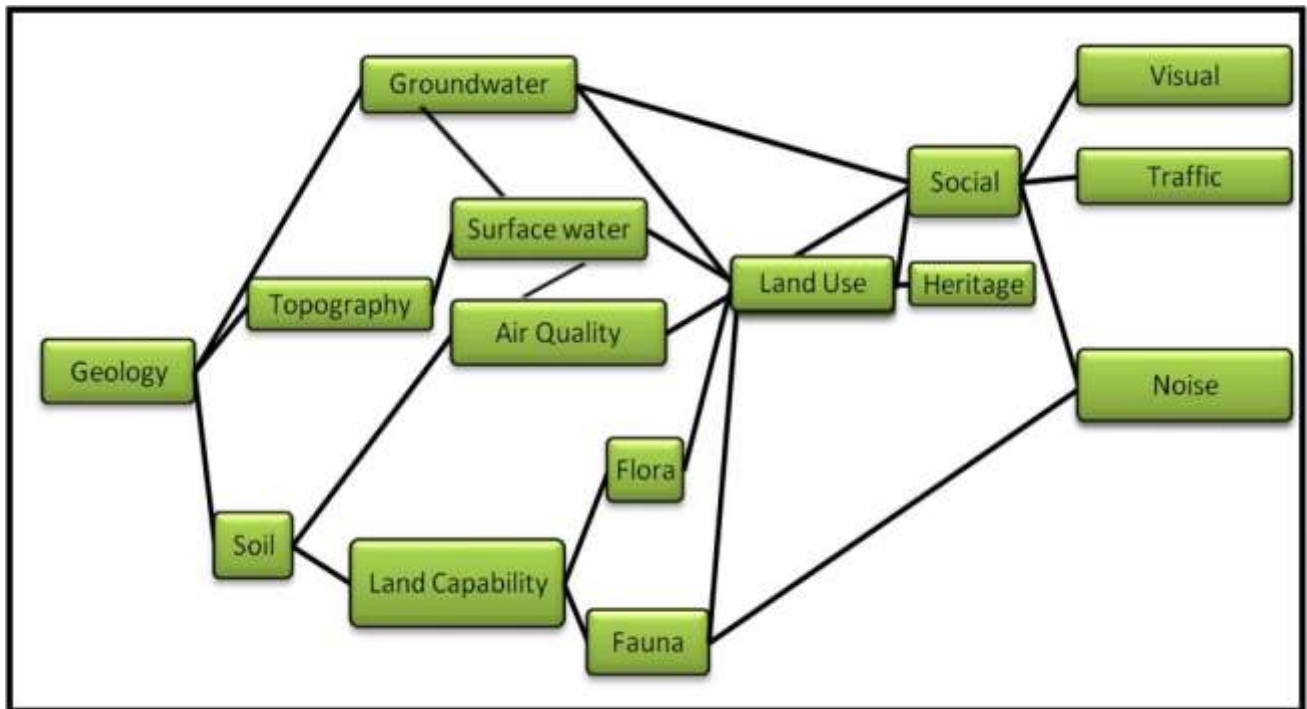
The EIA is a multi-disciplinary activity that differs from other types of project related studies in the scope and breadth of the work undertaken and includes a diversity of topics ranging from archaeological investigations to noise/vibration assessments.

In order to determine the most important impacts for each activity, the approach taken is to understand which environmental factor will be most influenced by that specific activity. Please note that because the various factors are integrated and interrelated, influencing one factor inevitably has an influence on many other factors. The integration of environmental components is complex and often conflicting in various specialist reports. In an attempt to simplify and clearly communicate the potential impacts of this project on the environment, a diagram (Figure 11) is used that will be true in 90% of the cases. Simplification inevitably leads to certain assumptions that are not always true.

To understand the diagram one would start with the environmental factor that would be most influenced by a certain activity. As an example mining a mineral resource

present in an area will have an impact on the Geology surrounding the excavated material. This in turn will lead to an impact on groundwater because, amongst other things, the geological strata determine the quality and quantity of the groundwater.

Figure 8-17: Integration of interrelated environmental factors



Source: Diagram developed by JC Baartjes

Geology also impacts on topography as different geological strata would erode differently over geological time leaving certain areas mountainous and other areas as valleys. In the same context the soil is dependent on the geological strata as soil formation develops from the mother rock (geological strata). The type of soil, the soil capability and the texture of soil are all determined by the physical properties of the mother rock.

Looking at the social component groundwater, land use and air quality influence social development, which in turn influences visual, traffic and noise. In order to determine which activities impact on the environmental factors, one determines the most likely entry point to the graph and then apply one's mind to the potential impacts associated with the environmental factors surrounding the identified environmental factor.

Please refer to paragraphs under Section 9 for a description of the environmental impacts and Section 9.14 for the methodology used to assess the impacts. Significance is determined by the acceptability and manageability of the risk. See the table below.

Table 8-14: Significance Ratings

IMPACT SIGNIFICANCE	
How acceptable is the impact?	<i>Impact Rating</i>
Low (Acceptable). Low risk to public health; environment.	1 – 1214
Medium (Manageable). With regulatory controls. With project proponent's commitments.	1215 – 5119
High (Unacceptable). Redesign project to remove or avoid impact. Abandon project if no mitigation is possible	> 5120

Source: Developed from Combination of sources, including DEAT (2008) Guideline, Professional capacity

8.30 ASSESSMENT OF SIGNIFICANT IMPACTS

b. Assessment of each identified potentially significant impact and risk

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties).

Table 8-15: Potentially significant impact and risk

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
<p><i>whether listed or not listed.</i></p> <p><i>(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.).</i></p>	<p><i>In which impact is anticipated</i></p> <p><i>(e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)</i></p>	<p><i>(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)</i></p>		<p><i>SIGNIFICANCE if not mitigated</i></p>	<p><i>modify, remedy, control, or stop</i></p> <p><i>through</i></p> <p><i>(e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)</i></p> <p><i>E.g.</i></p> <p><i>Modify through alternative method.</i></p> <p><i>Control through noise control</i></p> <p><i>Control through management and monitoring through rehabilitation..</i></p>	<p><i>SIGNIFICANCE if mitigated</i></p>
Drilling and blasting of overburden and underlying strata	Construction Operation	Alteration of the geology of the site	Geology	2500	Operational Control	1500
Drilling and blasting of overburden and underlying strata	Construction Operation	Ground vibration and air blast	Damage to houses and buildings	2400	Operational Control through Blast management	960
Drilling and blasting of overburden and	Construction Operation	Ground vibration and air blast	Creation of fly rock	1500	Operational Control	600

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
underlying strata						
Drilling and blasting of overburden and underlying strata	Construction Operation Decommissioning Post Mining	Formation of overburden dumps	Topography	2500	Rehabilitation	1500
Drilling and blasting of overburden and underlying strata	Construction Operation Decommissioning Post Mining	Blasting noise, neighbouring community	Nuisance	1500	1. Control through monitoring. 2. Remedy with notification, complaints procedure & investigation.	900
Drilling and blasting of overburden and underlying strata	Construction Operation Decommissioning Post Mining	Blasting - dust - neighbouring community	Nuisance	1500	Operational Control	900
Drilling and blasting of overburden and underlying strata	Construction Operation Decommissioning Post Mining	Blasting vibration - neighbouring community	Nuisance	1500	Operational Control	900
Stockpiling of topsoil and subsoil	Construction Operation	Mounds created in surface land use area altering the topography	Topography	2000	Rehabilitation	800
Box cutting (Eastern Mine site)	Construction	Creation of the box-cut will cause depressions	Topography	1250	Control	1250
Construction of surface water management systems, weighbridge and plant areas	Construction Operation	Cut to fill berms, trenches and plant areas will change the topography of the affected sites	Topography	2000	Control	1200
Construction of weighbridge	Construction	Soil erosion during construction	Topography	240	Remedy through rehabilitation.	144
Decommissioning of infrastructure and mining areas and rehabilitation (Western Mine)	Decommissioning Rehabilitation	A void will be left as mined material cannot be returned to the mining pit.	Topography	2500	Remedy through rehabilitation.	1500

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
Decommissioning of infrastructure and mining areas and rehabilitation (Eastern Mine)	Decommissioning Rehabilitation	A void will be left as mined material cannot be returned to the mining pit.	Topography	2500	Remedy through rehabilitation.	1000
Clearance of vegetation	Construction	Excavation of topsoil and subsoil during clearing of opencast pit and bench extensions.	Soil	2500	Control through planning and monitoring. Remedy through rehabilitation.	1500
Clearance of vegetation	Construction Operation	Exposure of soil to erosion	Soil	1200	Control through planning and monitoring. Remedy through rehabilitation.	720
Movement of vehicles	Construction Operation	Compaction, surface crusting erosion and hard setting of soil	Soil	1600	Control through planning and monitoring. Remedy through rehabilitation.	960
Hydrocarbon spills occur when using heavy machinery, as they all use oils and diesel to run, thus impacting soil quality	Construction Operation Decommissioning	Hydrocarbon spillages	Soil	240	Remedy through clean-up Avoid through bunding Stop through placement of drip trays Control through vehicle maintenance	96
Hydrocarbon spills occur when using heavy machinery, as they all use oils and diesel to run, thus impacting soil quality	Construction Operation Decommissioning	Hydrocarbon spillages	Surface water	480	Remedy through clean-up Avoid through bunding Stop through placement of drip trays Control through vehicle maintenance	192
Stripping and stockpiling of soils	Construction Operation Decommissioning	Loss of soil structure, depth, volume and function	Soil	600	Control through planning and monitoring. Remedy through rehabilitation.	240
Decommissioning of infrastructure and mining areas and rehabilitation	Decommissioning	Stockpiled soils will be utilized for the rehabilitation of levelled areas. The possible mixing of soils might affect the functionality of the soil.	Soil	1200	Control through planning and monitoring. Remedy through rehabilitation.	720

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
1. Decommissioning of infrastructure and mining areas and rehabilitation. 2. Shaping and rehabilitation of mining voids	Decommissioning	Exposed soil will be subject to water and wind erosion, resulting in the loss of soil.	Soil	540	Control through planning and monitoring. Remedy through rehabilitation.	324
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Sterilization of agricultural potential	Land capability	1500	Control through implementation of mine plan	900
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Alteration of land capability	Land capability	2500	Control through implementation of mine plan	1500
Decommissioning of infrastructure and mining areas and rehabilitation	Decommissioning	Land capability will not in all instances return to the same as pre-mining land capability	Land capability	2500	Control through rehabilitation/closure plan	1500
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Change in land use (Agriculture to Mining) (Eastern Mine Site)	Land use	1250	Control through implementation of mine plan	250
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Change in land use (Agriculture to Mining). Positive Impact: Increased income per hectare	Land use	3200	Control through implementation of legal requirements	640
Decommissioning of infrastructure and mining areas and rehabilitation	Decommissioning	Failure to manage land use to be compatible with surrounding land use	Land use	3750	Control through rehabilitation/closure plan	1500
Removal of vegetation	Construction Operation	Loss of seed banks resulting in a decrease of propagation potential of plants	Flora	720	Control through management practices.	288
Construction of infrastructure. Mining. (Including box cut)	Decommissioning Rehabilitation	Insufficient re-establishment of indigenous vegetation in disturbed areas	Flora	1080	Control through EMP monitoring Programme.	432

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Loss of habitat for animal life	Fauna	3000	1. Control through awareness. 2, Remedy through rehabilitation efforts	1800
Decommissioning of infrastructure and mining areas and rehabilitation	Decommissioning Post Closure	Prevention of the re-introduction of animal life	Fauna	810	Control through awareness and monitoring	486
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Surface water contamination due to contact with loose soil	Surface water	1620	Control through water management system	648
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Reduction in surface water run-off due to containment in box-cut, pit and other excavations.	Surface water	1875	Control through water management system	1125
Construction of infrastructure, including site establishment, the digging of foundations, erection of structures, weighbridge and fencing, development of access roads, development of box cuts, etc.	Construction	Change in natural flow paths and ponding of clean surface water due to construction of road drainage systems and alteration of drainage patterns.	Surface water	2400	Control through water management system	1440
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Surface water contamination due to inadequate surface water management measures put in place.	Surface water	1080	Control through water management system	648
Construction of infrastructure. Mining. (Including box cut)	Construction	Increased suspended solids in surface water runoff due to erosion of exposed surfaces.	Surface water	810	Erosion control	486
Construction of surface water management systems	Construction Operation Decommissioning Post closure	Positive impact - Construction of surface water management infrastructure will ensure that clean and dirty water is	Surface water	3600	N/A	0

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
		separated and possible water quality related impacts mitigated.				
Water Storage (store water in plastic jojo tank(s))	Construction Operation	Positive impact - Water management to ensure regular supply of water is available	Surface water	300	N/A	0
Failure of surface water management systems	Operation	Possible flooding of mine workings and subsequent contamination of downstream receiving water body in the event of failure of storm water management systems or extreme storm events.	Surface water	160	Control through planning and monitoring. Remedy through rehabilitation.	128
Decommissioning of infrastructure and mining areas and rehabilitation	Decommissioning Post closure	Changes in topography, uneven slopes, as well as depressions and settlement/slumping on rehabilitated areas may lead to interception of natural runoff or create ponding resulting in an impact on the catchment yield.	Surface water	3600	Control through planning and monitoring. Remedy through rehabilitation.	2880
Decommissioning of infrastructure and mining areas and rehabilitation	Decommissioning Post closure	A concentration of runoff over rehabilitated areas may cause erosion and possible water contamination	Surface water	1080	Control through planning and monitoring. Remedy through rehabilitation.	864
Decommissioning of infrastructure and mining areas and rehabilitation	Decommissioning	The pollution of nearby water sources may occur as a result of erosion while rehabilitation is still in progress	Surface water	720	Control through planning and monitoring. Remedy through rehabilitation.	432
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Damage to surrounding boreholes	Groundwater	1350	Control via prevention of damage.	810
Construction of infrastructure.	Construction	Potential seepage from construction and mining sites might result in groundwater	Groundwater	600	Control via water management and	360

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
Mining. (Including box cut)		contamination			monitoring	
Mining	Operation	Dewatering of the aquifer	Groundwater	1440	Control through planning and monitoring. Remedy through rehabilitation.	864
Blasting	Construction Operation	Temporary dust cloud may form over the site and surrounding areas.	Air Quality	1500	1. Control through correct stemming and effective blast management. 2. Control through monitoring. 3, Remedy with notification, complaints procedure & investigation.	900
Construction and mining activities	Construction Operation	Generation of dust.	Air Quality	750	1. Control through monitoring. 2. Remedy with notification, complaints procedure & investigation.	300
Movement of vehicles over exposed surface areas	Construction	Dust along the transport routes on site.	Air Quality	750	1. Control through monitoring. 2. Remedy with notification, complaints procedure & investigation.	300
Drilling and blasting	Construction Operation	Periodical increases in ambient noise level. Increases of approximately 15dB can be expected in some areas.	Noise	1500	1. Control through monitoring. 2. Remedy with notification, complaints procedure & investigation.	900
Mining and crushing	Operations	Nuisance noise to people living close to the mine.	Noise	750	1. Control through monitoring. 2. Remedy with notification, complaints procedure & investigation.	450
Movement of haulage trucks	Construction Operation	Nuisance noise to people living close to the transport routes.	Noise	750	1. Control through monitoring. 2. Remedy with	450

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
					notification, complaints procedure & investigation.	
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Disturbance of archaeological sites and graves	Cultural heritage	1080	Control through planning and monitoring. Remedy through rehabilitation.	648
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Surface water diverted around infrastructure and other depressions and dirty water areas will lead to water being released as point source discharges resulting in concentrated flows	Sensitive landscapes	1620	Control through planning and monitoring. Remedy through rehabilitation.	972
Mining and rehabilitation	Construction Operation	Visual impact to surrounding landscape of existing mine	Visual aesthetics	3000	1. Remedy through management of stockpile height and vegetation screens. 2. Modify through planting of indigenous vegetation.	1200
Construction of infrastructure. Mining. (Including box cut)	Construction Operation	Positive impact - Potential employment opportunities	Socio-Economic	8000	N/A	0
Operational activities - Increase in staff and increase in traffic and heavy vehicles; facilitating spreading of invasive plants	Operations	Invasive plant species may increase.	Flora	720	Control through implementation of alien invasive control management plan	288
Management & operation of mine (Invasive Species management)	Operations	A positive impact is the lower risk of an increase in the invasive species found on site through the implementation of invasive species control programme	Flora	1280	None required	1280

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
<p>1. Shaping and rehabilitation of mining voids.</p> <p>2. Decommissioning and rehabilitation of infrastructure.</p>	Decommissioning	Changes in topography, uneven slopes, as well as depressions and settlement/slumping on rehabilitated areas may lead to the interception of natural runoff or create ponding on such rehabilitated areas. Excessive ponding and interception of runoff during the execution of the rehabilitation activities may result in a reduction in runoff and thus an impact of the catchment yield.	Surface water	4500	Control through planning and monitoring. Remedy through rehabilitation.	2700
Shaping and rehabilitation of mining voids	Decommissioning	A change in runoff patterns, especially the concentration of runoff in certain areas may occur due to the rehabilitation of the mining areas. A concentration in run off over rehabilitated surfaces will cause excessive erosion and subsequent poor quality of runoff from the rehabilitated surfaces.	Surface water	1920	Control through planning and monitoring. Remedy through rehabilitation.	1152
Shaping and rehabilitation of mining voids	Decommissioning	The pollution of nearby water sources may occur as a result of erosion of rehabilitated surface soils due to a lack of vegetation cover on rehabilitated surfaces, while rehabilitation is still in progress.	Surface water	810	Control through planning and monitoring. Remedy through rehabilitation.	486
Shaping and rehabilitation of	Decommissioning	The void left after mining will result in a permanent	Surface water	3750	Control through planning and monitoring. Remedy	2250

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
mining voids		reduction in MAR in relation to pre-mining conditions.			through rehabilitation.	
Shaping and rehabilitation of mining voids	Decommissioning	Potential groundwater pollution due to seepage from void.	Groundwater	450	Control through planning and monitoring. Remedy through rehabilitation.	180
1. Shaping and rehabilitation of mining voids. 2. Decommissioning and rehabilitation of infrastructure.	Decommissioning	It is not anticipated that the proposed rehabilitation activities will result in any further destruction of graves or sites of archaeological significance.	Cultural Heritage	600	Control through planning and monitoring. Remedy through rehabilitation.	240
Shaping and rehabilitation of mining voids	Decommissioning	Loss of employment due to end of mining operations.	Socio-Economic	10000	Reduce through training	4000
Decommissioning and rehabilitation of infrastructure	Decommissioning	Positive Impact - Remaining soil stockpiles will be removed and used in the rehabilitation of disturbed areas previously used for infrastructure such as haul roads.	Topography	2500	N/A	0
Decommissioning and rehabilitation of infrastructure	Decommissioning	Positive Impact - Compacted soils on haul roads and stockpile platforms will be ripped and seeded.	Soil	2000	N/A	0
Decommissioning and rehabilitation of infrastructure	Decommissioning	Positive Impact - Re-establishment of vegetation on rehabilitated areas.	Flora	1280	None required	0
Decommissioning and rehabilitation of infrastructure	Decommissioning	Positive Impact - Infiltration of surface water into the aquifer will return to pre-mining conditions due to removal of compacted surfaces.	Groundwater	450	Control through planning and monitoring. Remedy through rehabilitation.	0
Decommissioning and	Decommissioning	Ripping of compacted areas	Air Quality	750	1. Control through	300

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
rehabilitation of infrastructure		might increase dust levels.			monitoring. 2. Remedy with notification, complaints procedure & investigation.	
Decommissioning and rehabilitation of infrastructure	Decommissioning	Positive Impact - Re-establishment of vegetation and removal of haul roads and positively impact on visual aesthetics	Visual aesthetics	3000	Control through planning and monitoring. Remedy through rehabilitation.	0
Groundwater might seep into the excavation area if the water table is breached	Operational	Potential change in groundwater levels due to restabilising of the breached water level	Groundwater	3600	None required	2160
Drilling, blasting, materials handling, Diesel engines emissions, Crushing and screening (Gaseous pollutants)	Construction Operation	Health effects due to gaseous pollutants (NO ₂ , VOC, CO, SO ₂)	Air Quality	60	Emission control by routine maintenance	48
Construction activities of roads	Construction	Spread of alien invasive plant species increased edge effects on road verges as a result of vehicles not staying within the demarcated roads, damage of species also occurs.	Flora	720	Control through restricting access to natural areas and awareness	288
Ineffective rehabilitation affecting flora	Closure and Post closure	The possibility exists for rehabilitation to be ineffective if measures are not appropriately complied to or rehabilitation is not planned well in advance.	Flora	720	Remedy through implementation of effective rehabilitation plan	288
Mine development on grazing land	Construction	Removal of grazing land for Domestic Animals	Fauna	2400	Control through awareness	1440
Operational activities (Continuous human activity over a long term)	Operational	Disturbance of habitat, less prominent and slower decrease in biodiversity and	Fauna	1920	Control through access restrictions and implementation of veld	1152

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
period, noise, the smell of humans, physical penetration into sensitive zones and natural areas)		degradation			management plan	
Closure of mine making land available for grazing	Closure Post closure	Positive impact Grazing Capacity of Domestic Animals	Fauna	1920	Positive Impact Control through awareness and implementation of grazing management plan	0
Blasting that can affect boreholes	Operation	Ground vibration might Impact on boreholes	Boreholes	360	Operational Control through Blast management	144
Blasting that can affect roads	Operation	Ground vibration might Impact on roads - gravel and tar	Roads	120	Stop through maintaining safe blasting distance, clearance of people & animals, closure of road & scheduling of blasts. Control through proper blasting practices and monitoring.	48
Construction activities (Establishment of the temporary site office and project infrastructure, access roads, general site preparation and operation, excavations, stockpiling soil and spoils removal of vegetation, exposure of bare soil, soil scars and exposed slope faces from excavations, contrasts of colour, form, texture, and line, primary dust impact associated with dust, littering by	Construction	Visual impact to surrounding landscape.	Visual aesthetics	2160	1. Control through dust suppression and awareness training. 2. Remedy through concurrent rehabilitation 3. Modify through landscaping	1296

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
labourers).						
Artificial lighting at night	Operational	Visual impact of artificial lighting	Sense of place (evening)	1440	Remedy through type and placement of lighting	864
Construction activities - Vegetation clearance, excavations, movement of soil	Construction	Damage or destruction of any identified aspect of archaeology, cultural or heritage sites detailed in the Heritage Report during construction activities.	Archaeology, cultural & heritage sites	1000	Avoid through fencing Control through authorisation from SAHRA	600
Activities that causes air pollution	Construction and Operation	Dust	Socio-economic (Health)	2560	Addressed at Air Quality	1024
Activities that causes noise pollution	Construction and Operation	Noise	Socio-economic (Health)	2560	Addressed at Noise and at Blasting	1024
Mining development since 1904 affecting surrounding land use	Operation and Closure	Impact on the way surrounding land is used and the value perceived, due to pre-existing land use	Socio-Economic	1875	Remedy through regularising land use	1875
Additional vehicles and heavy vehicles on road network	Construction and Operation	The local community, roads and associated infrastructure might be affected by the increase in heavy vehicles and traffic to the site	Socio-economic (Traffic)	2400	Addressed at traffic	1440
Heavy Vehicles driving on roads	Operation	Additional heavy vehicles on surrounding roads; Damage to existing roads & Pavement Structures	Roads damage and Traffic	3840	Control through monitoring, repair, delivery times & using rail for freight deliveries where possible	3072
Mechanical and physical disturbance associated with the proposed open-cast mining activities, whether it is created by blasting and digging of soil and rock, transportation of	Construction, operation and decommissioning	Dust	Air Quality	2880	1. Control through monitoring. 2. Remedy with notification, complaints procedure & investigation.	1728

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
materials or processing of ore, would create dust.						
Flooding (1:100 Recurrence Interval (RI) flood event)	Construction & Operation	Sedimentation of river, soil erosion, contamination of storm water	Storm water	160	Stop through construction of storm water control infrastructure	96
Fires (discarded cigarettes, open fires, sparks from equipment, electrical fires, lightning, arson)	Construction, Operation & Closure	Fires	Surrounding Areas and Infrastructure	540	Stop through establishment of fire break and control through implementation of fire prevention measures and training	324
Closure of mine making infrastructure available for future development	Closure and Post closure	A possible positive impact could be the availability of infrastructure (electricity, water, roads, fences, office facilities, etc.) available for future use	Socio-economic	3750	Positive Impact	0
Mine development on property (location advantage)	Construction & Operation	A positive impact is the location of the proposed mine development close to possible work force with no additional roads and infrastructure that needs to be developed to the site	Economic	3750	Positive Impact	0
General and hazardous waste generation by activities & people	Construction, Operation Decommissioning Closure Rehabilitation	Mismanagement of waste could lead to contamination of soil, surface & groundwater, degradation of vegetation and disturbance or death of fauna	Natural environment	2880	Control through management procedure.	1728
Open-pit operations stability and rehabilitation of pit walls both during and after mine life needs to be planned.	Construction, Operation Decommissioning Closure Rehabilitation	Open pit stability issues	Topography	1200	Control through Mine work Plan	720

Four Rivers Environmental Management Programme (EMPr)

ACTIVITIES	PHASE	POTENTIAL IMPACT	ASPECTS AFFECTED	UNCONTROLLED IMPACT RATING	MITIGATION TYPE	SIGNIFICANCE if mitigated
Vehicle wash bay	Operational	Oil water separator not maintained in good working order - discharge of oil contaminated water	Surface water	960	Control through management procedure.	576
Water use for dust suppression - water abstraction from Bon Accord Dam	Operational	Water consumption and potential leaks	Surface water	2160	Control through water management system	1296
Water use for dust suppression - water abstraction from the quarry	Operational	Water consumption and potential leaks	Surface water	1440	Control through water management system	864
Water use for dust suppression - water abstraction from Municipal supplied water	Operational	Use of drinking water for dust suppression	Municipal Water	960	Control water quantity through saving mechanisms	576
Water use Borehole - water abstraction	Operational	Decrease in groundwater quantity	Groundwater	3600		2160
Dismantling of processing plant and related structures	Decommissioning Closure Rehabilitation	Crushing temporary mobile plant	Soil	540	Rehabilitation	324
Rehabilitation of access roads	Decommissioning Closure Rehabilitation	Compaction, surface crusting erosion and hard setting of soil	Soil	900	Control through planning and monitoring. Remedy through rehabilitation.	540
Rehabilitation of overburden and spoils	Decommissioning Closure Rehabilitation	Positive Impact rehabilitation	Soil	1500	Rehabilitation	900
Sense of place	Construction and Operation	Communication with neighbours	Socio-Economic	6000	Control through implementation of procedures and no informal housing on site	3600

The supporting impact assessment conducted by the EAP must be attached as an appendix, marked **Appendix 7**

8.31 RECOMMENDATIONS FROM SPECIALISTS

c. Summary of specialist reports.

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):-

Table 8-16: Summary of specialist reports

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Heritage Impact Assessment: Phase 1 HIA on Portions 53, 127, 131 & 135 of the farm De Onderstepoort 300JR	1. Fence the graves of western mine area in and have a management plan drafted by heritage expert for the sustainable preservation thereof. 2. Should subterranean presence of archaeological and/or historical sites, features or artefacts be discovered, further disturbance must be stopped and a qualified archaeologist must be called in to investigate the occurrence.	X	Section 8
Alien Invasive Plan	1. Management plan for control of invasive/exotic plant species needs to be implemented. 2. Removal of these species is an ongoing process and if not managed regularly could result in severe changes and competition in plant communities.	X	Section 8

Attach copies of Specialist Reports as appendices

9 ENVIRONMENTAL IMPACT STATEMENT

d. Environmental impact statement

i. Summary of the key findings of the environmental impact assessment;

Table 9-1: Summary of key findings

	KEY FINDINGS	MITIGATION MEASURES
1	Communication with neighbours	<ol style="list-style-type: none"> 1. Establish a grievance mechanism that will specify procedures for lodging and registering complaints – by external parties, employees and contractors – and for responses to them including time limits for responding and addressing the complaint, and recording of same. 2. Draw up a public awareness programme that identifies areas of risk from a community health and safety perspective. 3. No informal settlements will be allowed on mine property. 4. Routine inspection of boundary fences.
2	Additional heavy vehicles on surrounding roads; Damage to existing roads & Pavement Structures	<ol style="list-style-type: none"> 1. Encouraging the receipt of materials during non-peak traffic hours to avoid traffic build-up. 2. Monitor the condition of the roads used 3. Repair the road where it becomes damaged due to mine traffic 4. Implement effective maintenance schedule for road management
3	Changes in topography, uneven slopes may lead to the interception of natural runoff or create ponding Excessive ponding and interception of runoff during the execution of the rehabilitation activities may result in a reduction in runoff and thus an impact of the catchment yield.	<ol style="list-style-type: none"> 1. Ongoing backfill of rehabilitated areas and soil balancing during the rehabilitation process should be undertaken continuously as mining progress. 2. Rehabilitation should be undertaken in such a manner as to ensure the creation of a free draining scenario of surface water runoff from rehabilitated areas. 3. Rehabilitated surfaces will be surveyed and verified that it matches the target post rehabilitation topography on an annual basis for the duration of the decommissioning phase until the rehabilitated surfaces have been proven to be stable. 4. Haul roads should be ripped, shaped and seeded to allow free drainage of surface water. 5. Rehabilitated areas should be surveyed and it should be verified that that it matches the target post rehabilitation topography. These surveys should be conducted annually during decommissioning until surfaces are stable.
4	The void left after mining will result in a permanent reduction in MAR in relation to pre-mining conditions.	<ol style="list-style-type: none"> 1. The permanent void left will collect mainly precipitation. This will result in a permanent reduction in the Mean Annual Run-off (MAR) that cannot be mitigated. 2. Additional hard surfacing will increase the MAR as accumulation of water will result in increased penetration. 3. Rehabilitation of surrounding areas should be conducted in such a manner that the topography returns to pre-mining conditions as far as possible. 4. Stockpiled soils and overburden should be used in the rehabilitation of the opencast pits and final pits and remaining voids. 5. Backfilled areas should be covered by soil from stockpiles and shaped.
5	Potential change in groundwater levels due to restabilising of the breached water level	Groundwater levels need to be monitored. The impact will be limited to the Mine site as there will not be any dewatering activities. The new water table will therefore remain stable.
6	Decrease in groundwater quantity	Continuous groundwater monitoring. The risk of groundwater contamination is very limited as there are no chemical treatment on site and no contaminants in the ore.
7	Impact on the way surrounding land is used and the value perceived, due to pre-existing land use	<ol style="list-style-type: none"> 1. Regularise the pre-existing lawful land use with current legislation.

Four Rivers Environmental Management Programme (EMPr)

9	Loss of habitat for animal life	<ol style="list-style-type: none"> 1. All construction and mining activities should be limited to the areas indicated on the mine plan. 2. The extent of vegetation clearance should be restricted to designated areas through the use of barriers and notifications. 3. Closure monitoring of faunal communities to ensure that ecology is restored and self-sustaining. 4. Animals needs to be encouraged to move the area prior to vegetation clearance by making noise before the site is cleared. 5. Ensure awareness amongst all staff, contractors and visitors to the site to not needlessly harm or hinder animals.
10	Dust	<ol style="list-style-type: none"> 1. Conduct regular dust suppression with water or alternative mechanisms. 2. Conduct dust fall-out monitoring. 3. Prevent dust by revegetating areas where possible
11	Mismanagement of waste could lead to contamination of soil, surface & groundwater, degradation of vegetation and disturbance or death of fauna	<ol style="list-style-type: none"> 1. Develop a Waste Management Procedure 2. A designated area for the placement of waste skips must be determined prior to construction activities, and the area will have to be cemented. 3. Place all waste in a skip to be collected by approved waste management companies. 4. Ensure that hazardous waste is disposed of at a licensed waste disposal facility. Proof of disposal (certificates / waybills) must be maintained for auditing purposes. 5. Allowance for keeping clean water run-off away from the skip area through the correct bunding design. 6. The burning of waste on site and excavation and use of rubbish pits are forbidden unless specifically authorised. 7. No littering allowed. 8. Promote reduce, re-use and recycling of waste.
12	Alteration of the geology of the site	<ol style="list-style-type: none"> 1. Drilling and blasting should be conducted by a certified blasting technician in accordance with specialized and localized blasting techniques in order to mitigate any possible impact on the surrounding geological strata.
13	Formation of overburden dumps	<ol style="list-style-type: none"> 1. Waste rock dumps should not exceed 5 meters in height. 2. Remnant waste rock or overburden stockpiles should be covered with layered covering to exclude infiltrating rain water and topsoil needs to be placed before the rainy season to ensure permanent vegetation cover. 3. Proposed waste rock areas needs to be included in the cost of Financial provision.
14	Excavation of topsoil and subsoil during clearing of opencast pit and bench extensions.	<ol style="list-style-type: none"> 1. An accurate soil map indicating classification, thickness and fertility status should be compiled (Eastern Mine area). 2. Remove and stockpile 500mm topsoil in berms or heaps less than 1.5m high. 3. Vegetate topsoil heaps with diverse grass mix to control erosion.
15	Alteration of land capability	<ol style="list-style-type: none"> 1. All construction and mining activities should be limited to the areas indicated on the mine plan. 2. Conduct activities on already disturbed land.
16	Land capability will not in all instances return to the same as pre-mining land capability	<ol style="list-style-type: none"> 1. A soil utilization and rehabilitation plan should be developed prior to rehabilitation and implemented as soon as rehabilitation commences.
17	Failure to manage land use to be compatible with surrounding land use	<ol style="list-style-type: none"> 1. The land should as far as possible be rehabilitated to its pre-mining land capability, to reduce the extent of the anticipated residual impacts. 2. Take into account developments in surrounding areas and design post-mining land use options to support and enhance long-term development options. 3. Opencast areas will be permanently affected and cannot be rehabilitated to pre-mining land use.
18	Visual impact to surrounding landscape.	<ol style="list-style-type: none"> 1. Reduce and control dust through the use of approved dust suspension techniques as and when required. 2. Rehabilitate any exposed soils as soon as construction has been completed to stabilise loose soils. 3. Institute low-scale landscaping throughout the project site to act as bio-filters. 4. Institute an awareness training programme to make contractors and sub contractor aware of site rules in terms of housekeeping.
19	Water consumption and potential leaks	<ol style="list-style-type: none"> 1. Surface water management infrastructure should be designed to comply with legal requirements.
20	Creation of the box-cut will cause depressions	Impact cannot be mitigated during the construction phase. Rehabilitation will only commence during operations.

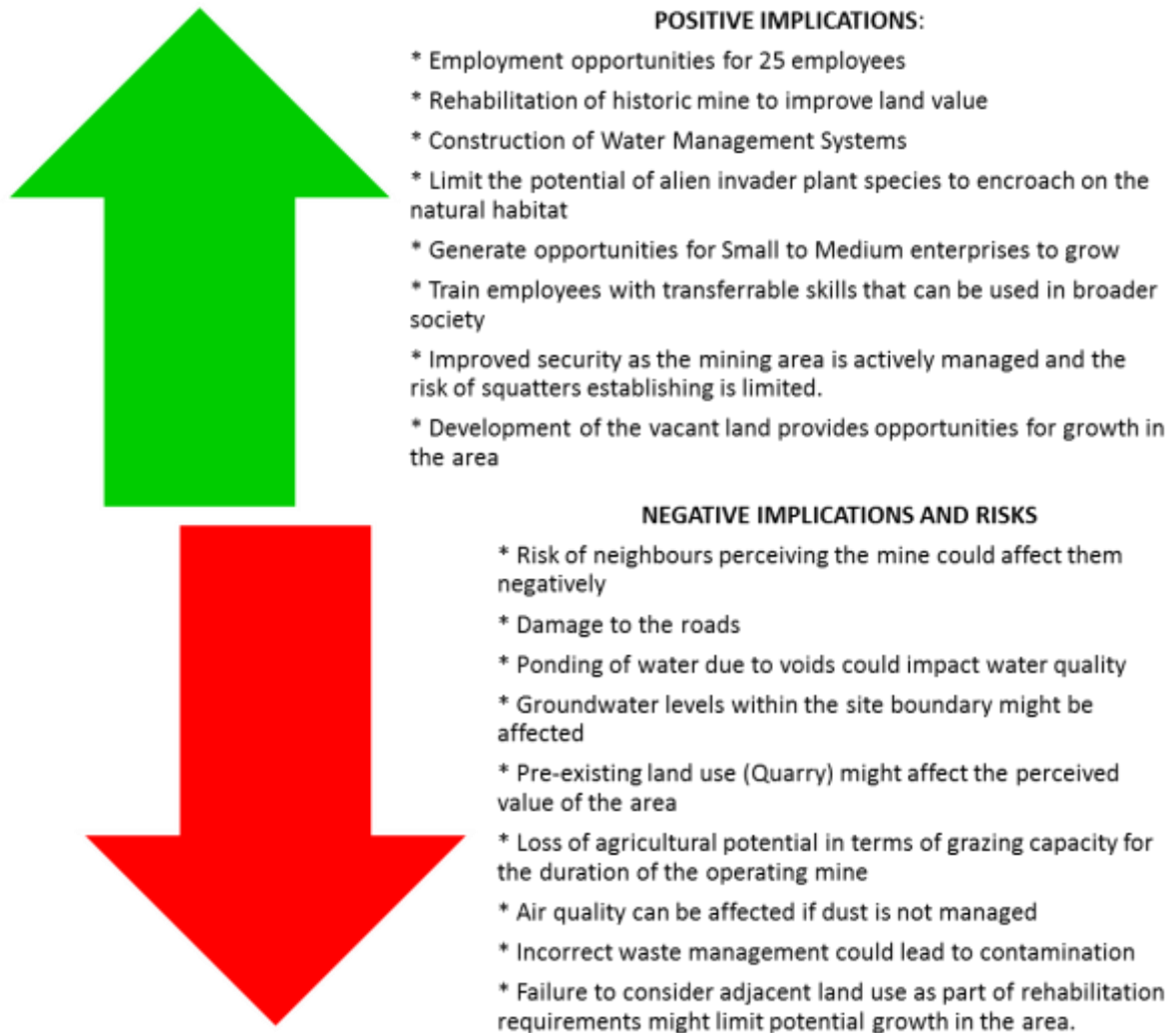
ii. Final Site Map

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers .

Please refer to **Appendix 8** for the Sensitivity & Activity Map.

iii. Summary of the positive and negative implications and risks of the proposed activity and identified alternatives;

Figure 9-1: Summary of positive and negative implications and risks



e. Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr;

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.

The objectives of the impact management process are as follows:

Air Quality:

To ensure that the construction and operation of the proposed development has a minimal adverse impact on air quality.

Groundwater:

To ensure that the construction and operation of the proposed mine development has minimal adverse impact on the surrounding groundwater water quality and prevents pollution of existing groundwater resources.

Surface Water

To ensure that the construction and operation of the proposed Mine development effectively utilise the consumption of freshwater, has minimal adverse impact on the surrounding surface water quality and prevents pollution of surrounding surface water resources. Adherence to the Monitoring Plan

Soils

To ensure that the development and operation of the proposed mine development has a positive impact on land and soils by mitigating potential erosion, preventing contamination & pollution and by implementing erosion prevention management plan.

Socio-Economic

To aid in the improvement of current, local, regional and national economies and improve the social environment of communities affected by the development of the proposed mine.

Visual

To mitigate and possibly negate the visual impacts associated with the planning of the proposed mine development during planning, construction, operation and decommissioning phases.

Noise

To control noise pollution stemming from the construction and operational activities of the proposed mine development.

Blasting & Vibration

To identify and avoid adverse effects of blasting and vibration on structures and humans caused by the proposed mining activities and to implement the necessary safety measures in accordance with legislation.

10 CONDITIONS OF AUTHORISATION AND EMPr

f. Final proposed alternatives.

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

Site location alternatives were not assessed as part of this amendment application. Alternatives in terms of land use after mining has been described , refer to Section 6.

g. Aspects for inclusion as conditions of Authorisation.

Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation

The following aspects should be considered for inclusion as conditions of the Authorisation:

Air Quality

- It is recommended that dustfall monitoring be conducted as part of the mine's air quality management plan, this should as a minimum adhere to the dust

monitoring regulations. This should be undertaken throughout the life of mine to provide air quality trends.

- Should the monitoring results indicate exceedance or potential for exceedances of the 24hour and annual SA NAAQS and National Dust Control Regulations additional dust suppression measures such as binding agents or chemical suppressants on dirt roads must be applied.
- If the above mentioned measures are inadequate special attention must be given to other dust generating activities, e.g. Crushers and screens should be enclosed and fitted with a dust collector or fabric filter. During transportation of ore, wastes and products, trucks should be well covered in order to avoid spillages. This will reduce PM emissions during transportation.

Surface Water

- The water balance should be updated once more specific domestic and process water reticulation volumes are known
- The water balance should be refined annually during the life of the mine.
- Flow meters should be installed in the domestic and process water circuits to provide actual data on water flows so that the water balance can be updated accordingly.
- A surface water monitoring programme should be implemented in line with water use licence conditions.
- A suitable dynamic water balance simulation model should be developed and used as a decision support tool as mining progresses.

Soils & Agricultural Potential

- Topsoil should be effectively stockpiled and managed.
- The depth of stockpile must not be more than 2.5 to 3 m.
- Topsoil should be stockpiled away from any underlying spoil material and cross-contamination should not be allowed.
- Stockpiles must be placed on a free draining location to limit erosion loss and water logging.
- Re-vegetate cleared areas and re-vegetate / cover stockpiles to avoid wind and water erosion loss.
- Maintain looseness of stockpiled soil by fertilising and seeding the soil by hand;
- Soil stockpiles should be monitored for fertility by sampling and testing.
- Minimise working on windy days where possible.
- Minimise the period of exposure of soil surfaces through dedicated planning.
- Monitor the condition of all unpaved roads due to rainfall and potential of water run-off and erosion on unpaved roads, especially during rainy season

Fauna & Flora

- Establish a fire break.
- During the maintenance work of roads, or any other areas, staff should be prohibited from entering and disturbing the surrounding natural areas.
- The remaining natural areas should be managed to prevent further degradation.
- Continuous rehabilitation of the area should take place.
- Animals (wildlife and domestic animals) may not be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees.

- A protected tree survey be undertaken on the proposed mining area, which should include exact locations of all individual protected tree species and density calculations.
- Any protected, endemic, rare or vulnerable species that occurs on the proposed site should be protected and/or left undisturbed. These species may only be relocated with the required permits to favourable sites with the use of a specialist prior to vegetation removal.
- The vegetation removal during the construction phase should be controlled and very specific.
- A management plan for control of invasive/exotic plant species needs to be implemented.

Freshwater

- No untreated water may be discharged to fresh surface water sources, the quality of the water discharged at the operation must be closely monitored.

Socio-economic

- The local jobs created should be linked to a skills development programme for permanent employment as per the SLP.
- Appoint a service provider to develop, implement and manage a “Health & Safety Orientation Programme” which include information on HIV/AIDS, TB, and alcohol abuse prevention, with all temporary and permanent workers on the site.
- Ensure workers have information available and sign a “code of conduct” at the start of employment which gives an overview of acceptable behaviour and information regarding health & safety on the site
- Establish a grievance mechanism that will specify procedures for lodging and registering complaints – by external parties, employees and contractors – and for responses to them including time limits for responding and addressing the complaint, and recording of same.

Noise

- Where possible only operate during the day. If night-time construction activities are required, do not operate closer than 900m (mobile equipment) from any receptors.
- Communication channels should be established to ensure prior notice to the sensitive receptor if work is to take place close to them (especially if work is to take place within 500m from them at night).
- Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures.
- Crushers should be enclosed on three sides, with the sides acting as a sound barrier to the closest receptors.
- The conveyor belt must be enclosed on the side closest to the receptors, if located closer than 500m from any receptor.
- Limit the maximum speed on the haul roads to 40 km/h or less. Road speeds should be kept as consistent as is feasibly possible between the open cast pit and ROM pad (i.e. no speed bumps to reduce noise or stop junctions).
- Road surface needs to be well maintained, smooth and homogenous in fashion relating to the surface layer elevation.
- The mine should develop and implement a noise measurement programme.

Visual

- Maintain the general appearance of the facility as a whole.

- All lighting must be installed at downward angles.
- Consider the application of motion detectors to allow the application of lighting only where and when it is required.
- The use of outdoor fixtures high up on tall structures should be limited or avoided.

Blasting & Vibration

- A minimum safe distance of 416 m is required but recommended is that a minimum of 500 m must be maintained from any blast done
- All persons and animals within 500 m from a blast must be cleared and where necessary evacuation must be conducted with all the required pre-blast negotiations.
- Blasting operations will have to be scheduled. Permissions and agreements concerning blasting operations will have to be arranged with the necessary authorities.
- The road will have to be closed during blasting operations at positions greater than 500m from any blast done in the pit area. This closure will have to be arranged and negotiated with the necessary road authorities and permissions acquired for road closure.
- The option of photographic survey of all structures up to 1500 m from the pit areas is recommended.
- It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community blasting dates and times.
- A monitoring programme for recording blasting operations is recommended.

Traffic

- Encouraging the receipt of materials during non-peak traffic hours to avoid traffic build-up.
- Monitor the condition of the roads used
- Repair the road where it becomes damaged due to mine traffic

Heritage

- Fence the graves and have a management plan drafted by heritage expert for the sustainable preservation thereof.
- Should subterranean presence of archaeological and/or historical sites, features or artefacts be discovered, further disturbance must be stopped and a qualified archaeologist must be called in to investigate the occurrence.

Waste Management

- Develop a Waste Management Procedure
- A dedicated area for the placement of waste skips must be determined prior to construction activities, and the area will to be cemented.
- Place all waste in a skip to be collected by approved waste licence disposal companies.
- Ensure that hazardous waste is disposed of at a licensed waste disposal facility. Proof of disposal (certificates / waybills) must be maintained for auditing purposes.
- Allowance for keeping clean water run-off away from the skip area through the correct bunding design
- The burning of waste on site and excavation and use of rubbish pits are forbidden unless specifically authorised

- No littering allowed
- Promote reduce, re-use and recycling of waste

10.1 ASSUMPTIONS & GAPS IN KNOWLEDGE

h. Description of any assumptions, uncertainties and gaps in knowledge.

(Which relate to the assessment and mitigation measures proposed)

This is an amendment of the Environmental Management Plan (EMP) to ensure that the weigh bridge and all mining activities are included in the EMP.

10.2 REASONED OPINION

i. Reasoned opinion as to whether the proposed activity should or should not be authorised

i. Reasons why the activity should be authorized or not.

The following aspects should be considered for inclusion as conditions of the Amended Authorisation:

Air Quality

- It is recommended that dustfall monitoring be conducted as part of the mine's air quality management plan, this should as a minimum adhere to the dust monitoring regulations. This should be undertaken throughout the life of mine to provide air quality trends.

Surface Water

- Adhere to stormwater management plan.
- A surface water monitoring programme should be implemented.
- The water balance should be updated once more specific domestic and process water reticulation volumes are known
- The water balance should be refined annually during the life of the mine.

Soils & Agricultural Potential

- Topsoil should be effectively be stockpiled and managed.
- Minimise working on windy days where possible.
- Minimise the period of exposure of soil surfaces through dedicated planning.
- Monitor the condition of all unpaved roads due to rainfall and potential of water run-off and erosion on unpaved roads, especially during rainy season

Fauna & Flora

- Establish a fire break.
- .The remaining natural areas should be managed to prevent further degradation.
- Continuous rehabilitation of the area should take place.
- A management plan for control of invasive/exotic plant species needs to be implemented.

Freshwater

- No untreated water may be discharged to fresh surface water sources, the quality of the water discharged at the operation must be closely monitored.

Socio-economic

- The local jobs created should be linked to a skills development programme for permanent employment as per the SLP.
- Establish a grievance mechanism that will specify procedures for lodging and registering complaints – by external parties, employees and contractors – and for responses to them including time limits for responding and addressing the complaint, and recording of same.

Noise

- The mine should develop and implement a noise measurement programme;

Visual

- Maintain the general appearance of the facility as a whole.

Blasting & Vibration

- A risk assessment must be done to determine the minimum safe distance from the blast.
- The option of photographic survey of all structures up to 1500 m from the pit areas is recommended.
- It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community blasting dates and times.
- A monitoring programme for recording blasting operations is recommended.

Traffic

- Encouraging the receipt of materials during non-peak traffic hours to avoid traffic build-up.
- Monitor the condition of the roads used.
- Repair the road where it becomes damaged due to mine traffic.

Heritage

- Fence the graves at the entrance gate at Portion 131 in and have a management plan drafted by heritage expert for the sustainable preservation thereof.
- Identified historical sites are of high significance and should be preserved if possible and definitely mitigated if to be impacted by development actions
- Should subterranean presence of archaeological and/or historical sites, features or artefacts be discovered, further disturbance must be stopped and a qualified archaeologist must be called in to investigate the occurrence.

Waste Management

- Develop a Waste Management Procedure
- Promote reduce, re-use and recycling of waste.

(1) Specific conditions to be included into the compilation and approval of EMPr

The following aspects should be considered for inclusion as conditions of the EMPr:

Air Quality

- It is recommended that dustfall monitoring be conducted as part of the mine's air quality management plan. This should be undertaken throughout the life of mine to provide air quality trends.
- Should the monitoring results indicate exceedance or potential for exceedances of the 24hour and annual SA NAAQS and National Dust Control Regulations additional dust suppression measures such as binding agents or chemical suppressants on dirt roads must be applied.
- If the above mentioned measures are inadequate special attention must be given to other dust generating activities, e.g. Crushers and screens should be enclosed and fitted with a dust collector or fabric filter. During transportation of

ore, wastes and products, trucks should be well covered in order to avoid spillages. This will reduce PM emissions during transportation.

Figure 10-1: Alternative to using water as dust suppression, gravel was put on areas to reduce dust



Surface Water

- The water balance should be updated once more specific domestic and process water reticulation volumes are known
- The water balance should be refined annually during the life of the mine.
- A surface water monitoring programme should be implemented and managed.

Soils & Agricultural Potential

- Topsoil should be effectively stockpiled and managed.
- The depth of stockpile must not be more than 2.5 to 3 m.
- Topsoil should be stockpiled away from any underlying spoil material and cross-contamination should not be allowed.
- Stockpiles must be placed on a free draining location to limit erosion loss and water logging.
- Re-vegetate cleared areas and re-vegetate / cover stockpiles to avoid wind and water erosion loss.
- Maintain looseness of stockpiled soil by fertilising and seeding the soil by hand;
- Soil stockpiles should be monitored for fertility by sampling and testing.
- Minimise working on windy days where possible.
- Minimise the period of exposure of soil surfaces through dedicated planning.
- Monitor the condition of all unpaved roads due to rainfall and potential of water run-off and erosion on unpaved roads, especially during rainy season

Fauna & Flora

- Establish a fire break.

- During the maintenance work of roads, or any other areas, staff should be prohibited from entering and disturbing the surrounding natural areas.
- The remaining natural areas should be managed to prevent further degradation.
- Continuous rehabilitation of the area should take place.
- Animals (wildlife and domestic animals) may not be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees.
- A management plan for control of invasive/exotic plant species needs to be implemented.

Freshwater

- No untreated water may be discharged to fresh surface water sources, the quality of the water discharged at the operation must be closely monitored.

Socio-economic

- The local jobs created should be linked to a skills development programme for permanent employment as per the SLP.
- Ensure workers have information available and sign a “code of conduct” at the start of employment which gives an overview of acceptable behaviour and information regarding health & safety on the site
- Establish a grievance mechanism that will specify procedures for lodging and registering complaints – by external parties, employees and contractors – and for responses to them including time limits for responding and addressing the complaint, and recording of same.

Noise

- The mine should develop and implement a noise measurement programme;
- Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material.
- Minimize equipment or processes at high levels, such as a material tip or primary crusher. Noisy infrastructure should be developed at ground height or even slightly below ground level;
- Environmental awareness training should include a noise component, allowing employees and contractors to realize the potential noise risks that activities (especially night-time activities) pose to the surrounding environment. All employees and contractors should receive this training;

Visual

- Maintain the general appearance of the facility as a whole.
- All lighting must be installed at downward angles.
- Consider the application of motion detectors to allow the application of lighting only where and when it is required.
- The use of outdoor fixtures high up on tall structures should be limited or avoided.

Blasting & Vibration

- A risk assessment must be done to determine the minimum safe distance that must be maintained from any blast done

- All persons and animals within 500 m from a blast must be cleared, unless written permission was obtained that states otherwise and where necessary evacuation must be conducted with all the required pre-blast negotiations.
- Blasting operations will have to be scheduled. Permissions and agreements concerning blasting operations will have to be arranged with the necessary authorities.
- The road will have to be closed during blasting operations at positions greater than 500m from any blast done in the pit area. This closure will have to be arranged and negotiated with the necessary road authorities and permissions acquired for road closure.
- The option of photographic survey of all structures up to 1500 m from the pit areas is recommended.
- It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community blasting dates and times.
- A monitoring programme for recording blasting operations is recommended.

Traffic

- Encouraging the receipt of materials during non-peak traffic hours to avoid traffic build-up.
- Monitor the condition of the roads used
- Repair the road where it becomes damaged due to mine traffic

Heritage

- Fence the graves located close to the entrance at Portion 131
- Preserve and Manage the Site and graves intact. It is recommended that the site containing the graves be cleaned and kept clean and that a new fence be erected around it, with an access gate to the site as well. A sign indicating the presence of a cemetery here should also be erected.
- Old brick works. Leave intact. If development is planned here then the site should be recorded in more detail before demolition and a permit obtained from SAHRA.
- Late Iron Age (LIA) stone-walled sites and features on Portions 53, 127 & 131; If the sites are to be impacted the following is recommended (a) Detailed mapping and drawing of sites and features (b) Archaeological excavations on sections of the sites and (c) the obtaining of a demolition permit from SAHRA once mitigation measures have been implemented. The alternative is to avoid the sites in total and then preserve it in situ and to Manage the site through a Cultural Heritage Management Plan.
- Late Iron Age (LIA) stone-walled sites and features on Portions 135; If the sites are to be impacted the following is recommended (a) Detailed mapping and drawing of sites and features (b) Archaeological excavations on sections of the sites and (c) the obtaining of a demolition permit from SAHRA once mitigation measures have been implemented. The alternative is to avoid the sites in total and then preserve it in situ and to manage the site through a Cultural Heritage Management Plan.
- Should subterranean presence of archaeological and/or historical sites, features or artefacts be discovered, further disturbance must be stopped and a qualified archaeologist must be called in to investigate the occurrence.

Waste Management

- Develop a Waste Management Procedure.
- A dedicated area for the placement of waste skips must be determined prior to construction activities, and the area will be cemented.
- Place all waste in a skip to be collected by approved waste licence disposal companies.
- Ensure that hazardous waste is disposed of at a licensed waste disposal facility. Proof of disposal (certificates / waybills) must be maintained for auditing purposes.
- Allowance for keeping clean water run-off away from the skip area through the correct bunding design.
- The burning of waste on site and excavation and use of rubbish pits are forbidden unless specifically authorised.
- No littering allowed.
- Promote reduce, re-use and recycling of waste.

(2) Rehabilitation requirements

The following conditions apply to the rehabilitation of the site:

- Surface water monitoring should continue as described in monitoring programme.
- Continue with alien invasive monitoring, eradication and control programme.

j. Period for which the Environmental Authorisation is required.

The Environmental; Authorisation is required for the life of the mine i.e. 20 years.

Current legislation requires that the decommissioning of the mine will be subject to a separate EIA and Environmental Authorisation application. The EA application for decommissioning should be initiated 2 years before mine closure.

11 UNDERTAKING

k. Undertaking

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic assessment report and the Environmental Management Programme report.

The undertaking required to meet this section (PART A: EIA) of the report is provided at the end of the PART B: EMPr. The undertaking provided at the end of the EMPr is applicable both to the Environmental Impact Report and the Environmental Management Programme Report.

12 FINANCIAL PROVISION

l. Financial Provision

State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation.

R5 812 455,77

i. Explain how the aforesaid amount was derived.

Financial provision was derived using the master rates provided by the DMR and the quantum for each description (area of disturbance) as stipulated in the project description and preferred layout.

- ii. Confirm that this amount can be provided for from operating expenditure.** (Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be).

Financial provision can be provided for as was proven to the DMR.

13 OTHER INFORMATION

13.1 DEVIATIONS FROM SCOPING AND PLAN OF STUDY

m. Deviations from the approved scoping report and plan of study.

- i. Deviations from the methodology used in determining the significance of potential environmental impacts and risks.**

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation).

Not applicable, this is an amendment of the existing Mining Right. Amendment of the EMP the plan of study was approved in terms of the mining right application.

- ii. Motivation for the deviation.**

Not applicable

n. Other Information required by the competent Authority

- i. Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). the EIA report must include the:-**

13.2 SOCIO-ECONOMIC (DIRECTLY AFFECTED PERSONS)

- 1. Impact on the socio-economic conditions of any directly affected person.** (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as **Appendix 2.19.1** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

The operational mining activities may impact on the socio-economic status of the surrounding area:

- Impact on the way surrounding land is used and the value perceived, due to pre-existing land use

- A possible positive impact could be the availability of infrastructure (electricity, water, roads, fences, office facilities, etc.) available for future use
- Development of growth opportunities in terms of entrepreneurship, employment opportunities for 25 people and further training opportunities.

13.3 HERITAGE IMPACTS

(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act. (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(j)(vi) and (vii) of that Act, attach the investigation report as **Appendix 2.19.2** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

A Heritage Impact Assessment: Phase 1 HIA on Portions 53, 127, 131 & 135 of the farm De Onderstepoort 300JR was completed

A number of known cultural heritage (archaeological and historical) sites exist in the larger geographical area within which the study area falls, while some sites and features were also identified in the specific study areas. The sites and features recorded date mainly to the Late Iron Age (LIA), although there are some recent historical features as well. This included a known recent historical graveyard

13.4 OTHER MATTERS

b) Other matters required in terms of sections 24(4)(a) and (b) of the Act.

(the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as **Appendix 4**).

Alternatives were considered and are presented in Section 6.