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ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE DEVELOPMENT OF THE PROPOSED COZA (JENKINS SECTION) MINE

FOR PUBLIC REVIEW

April 2016

SUBMITTED FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998) AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (ACT 59 OF 2008) IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (ACT 28 OF 2002) (AS AMENDED)

NAME OF APPLICANT: COZA Mining (Pty) Ltd

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Status	Draft
Applicant	COZA Mining (Pty) Ltd
Consultant	Synergistics Environmental Services (Pty) Ltd
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Project Manager	Caitlin Hird
Report Author	Caitlin Hird
Reviewer	Alex Pheiffer
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EXECUTIVE SUMMARY

INTRODUCTION TO THE PROPOSED PROJECT

COZA Mining (Pty) Ltd (COZA) is planning to develop a new iron ore mine on the farm Jenkins 562 located approximately 24 km south of Kathu within the Tsantsabane Local Municipality in the Northern Cape Province. Although the mining right application has been submitted for the entire Farm Jenkins 562, the mine will only be developed on Portion 1 and remaining Extent of Portion 1 of the Farm Jenkins 562. Refer to Figure 1 and Figure 2 for the regional and local settings respectively.

Mining at Jenkins Section forms part of the overall COZA Iron Ore Project which is a green-fields project that will involve iron ore mining from two other pits located on the farms Driehoekspan 435 (Remaining Extent) and Doornpan 445 (Portion 1). These sections, known as the COZA Iron Ore Project: Driehoekspan and Doornpan Sections are located approximately 30 km south of Farm Jenkins as illustrated in Figure 1. It should be noted that this document deals only with the proposed COZA Iron Ore Project: Jenkins Section.

In general terms, open pit mining will be undertaken by convential truck and shovel method and an on site processing plant will be constructed where mined ore will be crushed, screened and blended prior to being despatched to market.

Synergistics Environmental Services (Pty) Ltd (Synergistics), an independent firm of environmental assessment practitioners, has been appointed to undertake the Scoping and Environmental Impact Assessment (EIA) process required for the COZA Iron Ore: Jenkins Section Project.

LEGAL FRAMEWORK

Prior to the commencement of the proposed project, environmental authorisation is required from various government departments. These include:

- Environmental authorisation from the Department of Mineral Resources (DMR) in terms of National Environmental Management Act No.107 of 1998 (NEMA). The proposed project incorporates several listed environmental activities. An application was submitted by Coza to the DMR in October 2015. The applicable list of activities is provided in Section 4.1. The EIA regulations being followed for this project are Regulation 982 of 04 December 2014. A copy of the NEMA application is included in Appendix E.

- A mining right and an environmental authorisation from the Department of Mineral Resources (DMR) in terms of the Mineral and Petroleum Resources Development Act No. 28 of 2002 (MPRDA). The mining right application was submitted by Coza to the DMR in October 2015. A single scoping report and EIA and EMP report supporting the new mining right application and associated infrastructure will be submitted to the DMR for decision making.
- A water use license from the Department of Water and Sanitation (DWS) in terms of the National Water Act No. 36 of 1998 (NWA). The applicable water uses in terms of Section 21 of the NWA may include (a) Taking water from a resource, (b) Storage of water, (c) Impeding or diverting the flow of water in a watercourse, (g) Disposing of waste in a manner that may detrimentally impact on a water resource, (i) Altering the beds, banks, course or characteristics of a watercourse and (j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of the activity or the safety of people. This list will be refined when the WUL application is submitted.

- A waste management license from the DMR in terms of the National Environmental Management: Waste Act No. 59 of 2008 (NEM:WA). The applicable list of activities as currently set out in the legislation is provided in Section 4.1. The NEMA/NEM:WA application was submitted to the DMR in October 2015. A copy of the NEM:WA application is included in Appendix E.

STAKEHOLDER ENGAGEMENT

The stakeholder engagement process commenced prior to scoping and has continued throughout the environmental assessment process. As part of this process, authorities and interested and affected parties (IAPs) were given the opportunity to submit questions and comments to the project team, and review the background information document, scoping report and now the EIA and EMP report. All comments that have been submitted to date by the authorities and IAPs have been included and addressed in the EIA and EMP report. Further comments arising from the EIA and EMP report review process will be handled in a similar manner.

IMPACTS AND MITIGATION MEASURES

This report provides an assessment of the potential impacts of the proposed project and provides measures to prevent or mitigate the impacts.

The potential impacts associated with the proposed mine activities and infrastructure can be categorised into those that have low, medium and high significance in the unmitigated scenario. All three categories of impacts require a measure of mitigation which, if successfully implemented will reduce the significance of the impacts and the related residual risk.

The table below provides a summary of the potential impacts in no particular order of importance.

Table A – Potential impact summary

Aspect	Potential impact	Impact discussion	Significance without mitigation	Significance with mitigation
Geology	Loss and sterilization of mineral resources	Mineral resources can be sterilised and/or lost through the placement of infrastructure and activities in close proximity to mineral resources, by preventing access to potential mining areas, and through the disposal of mineral resources onto mineralised waste facilities (overburden stockpiles) or as backfill in the open pit. Cross discipline planning to avoid mineral sterilisation can help to mitigate the unacceptable sterilisation of resources, without compromising safety requirements.	High	Low
Topography	Hazardous excavations, surface subsidence and infrastructure that can be harmful to people and animals	Hazardous excavations and infrastructure include all structures into or off which third parties and animals can fall and be harmed. Included in this category is surface subsidence associated with mining areas. Related mitigation measures focus on infrastructure safety as well as on limiting access to third parties and animals.	High	Low
Soil and land capability	Loss of soil resources and land capability through contamination	Soil is a valuable resource that support a variety of ecological functions and is the key to re-establishing post closure land capability. Soil and related land capability can be compromised through pollution and through physical disturbance through compaction, removal and erosion. Related mitigation measures focus on pollution prevention, implementing soil conservation procedures and limiting site clearance to what is absolutely necessary.	Med	Low
	Loss of soil resources and land capability through physical disturbance		High	Low
Biodiversity	Physical destruction of biodiversity	Areas of high ecological sensitivity are functioning biodiversity areas with species diversity and associated intrinsic value. In addition, some of these areas host protected species. The linking areas have value because of the role they play in allowing the migration or movement of flora and fauna between the areas which is a key function for the broader ecosystem. Development of the project has the potential to impact on biodiversity both through physical destruction (mainly during infrastructure establishment and mine development) and on-going physical disturbance during all project phases. Related mitigation measures focus on limiting the project footprint area, implementation of a biodiversity offset and operation controls to limit on-going disturbance.	High	Medium
	General disturbance of biodiversity		High	Low
Surface water	Contamination of surface water resources	The proposed project has the potential to contaminate surface water resources. Relate mitigation measures focus on pollution prevention, monitoring and risk based response to identified pollution occurrences.	Medium	Low
	Alteration of surface water drainage	Rainfall and surface water run-off are collected in all areas that have been designed with water containment infrastructure. The collected run-off will therefore be lost to the catchment	Medium	Low

Aspect	Potential impact	Impact discussion	Significance without mitigation	Significance with mitigation
	patterns	and can result in the alteration of drainage patterns and reduction to downstream surface water users. Related mitigation measures focus on minimising the footprint areas associated with containing rainfall and runoff and diverting clean run-off away from the project site.		Low
Groundwater	Contamination of groundwater resources	The nature of the proposed project is such that it presents a potential for the contamination of groundwater resources that in some cases may be used by third parties for domestic and livestock watering purposes. Related mitigation measures focus on pollution prevention, monitoring and risk based response to identified contamination occurrences.	Medium	Low
	Reducing groundwater levels and availability	The pumping of seepage water from the open pit and the abstraction of water from boreholes for the use as potable and process water has the potential to cause a lowering of groundwater levels. Lowering of groundwater levels has the potential to impact on third party boreholes that may be utilised for domestic and livestock watering. Related mitigation measures focus on monitoring and risk based response to identified groundwater reduction impacts.	Low	Low
Air	Air pollution	The main contaminants associated with the proposed project include: inhalable particulate matter less than 10 and 2.5 microns in size (PM10 and PM2.5) and larger total suspended particulates (TSP) that relate to dust fallout, and gas emissions mainly from vehicles and generators. At certain concentrations, contaminants can have health and/or nuisance impacts. Related mitigation measures focus on pollution prevention, monitoring and risk based response to identified pollution occurrences.	High	Medium (Low for dust fallout)
Noise	Increase in disturbing noise levels	Noise pollution (disturbance and nuisance) will have different impacts on different receptors because some are very sensitive to noise and others are not. Modelled results indicate that a limited increase in noise levels is expected at the nearest sensitive receptors. Related mitigation measures focus on noise pollution prevention and monitoring when required.	Medium	Low
Blasting	Blasting impacts	Blast related impacts to third parties and property can be caused by fly rock, vibrations and air blast. Related mitigation measures focus on blast controls, monitoring and risk based response to identified blast impact occurrences.	High	Medium
Traffic	Disturbance of roads by project related traffic	The proposed project will result in an increase in traffic volumes along the R325. Potential traffic safety risks include: pedestrian accidents and vehicle accidents. Related mitigation measures focus on road and pedestrian safety.	High	Medium
Visual	Negative visual impacts	Visual impacts are assessed by considering changes to the visual landscape. Mine infrastructure and activities will change this landscape and the changes will have different impacts that will vary between the different viewpoints and the associated visual receptors. Related mitigation measures focus on landscaping interventions particularly during the decommissioning and rehabilitation stages.	Medium	Medium (Low at closure)
Heritage, cultural and	Destruction of heritage, cultural and	Various cultural and heritage resources have been identified in the proposed project area. No potential for paleontological resources exist. The proposed project has the potential to	High	Medium

Aspect	**Potential impact**	**Impact discussion**	**Significance without mitigation**	**Significance with mitigation**
paleontological resources	paleontological resources	damage low significance heritage/cultural resources. Related mitigation measures focus on avoidance and preservation as a first priority.		
Socio-economic	Economic impact	Coza's net contribution to the local, regional and national economy is positive and significant. Part of this contribution is through employment, procurement, investment, tax contributions, and foreign exchange earnings. The objective of the related mitigation measures is to enhance the positive economic impacts and limit the negative economic impacts. Part of this objective is to enhance the contribution to the local economy in particular.	High positive	High positive
	Inward migration impacts	Mines tend to bring with them an expectation of employment in all project phases prior to closure. This expectation can lead to the influx of job seekers to an area which could cause: an increase of people moving through the area, pressure on the capacity of existing communities and possibly also the development of informal settlements. In general, both increased movement of poor people into an area and informal settlements are associated with poor standards of living which can promote disease, crime and a general threat to the safety and security of an area. Linked to this influx of people is the potential inability of receiving areas to supply basic services such as water, food, electricity, health, education and sanitation. Related mitigation measures focus on cooperation with the local municipal authorities, skills development, employment, procurement and social development.	High	Medium
Land use	Change in land use	Alternative land uses such a livestock grazing currently taking place on Jenkins may be negatively impacted by one or more of the above mentioned environmental and social impacts. Related mitigation measures focus on mitigation of potential environmental and socio-economic impacts described above and measures to promote the continuation of surrounding land uses.	High	Medium (Low at closure)

ENVIRONMENTAL STATEMENT

The assessment of the proposed project presents the potential for significant negative impacts to occur (in the unmitigated scenario in particular) on the bio-physical, cultural and socio-economic environments both on the project site and in the surrounding area. With mitigation these potential impacts can be prevented or reduced to acceptable levels.

It follows that provided the EMP is effectively implemented there is no environmental, social or economic reason why the project should not proceed.

ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE DEVELOPMENT OF THE PROPOSED COZA (JENKINS SECTION) MINE

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ACRONYMS AND ABBREVIATIONS

Acronyms / Abbreviations	Definition
ABA	Acid Base Accounting
AP	Acid Potential
BID	Background information document
BIFF	Banded Iron Formation
CBA	Critical biodiversity area
C	Carbon
CO	Carbon monoxide
CO_2	Carbon dioxide
DAFF	Department of Agriculture, Forestry and Fisheries
DENC	Department of Environment and Nature Conservation
DMR	Department of Mineral Resources
DRDLR	Department of Rural Development and Land Reform
DWS	Department of Water and Sanitation
DPWRT	Department of Public Works, Roads and Transport
DWEA	Department of Water and Environmental Affairs
DWAF	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental impact assessment
EMPr	Environmental management programme report
IAPs	Interested and/or affected parties
IUCN	International Union for Conservation of Nature
IFC	International Finance Corporation
mamsl	Metres above mean sea level
MPRDA	Mineral and Petroleum Resources Development Act
Mn	Manganese
NCNCA	Northern Cape Nature Conservation Act No. 9 of 2009
NEMA	National Environmental Management Act
NEM:WA	National Environmental Management: Waste Management Act
NFA	National Forest Act No. 84 of 1998
NFEPA	National Freshwater Ecosystem Priority Areas 2011
NP	Neutralising Potential
NNP	Net Neutralising Potential
PAG	Potentially Acid Generating
NPAES	National Protected Areas Expansion Strategy 2008
NWA	National Water Act, 1998
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
$PM_{2.5}$	Inhalable particulate matter
PM_{10}	Thoracic particulate matter
ROM	Run-of-mine
ppb	parts per billion
SACNSP	South African Council for Natural Scientific Professionals
SAHRA	South African Heritage Resources Agency
SANS	South African National Standards
SANBI	South African National Botanical Institute
SLR	SLR Consulting (South Africa) (Pty) Ltd

Acronyms / Abbreviations	Definition
TSP	Total suspended particles
SO_2	Sulphur dioxide
VOCs	Volatile organic compounds
WR2005	Water Resources of South Africa, 2005

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Mining at the Jenkins Section forms part of the overall COZA Iron Ore Project which is a green-fields project that will involve iron ore mining from two other pits located on the farms Driehoekspan 435 (Remaining Extent) and Doornpan 445 (Portion 1). These sections, known as the COZA Iron Ore Project: Driehoekspan and Doornpan Sections are located approximately 30 km south of Farm Jenkins as illustrated in Figure 1. It should be noted that this document deals only with the proposed COZA Iron Ore Project: Jenkins Section.

In general terms, open pit mining will be undertaken by conventional truck and shovel method and an on-site processing plant will be constructed where mined ore will be crushed, screened and blended prior to being despatched to market.

The EIA process comprises two phases: a scoping phase and an environmental impact assessment phase combined with the environmental management programme (EIA and EMP) phase. This report describes the EIA an EMP phase for the proposed project.

Synergistics Environmental Services (Pty) Ltd (Synergistics), an independent firm of environmental assessment practitioners, has been appointed to undertake the Scoping and Environmental Impact Assessment (EIA) process required for the COZA Iron Ore: Jenkins Section Project.

LEGAL FRAMEWORK

Prior to the commencement of the proposed project, environmental authorisation is required from various government departments. These include:

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OTHER APPROVALS / PERMITS

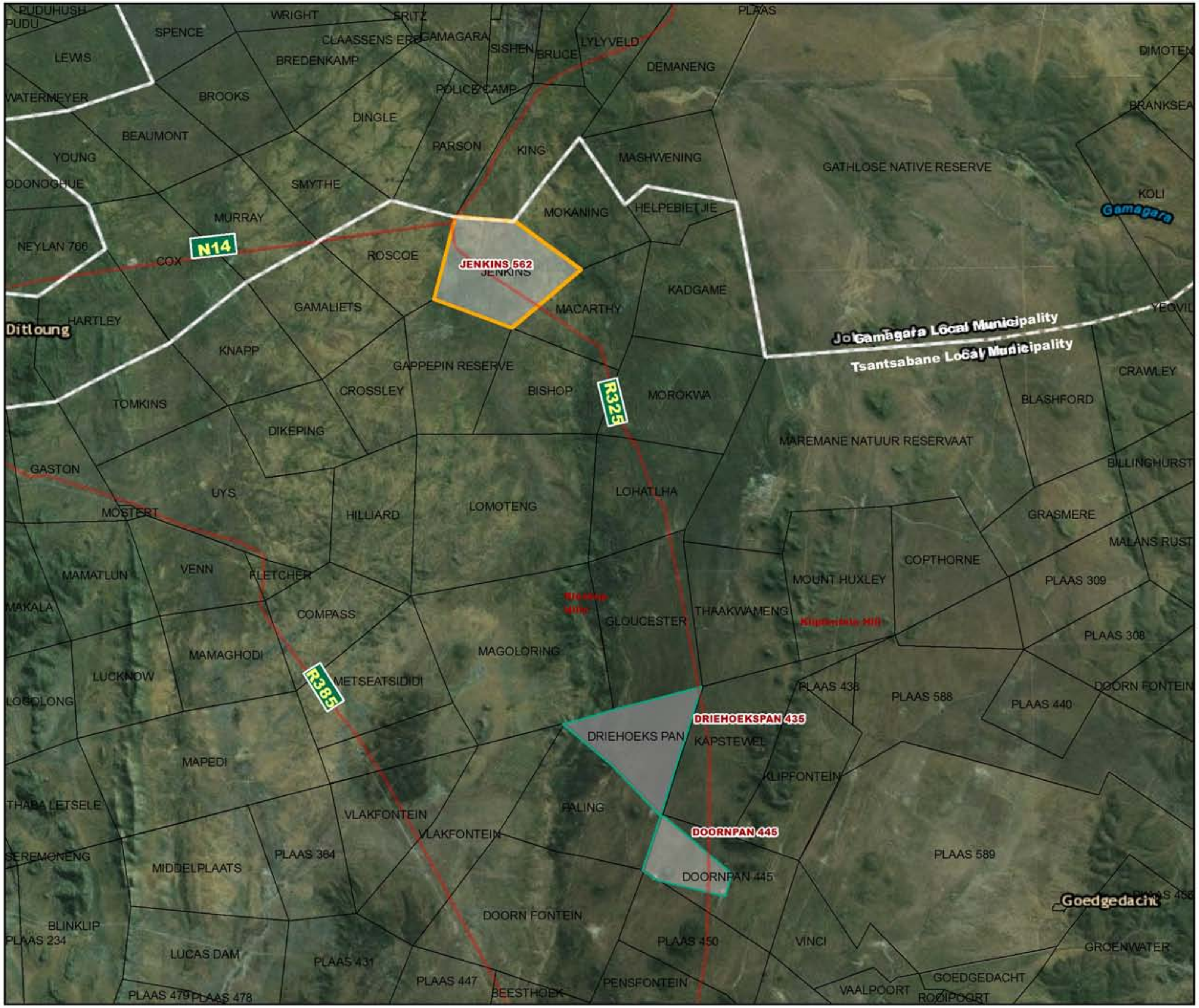
Other approvals/permits needed for the proposed project are listed below. In this regard, there are other approvals that are required prior to construction and/or commissioning of the mining and related activities. This list does not cover occupational health and safety legislation requirements.

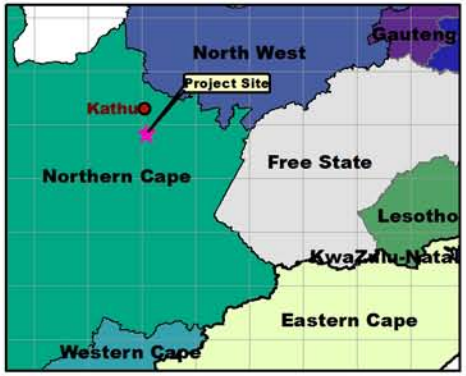
- Prior to removing or damaging any protected plant species, the necessary permits will be obtained from DWS in terms of the National Forests Act, 84 of 1998.
- Prior to storage, handling, transportation and disposal of explosives the relevant licenses and written permissions are required in terms of the Explosives Act, 25 of 1956, and the Mine Health and Safety Act, 29 of 1996, as amended.
- Prior to removing or disturbing any graves, the South African Heritage Resources Association (SAHRA) should be engaged in terms of Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and National Health Act (Act 61 of 2003).
- Prior to commencing with construction activities a re-zoning application should be lodged. Agricultural land cannot be changed to another land use without the supported recommendation under the sub-division of Agricultural Land Act, Act 70 of 1970. A local authority cannot change the zoning of demarcated agricultural land to any other zoning without a letter from the Registrar of the Act.

EIA AND EMP PHASE OBJECTIVES

The objectives of the environmental assessment process are as follows:

- The identification of policies and legislation that is relevant to the proposed project
- To describe the need and desirability of the proposed project
- To describe the proposed project including alternatives that are being considered
- To provide an assessment of the environmental and social impacts taking into account all project alternatives
- To identify measures to avoid, manage or mitigate identified impacts including the residual risks that need to be managed and monitored.





Legend

- Main Roads
- Jenkins 562
- Farm Boundaries

Kilometers
0 5 10

Synergistics
Environmental Services

SLR
Synergistics is a SLR group company

Figure 1: Regional Setting	755.03048.00001	Coordinate System DMS	
		Spheroid WGS84	Central Meridian LO

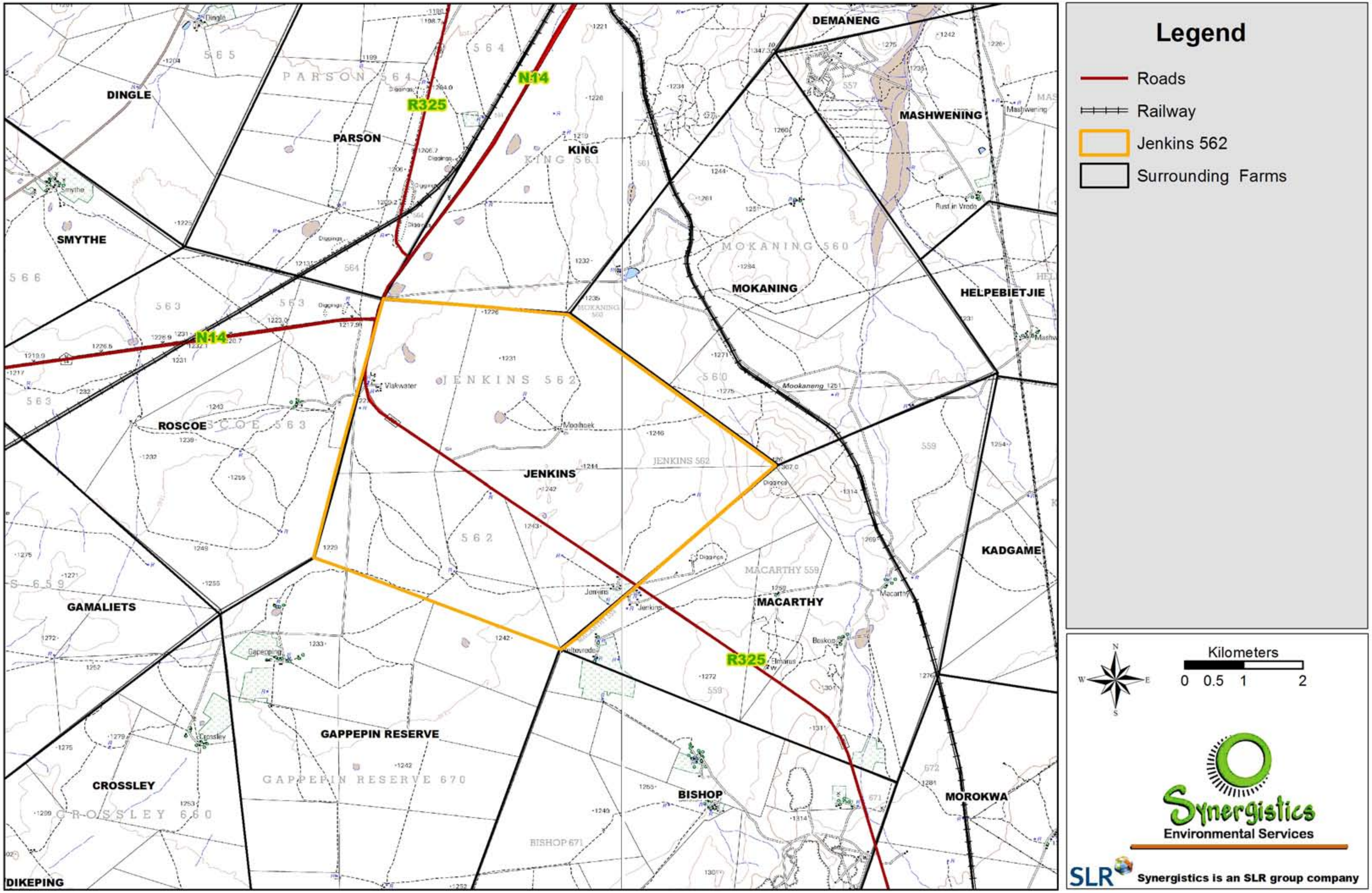


Figure 2: Local Setting	755.03048.00001	Coordinate System DMS	
		Spheroid WGS84	Central Meridian LO

PART A – SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTISIONER

1.1 DETAILS OF THE EAP WHO PREPARED THE REPORT

The details of the environmental assessment practitioners (EAPs) that were involved in the preparation of this EIA and EMP report are provided in Table 1 below.

TABLE 1: DETAILS OF THE EAPS

Details	Project manager and author	Reviewer
Name of the practitioner	Caitlin Hird	Alex Pheiffer
Tel No.:	011 467 0945	011 467 0945
Fax No.:	011 467 0978	011 467 0978
E-mail address	chird@slrconsulting.com	apheiffer@slrconsulting.com

Neither SLR nor any of the specialists involved in the environmental assessment process have any interest in the project other than fair payment for consulting services rendered as part of the environmental assessment process.

1.2 EXPERTISE OF THE EAP

Caitlin Hird holds an Honours degree in Geography and Environmental Management and has approximately 6 years of relevant experience (Curriculum Vitae attached in Appendix B). Alex Pheiffer is a director at SLR, has over 15 years of relevant experience (Curriculum Vitae attached in Appendix B) and is registered as a professional natural scientist (Environmental Science) with the South African Council for Natural Scientific Professions. The proof of this registration is attached in Appendix A. Both Caitlin Hird and Alex Pheiffer have been involved in several impact assessments for large scale mining development in Southern Africa.

2 PROJECT DESCRIPTION

A description of the property on which the proposed project is located is provided in Table 2.

TABLE 2: DESCRIPTION OF THE PROPERTY

<table>
<tr><td>Farm Name</td><td>Jenkins 562 Portion 1 and Portion 0 (Remaining Extent) (where mining and related activities will be undertaken).

Jenkins 562 Portion 2 and 3 (also part of the Mining Right application area but not earmarked for any mining related development or infrastructure).</td></tr>
<tr><td>Application area (Ha)</td><td>The total Mining Right Application area (all four farm portions above) cover an area of approximately 2536 ha. It is however expected that only 250 ha will be disturbed as part of the proposed project. This includes the open pit and the supporting infrastructure.</td></tr>
<tr><td>Magisterial district</td><td>Hay Magisterial District</td></tr>
<tr><td>Local municipality</td><td>Tsantsabane Local Municipality and the ZF Mgcawu District Municipality (previously known as the Siyanda District Municipality)</td></tr>
<tr><td>Distance and direction from nearest town</td><td>Located approximately 24 km south of Kathu</td></tr>
<tr><td>21 digit Surveyor General Code for each farm portion</td><td>Portion 0 (RE) of the farm Jenkins 562: C04100000000056200000
Portion 1 of the farm Jenkins 562: C04100000000056200001
Portion 2 of the farm Jenkins 562: C04100000000056200002
Portion 3 of the farm Jenkins 562: C04100000000056200003</td></tr>
<tr><td>Co-ordinates (Points A, B, C, D and E as illustrated on Figure 2)</td><td><table>
<tr><th>CID</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>A</td><td>27° 53' 43.81" S</td><td>22° 57' 49.49" E</td></tr>
<tr><td>B</td><td>27° 53' 52.62" S</td><td>22° 59' 30.43" E</td></tr>
<tr><td>C</td><td>27° 55' 14.97" S</td><td>23° 1' 23.78" E</td></tr>
<tr><td>D</td><td>27° 56' 55.31" S</td><td>22° 59' 26.77" E</td></tr>
<tr><td>E</td><td>27° 56' 5.30" S</td><td>22° 57' 11.42" E</td></tr>
</table></td></tr>
</table>

3 LOCALITY MAP

The local and regional setting of the proposed project site is illustrated in Figure 1 and Figure 2.

4 DESCRIPTION OF THE SCOPE OF THE PROPOSED ACTIVITY

4.1 LISTED AND SPECIFIED ACTIVITIES

The activities and infrastructure associated with the proposed project are listed in Table 3 below and are illustrated in Figure 3 (where relevant). In each case the relevant NEMA and/or possible NEM:WA listed activities which will be triggered by the proposed project for the various activities and infrastructure has been provided in Table 3. A description of each of the listed activities identified is provided in Table 4.

TABLE 3: LIST OF ACTIVITIES/INFRASTRUCTURE ASSOCIATED WITH THE PROPOSED PROJECT

Description of activity	Aerial extent of the activity (ha or m^3)	Listed activity	Listed activity number and applicable listing notice
Site clearing			
Selective clearing of vegetation in areas designated for surface infrastructure	Approximately 250 ha	X	GNR. 983 (Activity 27) GNR. 984 (Activity 15) GNR. 985 (Activity 12)
Digging of foundations and trenches	Approximately 43.1 ha	X	GNR. 983 (Activity 19, 27) GNR. 985 (Activity 14)
Set up of contractor's facilities			
Construction of contractor's camp (laydown area and temporary accommodation)	To be determined	X	GNR. 983 (Activity 28)
Open pit mining			
Drilling, Blasting and Excavating	Approximately 36 ha	None	
Development of borrow pits for sourcing material.	To be determined	X	GNR. 983 (Activity 21)
Mining of iron ore in open pits (requires a mining right in terms of the MPRDA).	Open pit approximately 36 ha	X	GNR. 984 (Activity 17)
Mining within listed ecosystem or critical biodiversity area **(pending publication of Northern Cape's listed ecosystems).**	Open pit approximately 36 ha	X	GNR. 983 (Activity 30)
Crushing, screening and blending			
Primary processing of ore: crushing, screening and blending will take place on site. Crushed ore will then be blended prior to transport off-site where it will be further processed.	Approximately 7 ha	X	GNR. 984 (Activity 21)
Water supply, use and management			
Bulk pipelines for dewatering activities/water reticulation and stormwater. These pipelines are likely to exceed 1 000 metres in length with an internal diameter of 0.36 metres or more with peak throughput of 120 litres per second or more.	To be determined	X	GNR. 983 (Activity 9)
Bulk pipelines to transport return water/effluent from the sewage treatment facility and waste water from mining	To be determined	X	GNR. 983 (Activity 10)

Description of activity	Aerial extent of the activity (ha or m^3)	Listed activity	Listed activity number and applicable listing notice
activities. These pipelines may exceed 1 000 metres in length with a diameter of 0.36 metres or more or a peak throughput of 120 litres per second or more.			
Construction/development of mine infrastructure which exceed 100 square metres will be constructed within 32 metres of a watercourse.	Approximately 250 ha	X	GNR. 983 (Activity 12)
Construction of pollution control/attenuation dams, water supply tanks for the Jenkins mine.	Approximately 3ha	X	GNR. 983 (Activity 13) GNR. 985 (Activity 2)
Development of the mine pit near the watercourse.The mining activities and the construction of infrastructure , requiring earthworks (excavation/fill) of more than 5 cubic meters within watercourses.	Approximately 36 ha	X	GNR. 983 (Activity 19)
Construction of dewatering pipelines. The pipelines may transfer 50 000 cubic metres of water from the mine pit catchment area to other catchments within the mine property. Pipelines can potentially transfer up to 50 000m3 of water a day between impoundments/attenuation dams on site during peak flows.	To be determined	X	GNR. 984 (Activity 11)
Construction of pollution control dam/s or attenuation dams.	Approximately 3 ha	X	GNR. 984 (Activity 16) GNR. 985 (Activity 14)
The storage of water containing waste, i.e. pumped from the pits, wash bays, workshop area and waste rock dumps, requires a water use license in terms of the NWA which governs the release of waste.	To be determined	X	GNR. 984 (Activity 6)
Transportation and access roads			
Construction of haul roads and access and service roads at the mine. Some of the roads will be wider than 8 metres.	To be determined	X	GNR. 983 (Activity 24) GNR. 985 (Activity 4, 18)

Description of activity	Aerial extent of the activity (ha or m^3)	Listed activity	Listed activity number and applicable listing notice
The expansion of the district road intersection with the mine access road to accommodate passing lanes.	To be determined	X	GNR. 983 (Activity 56)
Development of rail infrastructure for the transportation of iron ore to Vanderbijlpark.	To be determined	X	GNR. 984 (Activity 12)
Power supply			
Construction of a 22 kV overhead pole, 10MVA/5MVA transformers and mini substation for electricity transmission and distribution at Jenkins mine.	To be determined	None	
Upgrading of existing substation to cater for Jenkins electricity supply (off-site).			
Waste Management (mineralised and non-mineralised)			
Construction of the waste rock dump	Approximately 3 ha	X	GNR. 921 Category B (Activity 7, 10, 11)
Establishment of the temporary general and hazardous waste storage area.	To be determined	X	GNR. 921 Category C (Activity 1, 2, 3)
Construction of the sewage treatment facility with capacity to treat $50m^3$ a day	To be determined	None	
Storage and handling of dangerous goods			
Construction of fuel storage facility/facilities with a capacity to store in excess of 500 m^3 of fuel	To be determined	X	GNR. 984 (Activity 4) GNR. 985 (Activity 10)
On-going exploration/prospecting/drilling			
On-going exploration/prospecting/drilling within the mining right application area	To be determined		GNR. 983 (Activity 21)

TABLE 4: DESCRIPTION OF THE LISTED ACTIVITIES APPLIED FOR AS PART OF THE PROPOSED PROJECT

Activity number	Listed activity
NEMA Listing Notice 1 GNR.983	
9	The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;

Activity number	Listed activity
10	The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;
12	The development of- (i) canals exceeding 100 square metres in size (ii) channels exceeding 100 square metres in size (iii) bridges exceeding 100 square metres in size (iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; (vi) bulk storm water outlet structures exceeding 100 square metres in size; (x) buildings exceeding 100 square metres in size; (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; - excluding- (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;
13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.
19	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.
21	Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act , 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act , 2002 (Act No. 28 of 2002).
24	The development of - (i) a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; (ii) a road with a reserve wider than 13.5 metres, or where no reserve exists where the road is wider than 8 metres but excluding – (a) roads which are identified and included in activity 27 of Listing Notice 27 in Notice 2 of 2014; or

Activity number	Listed activity
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.
30	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act , 2004 (Act No. 10 of 2004).
56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 km – (iii) where the existing reserve is wider than 13.5 metres; or (iv) where no reserve exists, where the existing road is wider than 8 metres;
NEMA Listing Notice 2: GNR.984	
4	The development of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.
6	The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or (iii) the development of facilities or infrastructure for the treatment of effluent, wastewater or sewage where such facilities have a daily throughput capacity of 2000 cubic metres or less.
11	The development of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day, from and to or between any combination of the following - (i) water catchments; (ii) water treatment works; or (iii) impoundments; excluding treatment works where water is to be treated for drinking purposes.
12	The development of railway lines, stations or shunting yards excluding - (i) railway lines, shunting yards and railway stations in industrial complexes or zones; (ii) underground railway lines in a mining area ; or (iii) additional railway lines within the railway line reserve.
15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.

Activity number	Listed activity
16	The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.
17	Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).
21	Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.
NEMA Listing Notice 3: GNR. 985	
2	The development of reservoirs for bulk water supply with a capacity of more than 250 cubic metres. In an estuary ; ii. In a protected area identified in terms of NEMPAA , excluding conservancies; iii. Outside urban areas , in: (aa) National Protected Area Expansion Strategy Focus areas; (bb) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (cc) Sites or areas identified in terms of an International Convention; (dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ee) Core areas in biosphere reserves; (ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority , or zoned for a conservation purpose; or (cc) Areas seawards of the development setback line or within urban protected areas.
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. ii. Outside urban areas , in: (aa) A protected area identified in terms of NEMPAA , excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas; or

Activity number	Listed activity
	(hh) (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;
10	The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. ii. Outside urban areas , in: (aa) A protected area identified in terms of NEMPAA , excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; or (jj) Within 500 metres of an estuary ; or (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;
12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA 'or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.
14	The development of - (i) canals exceeding 10 square metres in size ; (ii) channels exceeding 10 square metres in size; CO bridges exceeding 10 square metres in size; (iv) dams, where the dam , including infrastructure and water surface area exceeds 10 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres in size; (vi) bulk storm water outlet structures exceeding 10 square metres in size; (x) buildings exceeding 10 square metres in size;

Activity number	Listed activity
	(xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs - (a) within a watercourse ; (b) in front of a development setback ; or (c) if no development setback has been adoped, within 32 metres of a watercourse , measured from the edge of a watercourse ; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. In an estuary ; ii. Outside urban areas , in: (aa) A protected area identified in terms of NEMPAA , excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (ee) Sites or areas identified in terms of an International Convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adoped by the competent authority , zoned for a conservation purpose;.
18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. ii. Outside urban areas , in: (aa) A protected area identified in terms of NEMPAA , excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; or (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.

Activity number	**Listed activity**
NEM:WA Listed Activities GNR 921	
Category B 4(7)	The disposal of any quantities of hazardous waste to land
Category B 4(10)	The construction of a facility for a waste management activity listed in Category B of this schedule
Category B 4(11)	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002_
Category C 5(1)	The storage of general waste at a facility that has the capacity to store in excess of 100m^3 of general waste at any one time, excluding the storage of waste in lagoons or temporary storage of such waste .
Category C 5(2)	The storage of hazardous waste at a facility that has the capacity to store in excess of 80m3 of hazardous waste at any one time, excluding the storage of hazardous waste in lagoons or temporary storage of such waste .
Category C 5(3)	The storage of waste tyres in a storage area exceeding 500m^2.

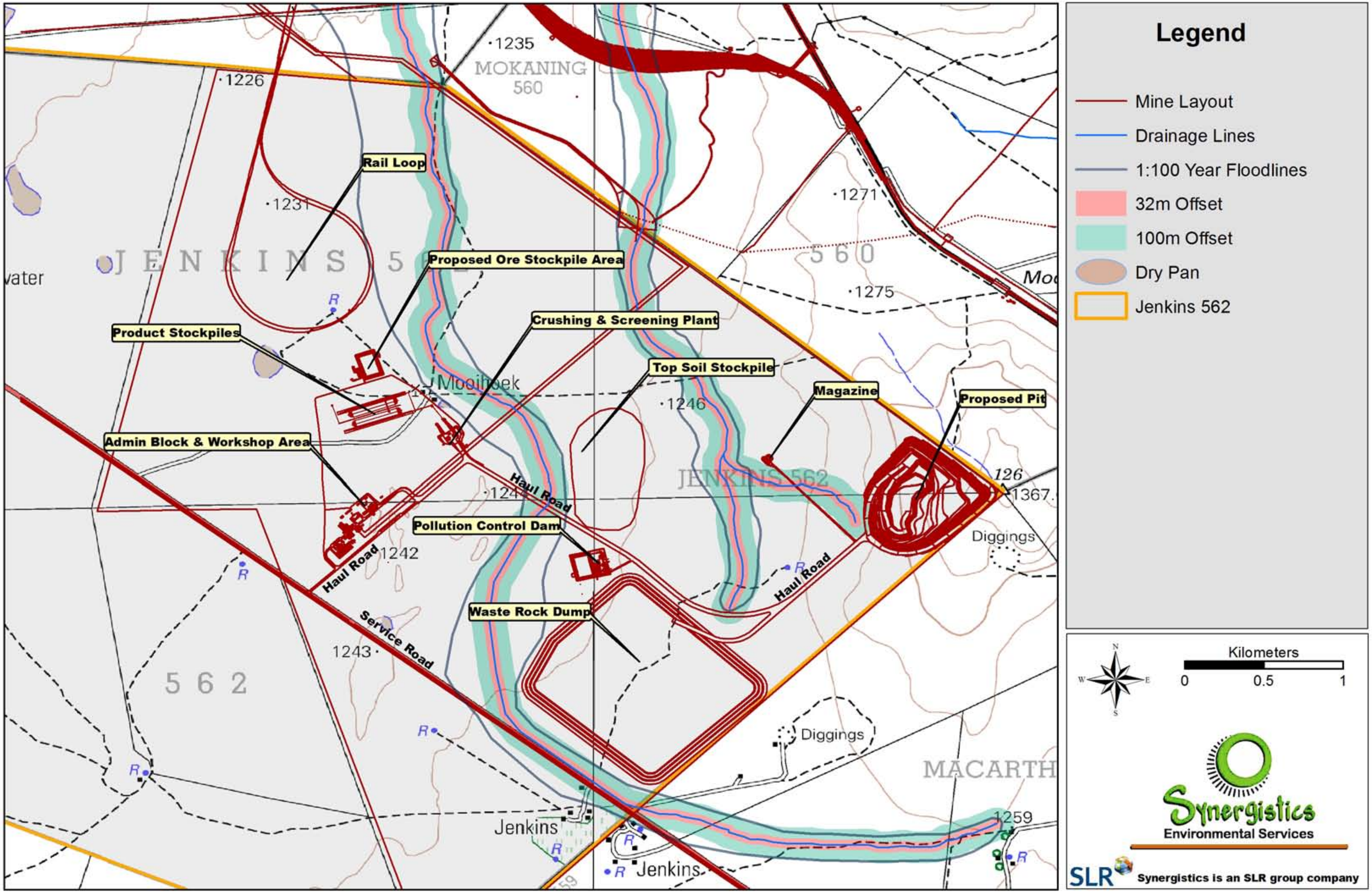


Figure 3: Infrastructure Plan

755.03048.00001	Coordinate System DMS	
	Spheroid WGS84	Central Meridian LO

4.2 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

Information provided in the following section was provided to SLR by the Jenkins project team.

In broad terms the proposed Jenkins mining project will comprise open cast activities, a dry crushing and screening plant, a waste rock dump, product and run-of mine stockpiles, topsoil stockpiles, mine related facilities such as workshops and stores and various support infrastructure and services such as water management infrastructure. Further detail is provided in the sections below.

4.2.1 CONSTRUCTION PHASE

CONSTRUCTION PHASE ACTIVITIES

The key construction activities associated with the proposed project include:

- Setting up a contractor's laydown area and construction camp;
- Clearing of vegetation in areas designated for surface infrastructure (excluding the open pit as this will be cleared progressively during the operational phase as the pit advances) in line with a biodiversity management plan to be developed for the project;
- Stripping and stockpiling of soil resources in areas designated for surface infrastructure (excluding the open pit as this will be cleared progressively during the operational phase as the pit advances) in line with a soil conservation procedure to be developed for the project;
- Developing borrow pits within the project area for sourcing building materials;
- Digging and/or blasting foundations and trenches;
- Establishing haul roads;
- Delivery of materials and removal of waste;
- Excavating process and water storage dams as required;
- Preparing the residue disposal area; and
- General building activities including the erection of structures.

CONSTRUCTION PHASE FACILITIES

The construction phase facilities include:

- Workshops, stores, wash bays, lay-down areas, fuel handling and storage area, offices, ablution facilities
- Handling and storage area for construction materials (paints, solvents, oils, grease) and wastes
- Generator(s) for temporary power supply
- Construction camp.

Construction facilities will either be removed at the end of the construction phase or incorporated into the layout of the operational mine.

WATER SUPPLY AND MANAGEMENT FOR THE CONSTRUCTION PHASE

Stormwater control for construction

Storm water measures outlined in Section 4.2.2 will be established at the start of the construction phase.

Potable water

During the construction phase, potable water will be made available from on-site boreholes. The total daily requirement for potable water will be verified at a later stage.

TRANSPORTATION (ROUTES AND MECHANISMS) FOR THE CONSTRUCTION PHASE

Access to the proposed site

Access to the proposed site will be via the existing R325. Within the proposed site, internal access and haul roads will be constructed (see Figure 3). It is proposed that the intersection between the R325 and the main project access road be upgraded to cater for a right-turn refuge lane with a by-pass lane to improve safety. The right-turn lane should be provided according to the Northern Cape provincial road standards.

Transportation of workers and supplies to site

During the construction of the proposed project there will be workers travelling to and from site, vehicles supplying input materials and machinery, and vehicles removing waste material. It is however expected that the construction phase will be limited to approximately 12 months and that only the appointed contractor with a small work force will be accessing site during this time. Construction phase trip generation calculations have therefore not been provided as part of the specialist traffic impact assessment. Trip generation calculations have however been presented for the operational phase and these are provided in Section 4.2.2.

Pipelines for construction

Pipelines as outlined in Section 4.2.2 will be established at the start of the construction phase.

Conveyors

Conveyors as outlined in Section 4.2.2 will be established at the start of the construction phase.

POWER SUPPLY AND USE FOR THE CONSTRUCTION PHASE

During the construction phase limited power will be required for drilling, welding and construction lighting, and it is expected that this power will be sourced from generators.

NON-MINERALISED WASTE MANAGEMENT FOR THE CONSTRUCTION PHASE

<u>Domestic and industrial waste</u>

Facilities for the temporary storage of non-mineralised waste associated with the project will be provided. The types of waste that could be generated during the construction phase include: hazardous industrial waste (such as packaging for hazardous materials, used oil, lubricants), general industrial waste (such as scrap metal, contaminated wood and building rubble), and domestic waste (such as packaging and food waste). These wastes will be temporarily handled and stored on site before being removed for recycling by suppliers and approved waste handling companies, reuse by scrap dealers or final disposal at permitted waste disposal facilities at either Kuruman, Deben, Hotazel or Kimberley.

<u>Sewage</u>

Construction workers will make use of portable toilets that will be serviced on a regular basis. The sewage will be removed off-site by a certified contractor and disposed at a licensed facility in either Kuruman, Deben, Hotazel or Kimberley.

EMPLOYMENT AND HOUSING FOR THE CONSTRUCTION PHASE

The proposed project will create jobs during the construction phase. This workforce will be accommodated within a temporary construction camp (mobile containers) located on site. The construction camp will be provided with a septic tank, water tank and reticulation pipeline, and a temporary waste storage facility.

OPERATING HOURS FOR THE CONSTRUCTION PHASE

It is anticipated that the construction phase will consist of one shift per day from 07h00 to 16h30 from Monday to Friday. In cases where emergency action is required or critical activities are required, motivation will be made for the extension of these hours within the provisions of the regulations.

SECURITY AND ACCESS CONTROL

A fence will be established around the perimeter of the proposed project site. A designated access control and security office will be established at the access of the mine leading off the R325.

CONSTRUCTION PHASE TIMING

It is envisaged that construction phase activities will commence during the first quarter of 2017 and will continue for a period of approximately 12 months.

4.2.2 OPERATIONS PHASE

SURFACE INFRASTRUCTURE

Operational phase surface infrastructure is listed below and is illustrated in Figure 3 where relevant**.**

- An open pit;
- Rail loop
- Access road (off R325)
- Topsoil stockpile;
- Waste rock dump;
- Ore stockpile
- Product stockpile;
- Crushing and screening plant;
- Haul roads/Service road
- Weighbridge;
- Change house and ablution facilities;
- Sewage treatment facility
- Fire detection and fighting facilities;
- Water storage facilities and surface water control measures in compliance with Regulation 704;
- Explosives magazine;
- Administration office block;
- Clinic
- Parking areas;
- Fuel storage area and refuelling bay;
- Washbay and workshop
- Waste yard for the temporary storage of general and hazardous wastes
- Security gate and office

MINING METHOD – OPEN CAST ACTIVITIES

The proposed project will comprise conventional open cast strip mining methods. Following site preparation and initial earthworks, both excavation and drill and blast methods will be used to loosen the overburden rock and ore. Truck and shovel methods will be used to load and haul the box cut materials to the overburden rock stockpiles and the run-of-mine (ROM) to the relevant delivery point. Topsoil and overburden rock stripped during the mining operations will be used in the on-going rehabilitation processes. Table 5 summaries the associated open cast activities. Table 6 includes project data that provides perspective and scale to the proposed project. The proposed open pit area is illustrated in Figure 3.

TABLE 5: SUMMARY OF OPEN CAST ACTIVITIES

Activity	Description
Topsoil stripping	Topsoil will be stripped and stockpiled separately in accordance with the soil conservation management procedures.
Drilling and blasting	Once the topsoil and soft overburden material has been removed, the hard overburden rock will be drilled as per a predetermined design. Charges for blasting will be designed to prevent excessive ground vibration, fly rock and air blast.
Removal of overburden rock	The removal of the overburden rock above the ore body will be done by means of dozing / loading and hauling with large equipment. Apart from the overburden rock stockpile that is required for the initial box cut, the overburden rock material will be placed into the previously mined out void. Some overburden rock will be utilised for the establishment of platforms and internal haul roads.
Mining progression and concurrent rehabilitation	The initial box cut will be developed on the western boundary of the open pit where the ore seam is the shallowest. Mining will then progress towards the east. Topsoil will be placed on top of the backfilled overburden thus ensuring that the rehabilitation is done concurrently to the mining (rollover mining).
Removal of ore	The run of mine (ROM) ore will be transported via conveyors to the crushers before being conveyed to the product stockpile and despatched.

TABLE 6: PROJECT DATA THAT PROVIDES PERSPECTIVE AND SCALE OF THE PROPOSED PROJECT

Feature	Detail
Target ore body	The resource to be mined is the iron ore body of the Asbesheuwels Subgroup of the Transvaal Supergroup.
Depth of the open pit	The maximum depth of the open pit will range between be approximately 193 m.
Tonnages	It is anticipated that approximately 1.5 million tons/annum will be produced. There is an expected total of 8.54 million tonnes of Direct Shipping Iron Ore to mine at Jenkins.
Size of initial box cut	The size of the initial boxcut is approximately 19274 m^2. It should however be noted that approximately some of the overburden material from the initial box cut will be used for road and platform construction.
Grade target	Average target grade is 62% (this includes Driehoekspan and Doornpan)

CRUSHING AND SCREENING PLANT

Processing will be limited to crushing, screening and blending activities. The plant will operate in a three stage crushing system with open circuit primary crushing and closed circuit secondary and tertiary crushing. The -32mm product from the crusher will report to the product sizing and storage section where it will be screened to produce a -32mm +8mm lumpy product and a -8mm fines product which will be stockpiled separately. Run of mine (ROM) material will be processed as Direct Selling Ore (DSO) and therefore no further process or tailings facilities will be developed at the mine. Table 7 summarises the processing plant activities.

TABLE 7: SUMMARY OF CRUSHING AND SCREENING ACTIVITIES

Activity	Description
Primary crushing station	An excavator or front end loaders will be used to load the ore delivered from the ROM stockpile into a primary crushing feed bin. The ore is withdrawn from the feed bin with a vibrating grizzly feeder located at the bottom of the feed bin. The vibrating grizzly feeder transfers the ore directly to the jaw crusher in order to reduce the material to a size required by the downstream processes. The crushed ore is transferred from a jaw crusher onto a series of conveyor belts which will transfer the crushed ore into a surge bin.
Screening station	The crushed material from the surge bin in the primary crushing station will be withdrawn from the surge bin via a vibrating feeder that will feed the crushed ore onto a conveyor. Oversize material from the screening process will be sent to the secondary crushing station by means of a conveyor. Correctly sized material will be fed from the middle and bottom decks to a product stockpile via conveyor from where it will be moved by front end loaders and conveyors to the rail loading facility from where the product will be removed off-site via rail for sale to third parties.
Secondary crushing station	Oversize material from the screening station will be fed to a secondary surge bin at the secondary crushing station in order to reduce any oversize material to the required specifications. Material from the secondary surge bin is withdrawn via a vibrating pan feeder and transferred to the secondary cone crusher. The re-crushed material will be re-circulated back to the screening station via a conveyor. Any oversize material still present in the secondary crushing station will continue to be re-circulated until the required product specification is reached.
Dust suppression	Dust suppression will be utilised at all major dust generating points. The spray water pump will be fed by a JOJO tank from where it will supply water to spray nozzles in strategic positions.
Wash-down	The plant will also have high pressure wash water pumps that will supply water for wash-down and cleaning for maintenance operations. Dedicated JOJO tanks filled with process water will be used for the wash-down. The wash water used in the wash down operation will collect in dedicated sumps in all the main areas from where spillage pumps will pump the accumulated water back into a JOJO tank to be reused as wash-down water. The wash water pumps can also be used to pump water from the JOJO tanks to dedicated water control or recycle ponds as required. The solids in the sump will be removed by a bobcat loader and disposed of at the fines stockpile and then sold as fines when dried out.

ROM AND PRODUCT STOCKPILES

Designated ROM and product stockpiles will be developed for the temporary storage of ROM and product. It is recommended that both the ROM and product stockpile are developed with an appropriate barrier system in order to prevent the likelihood of seepage from these stockpiles.

TOPSOIL STOCKPILES

A designated topsoil stockpile area measuring 765 m (length) by 418 m (breadth) will be established as part of the proposed project (Figure 3). All topsoil will be used as part of con-current and final rehabilitation.

WATER SUPPLY AND USE FOR THE OPERATIONAL PHASE

Potable, Process and Fire Water

Potable water used for domestic and firefighting purposes will be made available from on-site boreholes, whilst service water will be sourced from pit dewatering (and boreholes if required). A total of 50m^3/day of potable water will be required as part of the proposed project.

STORMWATER MANAGEMENT SYSTEM FOR THE OPERATIONAL PHASE

Information provided in this section was sourced from the Surface Water Management Plan (SWMP) developed for the proposed project by Jeffares and Green (January 2016) (included in Appendix K) and the Coza project team.

Water management facilities for the control of stormwater and for pollution prevention will be designed to meet the requirements of Regulation 704 (4 June 1999) for water management on mines. The two main principle sections of Regulation 704 (4 June 1999) that are applicable to the stormwater management of the proposed project include:

- Regulation 6 which describes the capacity requirements of clean and dirty water systems. Clean and dirty water systems must be kept separate and must be designed, constructed, maintained and operated such that these systems do not spill more than once in 50 years.
- Regulation 7 which requires that measures which must be taken to protect water resources from all dirty water or substances which cause or are likely to cause pollution of a water resource either through natural flow or by seepage.

Clean water will be diverted away from dirty areas and operational areas (opencast pit, WRD and stockpiles area) by means of diversion channels, the location of which is illustrated in Figure 4. The clean water diversion channels have been designed in a manner that will allow clean water to flow in a northerly direction, following the natural topography of the site where it will be discharged back to the natural environment. Dirty water on-site will be collected by a series of stormwater channels and will be directed to pollution control dams (PCDs). Jeffares and Green have recommended that two PCD facilities be constructed if clean and dirty water mixing is to be mitigated. Further information pertaining to these PCDs is provided in the section below.

Pollution control dams – containment of dirty water

Dirty water run-off on-site will be contained in two PCDs. Further details regarding the PCDs is provided in Table 8 and Table 9 below. The position of the PCDs is illustrated in Figure 4.

TABLE 8: DETAILS OF THE POLLUTION CONTROL DAMS

PCD	Catchment Area (km^2)	Capacity (m^3)	Purpose
PCD 1	0.0182	2300	Will contain dirty run-off water from the workshop area
PCD 2	0.0198	2500	Will contain dirty run-off water from the ROM stockpile and crusher area

TABLE 9: CONCEPTUAL DESIGN PRINCIPLES FOR WATER HOLDING FACILITIES (INCL. PCDS)

Feature	Detail
Diversion	The upstream embankments of each dam form a clean water diversion where applicable.
Topsoil Stripping	Topsoil within the dam footprint areas will be stripped and stockpiled in accordance with the topsoil conservation guide. A stripping depth of 500mm has been recommended by the soils study.
Lining	Composite liner to all dams comprising: • 1.5 mm HDPE liner, overlying; • 150mm compacted clay liner; • Leakage detection system to intercept leak in HDPE liner.
Embankments	All inner side slopes 1V:3H All outer slopes 1V:2.5H
Leakage Detection	160mm diameter perforated drainex pipe in a gravel bedding wrapped in geotextile connecting to individual sumps outside the footprint of each dam. Leakage detected through inspection of sumps.
Access and Access Control	4m wide waste rock road to the storm water dam along pipeline route. Barbed wire perimeter fence around each dam with gates as required.
Drown Prevention Facilities	4 manilla ropes in each corner of dam for humans. 2 life rings for each dam.
Settling Facility	A silt trap will be required upstream of the dam.
Emergency Spillway	Each dam to be provided with a spillway of adequate width to ensure controlled spilling during extreme storm events (greater than 1:50year).

Feature	Detail
Monitoring and Maintenance	Daily monitoring to include: • Water levels • Operation of pumps and pump motor control systems Monthly monitoring to include: • Inspection of leakage detection sumps • Pumping flow rates between, from and into the various dams • Physical inspection for damage to liner • Level of silt in storm water dam silt trap Quarterly monitoring: • Pumping flow rates between, from and into the various dams De-silting (either mechanically or hydraulically using slurry pumps) of the storm water dam silt trap will be required occasionally.
Contingency Plans	In the event that leakage is detected in any of the dams, the dam should be emptied by pumping water to the process water dam. Once the cause for the leakage is located in the empty dam, the leak must be repaired and tested prior to filling with water. In the event that the downstream borehole monitoring indicates possible pollution, the incidence should be investigated by a specialist to identify: • Possible leakage from pipelines • Possible undetected liner leakage • Possible alternative source of pollution • Appropriate action should be implemented to prevent further pollution and if necessary, clean up the existing plume
Closure	Water dams will be removed and the land rehabilitated unless a suitable post-closure use for the dams can be identified. All plastic liners will be removed. It is probable that the water dams will be suitable for use as part of the artificial recharge system possibly to be developed in the backfilled open pit.

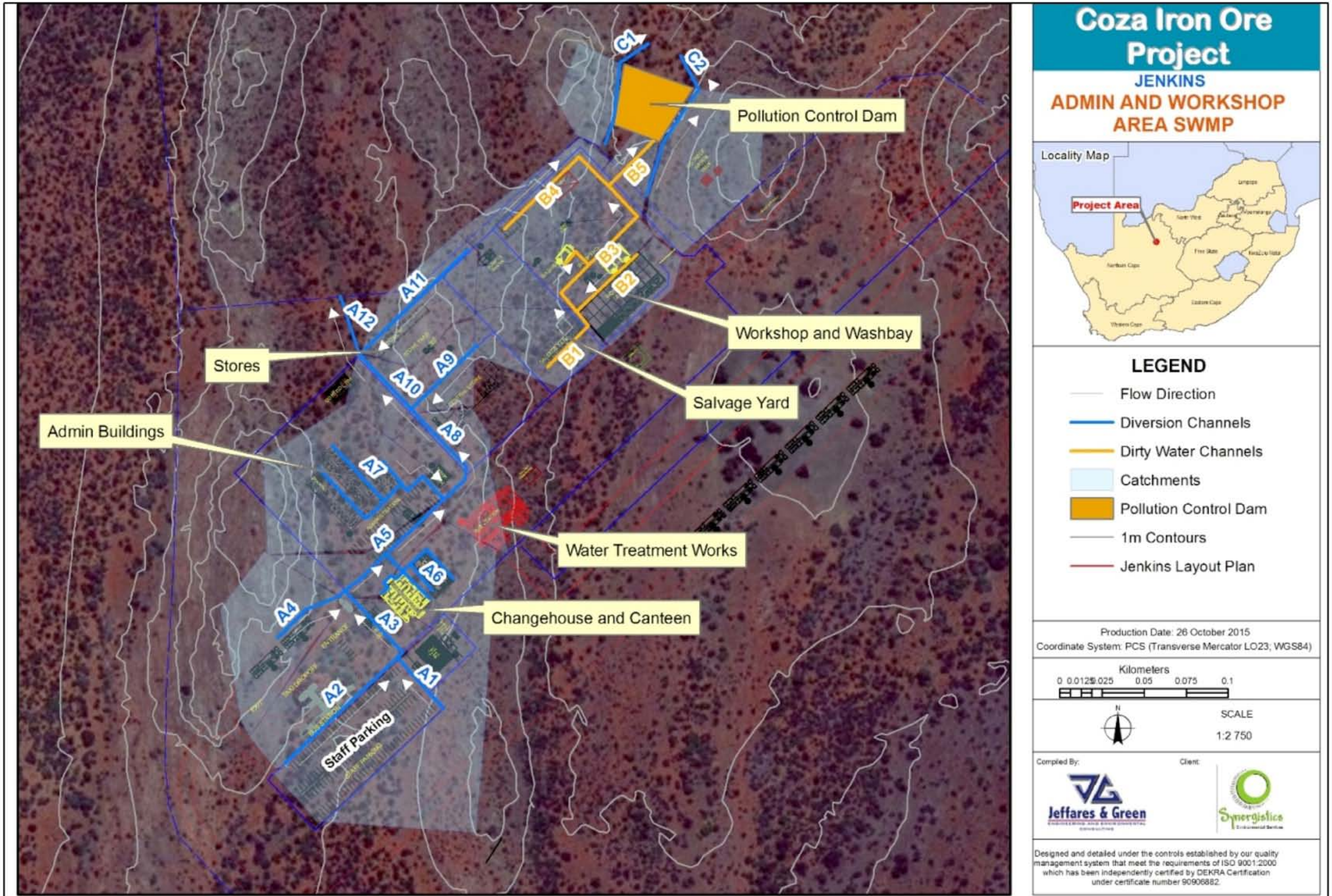


Figure 4: Conceptual Stormwater Management Plan for Admin and Workshop Area (Jeffares and Green, 2016)

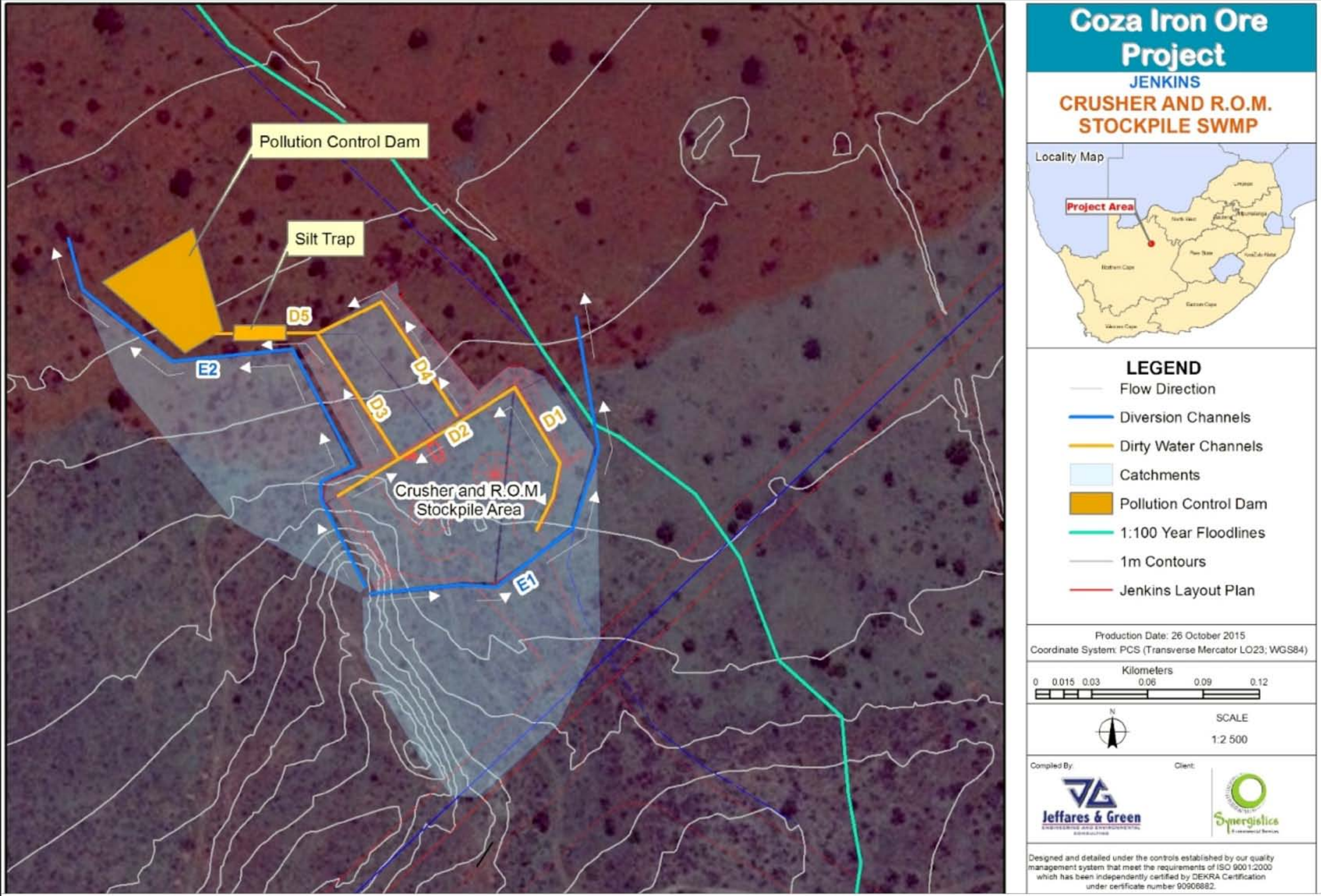


Figure 5: Conceptual Stormwater Management Plan for Crusher and ROM Stockpile Area (Jeffares and Green, 2016)

DISTURBANCE OF WATERCOURSES

Regulation 704 of the NWA requires that infrastructure including residue facilities should not be located within 100m from any watercourse or within the 1:100 year floodline, whichever is the greatest. According to the preferred site layout alternative being assessed as part of the EIA and EMP (Mine Plan 2 as presented in the Scoping report) provided by the Coza team, with the exception of internal haul roads no project infrastructure will encroach within the 1:100 year floodlines or within 100m from any watercourse.

The internal haul road between the admin area and the topsoil stockpile (see Figure 3) will require both approval in terms of a water use license as well as exemption from Regulation 704 of the NWA given that it will require a crossing over a non-perennial drainage line.

WATER BALANCE

Information in this section was sourced from the water balance report (Jeffares and Green, January 2016) undertaken for the proposed project and included in Appendix K.

A conceptual site wide water balance model has been prepared to understand flows within the Jenkins operational water circuit during years one to six of mining, and then during years seven, eight, nine and ten of mining. The water balance for years one to six of mining and the water balance for year ten of mining are illustrated in Figure 6 and Figure 7 respectively.

Based on information provided to Jeffares and Green by Coza, total monthly process water requirements will be approximately 2190 m^3. This is based on a daily water requirement of $42m^3$/day for mining operations and $30m^3$/day for dust suppression. Potable water requirements (based on a staff compliment of 180 people using 50 litres per day and a further 270 people using approximately 150 litres per day) are expected to be approximately $50m^3$/day which equates to $1509m^3$/month.

In order to cater for the process and potable water requirements on site, the year one to six year water balance indicates that 2332 m3/month of water will need to be abstracted from on site boreholes. Approximately 823 m3/month of this borehole water will be utilised as process water, with the remaining 1509 m3/month utilised as process water. During these initial years of mining, given the shallowness of the pit no fissure ingress water is expected and therefore full reliance on borehole water both for potable and process water is expected (approximately 1 054 m3/month for process water). Borehole water demand figures decrease to zero for the remainder of years 7 to 10. This is due to the volume of water that enters the mine water system (therefore supplement borehole water supply) as fissure water pumped from the open pit to the Raw / Process Water Dam.

Taking the above into account, the water balance model indicates that during years one to six there will not be a need to discharge water to the environment, however as the depth of the pit advances and the volume of pit ingress water increases, there may be a need to discharge water since this water will not have a scheduled use within the mine. It is expected that during years 8, 9 and 10 the volume of water to be pumped from the open pit will be an average of 5 763 m3/month, 5 460 m3/month and 11 375 m3/month respectively. The maximum water to be pumped from the open pit during this period will be 11 625 m3/month during year 10. This will result in excess water in the mine water system, which may be required to be treated for discharged, equal to 4 709 m3/month, 4 406 m3/month and 10 321 m3/month for years 8, 9 and 10 respectively.

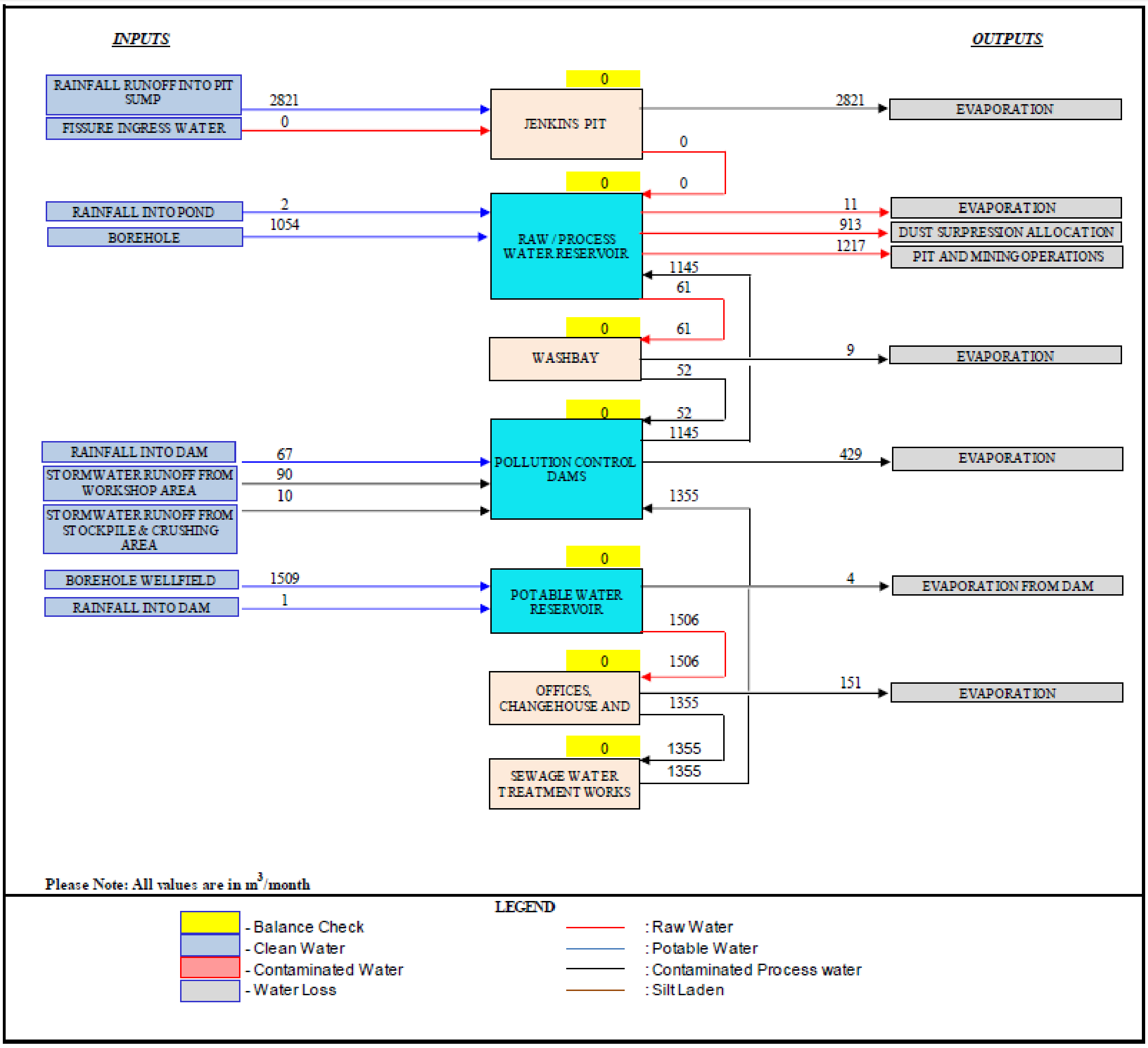


FIGURE 6: CONCEPTUAL WATER BALANCE FOR YEARS 1 TO 6 OF MINING (JEFFARES AND GREEN, JANUARY 2016)

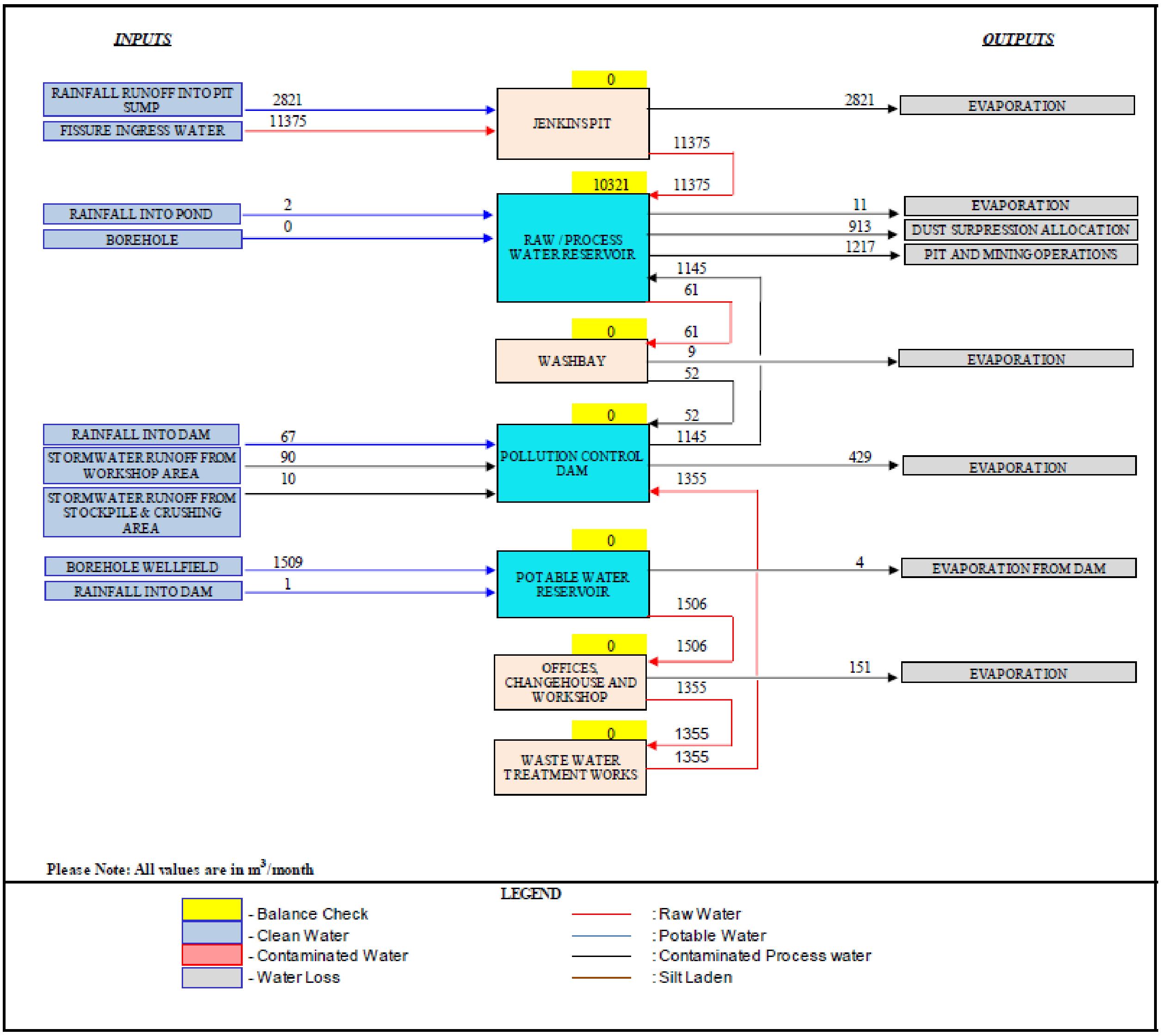


FIGURE 7: CONCEPTUAL WATER BALANCE FOR YEAR 10 OF MINING (JEFFARES AND GREEN, JANUARY 2016)

TRANSPORTATION (ROUTES AND MECHANISMS) FOR THE OPERATIONAL PHASE

Rail loop

As part of the proposed project, a rail loop will be built which will link to Transnet Freight Rail's domestic route.

Internal haul roads

Within the proposed site boundary haul roads will be established. These haul roads will consist of a combination of widening existing gravel roads as well as the establishment of new haul roads.

Access to the site

Access to the proposed project site will be via the R325 as discussed in Section 4.2.1. See Figure 3.

Transportation of workers and supplies to and from site

During the operation of the proposed project there will be workers travelling to and from site, trucks transporting input materials, machinery, waste removal and consumables as well as trucks carting ore from Driehoekspan and Doorpan mining sections (for processing at Jenkins). In addition there will also be internal haulage within the project area.

Conveyors

Conveyor belts will be used for the movement of minerals and waste rock out of the pit. All the conveyors will be equipped with apron slabs to collect pillage. The conveyors are designed to operate 8 hours a day for five days a week, excluding maintenance days and public holidays.

Pipelines

A series of pipelines will be required for the conveyance of potable water, process water and sewage effluent. Pipelines will convey all process and potable water within the water reticulation system. All water reticulation piping will be HDPE standard and will vary in size (50mm to 225mm) across the proposed project site. Pipelines with a minimum diameter of 100mm will be installed to convey sewage effluent from the change houses and the administrative block to the sewage treatment plant.

POWER SUPPLY AND USE FOR THE OPERATIONAL PHASE

Power supply to Jenkins will be via a bulk power supply from Eskom. Provision will be made to install a 132/22kV 10MVA transformer at the main substation, and from this substation, a 22kV overhead wooden pole line will be installed to provide power on site (Figure 3). The construction of the 22 kV powerline does not form part of this assessment as Eskom will be responsible for the infrastructure.

Alternatives for substations from where power will be sourced are currently being investigated. Section 4 discusses power supply alternatives considered for the project.

MINERALISED WASTE MANAGEMENT FOR THE OPERATIONAL PHASE

Overburden/waste rock stockpile

Overburden/waste rock associated with the proposed project will be temporarily stockpiled and then backfilled into the open pit as part of the concurrent rehabilitation initiative. In compliance with Section 4 of GN. 632 of the NEM:WA, the design characteristics associated with the overburden/waste rock stockpile are provided in Table 10 below.

TABLE 10: DESIGN CHARACTERISTICS FOR THE WASTE ROCK DUMP

Feature	Detail
Physical Dimensions	Foot print area: 1304 m x 1129 m
	Height: Approximately 30 m
Physical Characteristics	Size distribution: To be determined
	Void ratio: Approximately 0.5
Chemical Characteristics	Geochemical tests and analysis indicate that in both the ore and waste rock, the neutralising potential (NP) exceeds the acid potential (AP), which result in positive NNP values. Accordingly, both samples are therefore considered to be non-acid forming. Similarly, the results of the leach tests indicate that both the ore and waste rock from the project area are mostly inert and any leachate generated by planned ore stockpiles and/or WRDs should be of an acceptable quality. The only metal found to be present in the leachate at significant concentrations were aluminium and managanese.
Transport and placement	All material will be loaded onto trucks and transported to designated stockpiles
Stormwater management	Stormwater trenches / berms around the upstream boundaries of the overburden stockpiles that direct clean stormwater run-off around and away from the overburden stockpile. Dirty water runoff and/or seepage will be collected in dirty water paddocks which will be sized to comply with GN 704 and from which water may be abstracted for use in the circuit or left to evaporate.
Lining	No liner required.
Under Drains	No underdrains required.
Monitoring	On-going groundwater monitoring should be done at JNK01 as illustrated in Figure 20.
Access and Access control	Internal haul roads will be used for access. A perimeter fence is not planned around the overburden stockpile. Rather a perimeter fence is proposed around the whole proposed mine area.
Waste Minimisation	Waste rock will be used for concurrent rehabilitation and final closure of the open pit. If required, waste rock will also be used for the construction of platforms and roads, where required.
Dust control	No dust control will be provided at the overburden stockpile because these are not seen as a significant dust emission sources given the particle size distribution.
Closure	All the stockpile material will be removed for final closure of the open pit.

The safety classification for the overburden/waste rock stockpiles has been determined in accordance with the South African Code of Practice for Mine Residue Deposits (SANS 10286:1998) and the requirements of Section 3(c) of GN 527 of the MPRDA. The summarised safety classification is included in Table 11 below.

TABLE 11: SAFETY CLASSIFICATION CRITERIA FOR THE WASTE ROCK/OVERBURDEN STOCKPILE

Criteria No.	Criteria		Comment	Safety Classification
1	No. of Residents in Zone of Influence	0 (Low hazard)	No residents were noted within the zone of influence.	Low Hazard
		1 -10 (Medium hazard		
		>10 (High hazard)		
2	No. of Workers in Zone of Influence	<10 (Low hazard)	Minimal workers will be located in the zone of influence as the main activities will take place in the pit area	Low Hazard
		11 – 100 (Medium hazard)		
		>100 (High hazard)		
3	Value of third party property in zone of influence	0 – R2 Million (Low hazard)	No formal assessment of the value of property has been done in the zone of influence. The characteristics of the overburden dumps are such that catastrophic failures will be localised and no extended flow will be experienced.	Low Hazard
		R2 – R20 million (Medium hazard)		
		>R20 million (High hazard)		
4	Depth to underground mine workings	>200 m (Low hazard)	No underground activities are located within the zone of influence	Low Hazard
		50 m – 200 m (Medium hazard)		
		<50 m (High hazard)		

With reference to Table 11 above, the waste rock stockpiles is classified as a low safety risk.

Waste assessment for the overburden stockpile

In accordance with Section 5 GN. 632 of the NEM:WA, overburden stockpiles need to be classified taking into account Regulation 8 of GN R. 634 of 2013, which references the following associated National Norms and Standards:

- National Norms and Standards for the assessment of waste for landfill disposal (GN R.635 of 2013).
- National Norms and Standards for disposal of waste to landfill (GN R. 636 of 2013).

No site specific or proxy waste rock/overburden samples were available. SLR has however been involved in a number of waste assessments for overburden/waste rock in the Northern Cape region. In this regard, the outcomes of previous assessments indicate that depending on interpretation, waste rock/overburden material may be a Type 3 or 4 waste which would indicate a Class C or D liner system. Furthermore, risk based considerations are required to ensure that the end solution matches potential risk. In this regard, although baseline groundwater quality is good (used for domestic purposes), the modelled results of the Groundwater assessment (which assumes no liner) indicate limited potential for pollution migration from the temporary (maximum of ten years) waste rock/overburden dump. No third party boreholes will be impacted, aside from CJB02 which will be destroyed as part of project development. It is therefore recommended that there is less focus on implementing a liner and more focus on the control of dirty water runoff from the temporary waste rock/overburden facility. Moreover, a network of monitoring boreholes is required to closely track the potential for pollution migration emanating from the overburden/waste rock facility. The end mitigation measure is removal of the waste rock dump and disposal of this into the final pit void. This will eliminate the source.

In addition, it is not practically possible to line an open pit that is designed with con-current backfilling. There are multiple reasons for this. A key consideration is that the method of blasting overburden from one new strip into the previously mined strip will damage any liner system. A related issue is that the side and footwalls of the open pit are not smooth surfaced making it impossible to introduce a liner system. The pit will be at its deepest at approximately 193 m. No liner will completely withstand this type of loading without deformation.

NON-MINERALISED WASTE MANAGEMENT FOR THE OPERATIONAL PHASE

Domestic and industrial waste

Facilities for the temporary storage of non-mineralised waste associated with the proposed project will be provided. The types of waste that could be generated on site during the operational phase include: hazardous industrial waste (such as packaging for hazardous materials, used oil, lubricants), general industrial waste (such as scrap metal and building rubble), medical waste (such as swabs, bandages) from the clinic and domestic waste (such as packaging, canteen waste and office waste). These wastes will be temporarily handled and stored on site at the waste handling yard before being removed for recycling by suppliers, appointed waste contactors or reuse by scrap dealers or final disposal at permitted waste disposal facilities in either Kuruman, Deben, Hotazel or Kimberley.

Sewage

Sewage will be directed to the sewage treatment facility which will have capacity to treat 50kℓ a day of sewage.

BLASTING

Blasting will take place as part of the proposed project. It should however be noted that blasting will be limited to day-time hours.

OTHER SUPPORT SERVICES AND FACILITIES

Other support services associated with the proposed project include the following:

- A designated fuel storage area for the above ground diesel storage tanks which will be placed onto a concrete surface and will be surrounded by a bund wall which will be capable of containing 110% capacity to prevent seepage of spillages. The fuel storage area will also consist of a designated refuelling bay for all mine related vehicles.
- Weighbridge for final weighing of trucks prior to dispatching with ore
- Admin block comprising offices, kitchen area, canteen, training centre, clinic and emergency room (Figure 3).
- Flammable store
- Change house and stores
- Workshop and washbays used for servicing equipment and general maintenance
- A control room at the processing plant area that will be used to operate the plant
- Designated parking areas for light vehicles, surfaced with a wearing course established for use by administrative staff, visitors and contractors
- A truck staging area for the temporary parking of heavy vehicles.
- Lighting masts the position will be determined by an electrical engineer.

EMPLOYMENT AND HOUSING

The proposed project will allow for the creation of approximately 182 jobs during the operational phase. Nobody will be housed on-site during the operational phase of the proposed project. Operational workers will be accommodated in nearby towns.

OPERATING HOURS

At this stage it is expected that the proposed mine will be operational 8 hours a day for 5 days a week (Monday to Friday).

LIFE OF MINE

Based on current planning, it is anticipated that mining and processing activities will reach full production in 2018. The anticipated life of mine is approximately 10 years.

4.2.3 DECOMMISSIONING AND CLOSURE

The environmental objective for closure is to minimise the impacts associated with the closure and decommissioning of the mine and to restore the land to a useful land use not dissimilar to the pre mining land use. The conceptual closure plan objectives and principles include the following, and further detail is provided in the Closure Liability Report included in Appendix R:

- Environmental damage is minimised to the extent that is acceptable to all parties involved
- The land is rehabilitated to achieve a condition approximating its natural state, or so that the envisaged end use of grazing, woodland or wildlife (ACR, January 2016) is achieved.
- All surface infrastructure will be removed from site after rehabilitation and the open pit will be completely backfilled.
- Mine closure is achieved efficiently, cost effectively and in compliance with the law.
- The social and economic impacts resulting from mine closure are managed in such a way that negative socio-economic impacts are minimised.

5 POLICY AND LEGISLATIVE CONTEXT

This section outlines the key legislative requirements applicable to the proposed project. Table 12 below provides a summary of the applicable legislative context and policy.

TABLE 12: LEGAL FRAMEWORK

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
Mineral and Petroleum Resources Development Act No. 28 of 2002 (MPRDA) and Regulations	As outlined in Table 13	COZA has applied for a mining right in terms of the MPRDA. A mining right application was submitted in October 2015 to the Department of Mineral Resources.
National Environmental Management Act No. 107 of 1998 (NEMA)	As outlined in Table 13	An application for environmental authorisation in terms of listed activities in accordance to NEMA has been applied for. The NEMA application was submitted in October 2015 to the Department of Mineral Resources. A copy of the application form is attached in Appendix E.
Regulations 983 (Listing Notice 1), 984 (Listing Notice 2) and 985 (Listing Notice 3) in terms of NEMA	As outlined in Section 4.1	
Guideline on the need and desirability in terms of the Impact Assessment (EIA) Regulations, 2010, GNR. 891 of 2014.	Section 6	Need and desirability has been taken into account as part of project planning.
National Environment Management: Waste Act No. 59 of 2008 (NEM:WA)	Section 4.1	An application for a waste management license in terms of the NEM:WA was submitted in October 2015 to the Department of Mineral Resources. A copy of the application form is attached in Appendix E.
Regulation 921 in terms of NEM:WA	Section 4.1	
Regulations regarding the planning and management of residue stockpiles and deposits from a prospecting, mining, exploration or production operation in terms of NEM:WA, Regulation 632.	Section 4.2.2	Informs the design requirements for the overburden/waste rock dump associated with the proposed project.
National Norms and Standards for the assessment of waste for landfill disposal (GNR 635 of 2013)		
National Norms and Standards for the disposal of waste to landfill (GNR 636 of 2013)		
National Water Act No. 36 of 1998 (NWA)	Section 7.4.1.7, 7.8, and 27	A water use license application will be submitted to the Department of Water and Sanitation for various water uses in accordance to Section 21 of the NWA. As part of the water use license application, exemption in terms of Regulation 704 of 1999 will be applied for.
Regulation 704 of 1999 in terms of the NWA	Section 7.1.3, 7.4.1.7, 7.8 and 27	
National Environmental Management: Biodiversity Act No. 10 of 2004 (NEM:BA)	Section 7.4.1.6	Biodiversity has been taken into account as part of project planning.
Mining and Biodiversity Guideline (DEA et al, 2013)	Section 7.4.1.6	Biodiversity has been taken into account as part of project planning.

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
National Freshwater Ecosystem Priority Areas 2011 (NFEPA)	Section 7.4.1.6	Biodiversity has been taken into account as part of project planning.
National Veld and Forest Fire Act No. 101 of 1998	Section 7.8 and 27	Fire management has been taken into account as part of project planning.
International Union for Conservation of Nature (IUCN)	Section 7.4.1.6	Biodiversity has been taken into account as part of project planning.
National Forest Act No. 84 of 1998 (NFA)	Section 7.4.1.6	An integrated permit application will have to be made to the DENC to obtain the required permission to remove and/or translocate protected species in terms of the NFA and the NCNCA.
Northern Cape Nature Conservation Act No. 9 of 2009 (NCNCA)	Section 7.4.1.6	
Conservation of Agriculture Resources Act No. 43 of 1983	Section 7.4.1.6	Agriculture has been taken into account as part of project planning.
National Protected Areas Expansion Strategy 2008 (NPAES)	Section 7.4.1.6	Biodiversity has been taken into account as part of project planning.
South African National Botanical Institute (SANBI) Integrated Biodiversity Information	Section 7.4.1.6	Biodiversity has been taken into account as part of project planning.
Tsantsabane Local Municipality Integrated Development Plan	Sections 7.4.1.14	Land planning has been taken into account as part of project planning.
Tsantabane Spatial Development Framework	Section 6	Land planning has been taken into account as part of project planning.
ZF Mgcawu District Municipality (previously known as the Siyanda District Municipality) Integrated Development Plan	Sections 7.4.1.14	Land planning has been taken into account as part of project planning.
National Heritage Resource Act No. 25 of 1999	Section 7.1.3, 7.4.1.13, 7.8 and 27	Heritage has been taken into account as part of project planning.
Northern Cape Planning and Development Act No. 7 of 1998	Section 7.7 and Section 27	Submission of a re-zoning application
Spatial Planning and Land Use Management Act No. 16 of 2013.		
National Atmospheric Emission Reporting Regulations in terms of the National Environmental Management: Air Quality Act 39 of 2004 (the Reporting Regulations).	Section 27	Registration on the National Emissions Inventory System
South African Code of Practice for Mine Residue Deposits (SANS 10286:1998)	Section 4.2.2	Mine residue planning has been taken into account as part of project planning.

This document has been prepared strictly in accordance with the DMR EIA and EMP Report template format, and was informed by the guidelines posted on the official DMR website. This is in accordance with the requirements of the MPRDA. In addition, this report complies with the requirements of the National Environmental Management Act (NEMA) (Act 107 of 1998). The relevant criteria are indicated in Table 13.

TABLE 13: EIA AND EMP REPORT REQUIREMENTS

EIA and EMP report requirement as per the DMR template	EIA and EMP report requirements as per the 2014 NEMA regulations	Reference in the EIA
Part A of DMR report template	**Appendix 3 of the NEMA regulations**	**-**
The EAP who prepared the report	Details of the EAP who prepared the report.	Section 1.1
Expertise of the EAP	Details of the expertise of the EAP, including curriculum vitae.	1 and Appendix B
Description of the property	The location of the activity, including - the 21 digit Surveyor General code of each cadastral land parcel. Where available the physical address and farm name. Where the required information is not available, the coordinates of the boundary of the property or properties.	Section 2
Locality plan	A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken or on land where the property has not been defined, the coordinates within which the activity is to be undertaken	Section 3
Description of the scope of the proposed overall activity	A description of the scope of the proposed activity, including all listed and specified activities triggered.	Section 4.1
Description of the activities to be undertaken	A description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for and a description of the associated structure and infrastructure related to the development	Section 4.2
Policy and legislative context	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context	Section 5
Need and desirability of the proposed activity	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.	Section 6
Motivation for the preferred development footprint within the approved site including	A motivation of the preferred development footprint within the approved site including	Section 7
A full description of the process followed to reach the proposed development footprint within the approved site	A full description of the process followed to reach the proposed development footprint within the approved site	Section 7
Details of the development footprint alternatives considered	Details of all the alternatives considered.	Section 7.1
Details of the public participation process followed	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs.	Section 7.2
Summary of issues raised by IAPs	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.	Section 7.3

EIA and EMP report requirement as per the DMR template	EIA and EMP report requirements as per the 2014 NEMA regulations	Reference in the EIA
Environmental attributes associated with the development footprint alternatives	The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 7.4
Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts including the degree of the impacts	The impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed and mitigated.	Section 7.5
Methodology used in determining the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks.	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.	Section 7.6
The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternative will have on the environment and the community that may be affected.	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 7.7
The possible mitigation measures that could be applied and the level of risk	The possible mitigation measures that could be applied and level of residual risk.	Section 7.8
Motivation where no alternative sites were considered	If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such.	Section 7.9
Statement motivating the alternative development location within the overall site	A concluding statement indicating the preferred alternatives, including preferred location within the approved site.	Section 7.10
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) through the life of the activity	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structure and infrastructure will impose on the preferred location through the life of the activity including a description of all environmental issues and risks that were identified during the environmental impact assessment process and 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
Assessment of each identified potentially significant impact and risk	An assessment of each identified potentially significant impact and risk including cumulative impacts, the nature, significant and consequence of the impact and risk, the extent and duration of the impact and risk, the probability of the impact and risk occurring, the degree to which the impact can be reversed, the degree to which the impact and risk may cause irreplaceable loss of a resources and the degree to which the impact and risk can be mitigated.	Section 9
Summary of specialist reports	Where applicable the summary of the findings and recommendations of any specialist report complying with Appendix 6 of these Regulations and an indication as to	Section 10

EIA and EMP report requirement as per the DMR template	EIA and EMP report requirements as per the 2014 NEMA regulations	Reference in the EIA
	how these findings and recommendations have been included in the final assessment report.	
Environmental impact statement	An environmental impact statement which contains a summary of the key findings of the environmental impact assessment, 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 a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives	Section 11
Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr	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 26 and Section 27
Final proposed alternatives	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment	Section 12
Aspects for inclusion as conditions of authorisation	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 13
Description of any assumptions, uncertainties and gaps in knowledge	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed	Section 14
Reasoned opinion as to whether the proposed activity should or should not be authorised	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 that should be made in respect of that authorisation	Section 15
Period for which environmental authorisation is required	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 16
Undertaking	An undertaking under oath or affirmation by the EAP in relation to the correctness of the information provided in the reports, the inclusion of comments and inputs from stakeholders and I&Aps, the inclusion of inputs and recommendations from the specialist reports where relevant and 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 17
Financial provision	Where applicable, details of any financial provisions for the rehabilitation, closure, and	Section 18

EIA and EMP report requirement as per the DMR template	EIA and EMP report requirements as per the 2014 NEMA regulations	Reference in the EIA
	ongoing post decommissioning management of negative environmental impacts	
Deviation from the approved scoping report and plan of study	An indication of any deviation from the approved scoping report, including the plan of study, including any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and a motivation for the deviation	Section 19
Other information required by the competent authority	Any specific information required by the competent authority.	Section 20
Other matter required in terms of section 24(4)(a) and (b) of the Act.	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	Section 21
Part B of the DMR report template	**Appendix 4 of the NEMA regulations**	-
Details of EAP	Details of the EAP who prepared the EMPr and the expertise of that EAP to prepare the EMPr, including a curriculum vitae	Section 22
Description of the aspects of the activity	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description	Section 23
Composite map	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	Section 24
Description of impact management objectives including management statements	A description of the impact management objectives, including management statements,	Section 25
The determination of closure objectives	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 planning and design, pre-construction activities, construction activities, rehabilitation of the environment after construction and where applicable post closure; and where relevant, operation activities	Section 25.1
The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity	-	Section 25.2
Potential acid mine drainage	-	Section 25.3
Steps taken to investigate, assess and evaluate the impact of acid mine drainage	-	Section 25.4
Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage	-	Section 25.5

EIA and EMP report requirement as per the DMR template	EIA and EMP report requirements as per the 2014 NEMA regulations	Reference in the EIA
Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage	-	Section 25.6
Volumes and rate of water use required for the mining	-	Section 25.7
Has a water use license been applied for?	-	Section 25.8
Impacts to be mitigated in their respective phases	-	Section 25.9
Impact management outcomes	A description and identification of impact management outcomes required for the aspects contemplated in paragraph	Section 26
Impact management actions	A description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes be achieved, and must, where applicable, include actions to avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; comply with any prescribed environmental management standards or practices; comply with any applicable provisions of the Act regarding closure, where applicable comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	Section 27
Financial provision		Section 28
Mechanism for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon	The method of monitoring the implementation of the impact management actions	Section 29
	The frequency of monitoring the implementation of the impact management actions	
	An indication of the persons who will be responsible for the implementation of the impact management actions	
	The time periods within which the impact management actions must be implemented	
	The mechanism for monitoring compliance with the impact management actions	
	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations	
Environmental Awareness Plan	An environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work; and risks must be dealt with in order to avoid pollution or the degradation of the environment	Section 30
Specific information required by the competent authority	Any specific information that may be required by the competent authority	Section 31
Undertaking	-	Section 32

6 NEED AND DESIRABILITY OF THE PROPOSED PROJECT

The need and desirability of the proposed project is described below. This section has been compiled taking into account the need and desirability guidelines in terms of the environmental impact assessment regulations 891 of 2014.

6.1 ECOLOGICAL SUSTAINABLE DEVELOPMENT AND USE OF NATURAL RESOURCES

Due to the nature of mining projects, impacts on sensitive biodiversity areas, linkages between biodiversity areas and related species and the role that they play in the ecosystem are probable. The proposed project also has the potential to directly disturb vegetation, vertebrates and invertebrates. In addition to this, soil is a valuable resource that supports a variety of ecological functions. The proposed project has the potential to damage soil resources through physical disturbance and/or contamination, which has a direct impact on the potential loss of the natural capability of the land.

As part of the proposed project, independent biodiversity and soil specialists were appointed to determine the sensitivity of the proposed project area. In this regard the proposed project site does include areas of high biodiversity sensitivity as well as protected tree species *Vachellia erioloba* (Camel Thorn), *Vachellia haematoxylon* (Grey Camel Thorn) (refer to Section 7.4.1.6 for further information), which may be impacted as part of the proposed project (Refer to Appendix F for the detailed assessment). Linked to this, is the loss of soil functionality and related land capability as an ecological driver for vegetation and ecosystems that rely on soil (Refer to Appendix F for the detailed assessment).

Measures that were considered to avoid the destruction and disturbance of biodiversity and the loss of soil resources included limiting the project footprint to what was absolutely necessary. In this regard and with reference to section 7.1.3, planned infrastructure has been positioned in such a way as to avoid sensitive areas such as the depression wetland features identified on site (see Figure 16). Where sensitive biodiversity areas and the removal of protected trees cannot be avoided, mitigation measures will focus on ensuring ecological sustainability which include the implementation of a biodiversity offset, if required. Other mitigation measures focus on backfilling the open pit to ensure that no final void remains after closure and that rehabilitation aims at restoring pre-mining land capability.

6.2 PROMOTING JUSTIFIABLE ECONOMIC AND SOCIAL DEVELOPMENT

The proposed project will result in positive socio-economic impacts (Refer to Appendix F for the detailed assessment). In this regard, the proposed development of the mine supports the national SA economy at a macro level by generating exports that will leverage foreign income to the country. Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees. This is in line with the municipal Spatial Development Frameworks and Integrated Development Plans for the area which identify the promotion of mining job creation as one of the strategies to guide spatial development within the broader area given that mining forms the backbone of employment and is the main source of income within the local municipality. Further to this, through employment, persons at the proposed mine will gain skills in the construction and operation of a mine and development which contributes to the building of the nation. Management measures that will be implemented to further enhance positive socio-economic impacts include the employment of people in local communities (as far as possible), formal bursary and skills development provided to people in the closest communities and the implementation of a procurement mentorship programme which provides support to local businesses. Further to this, the proposed development will also ensure local economic development through the implementation of projects identified in the social and labour plan (SLP). The projects identified in the SLP will aim to contribute towards the socio-economic development of the area as well as the areas from which the majority of the workforce is sourced.

Due to the expectation of employment associated with mining projects there is potential for negative socio-economic impacts to occur (Refer to Appendix F for the detailed assessment). In this regard, an influx of job seekers to an area increases pressure on existing communities, housing, basic service delivery and raises concerns around safety and security. Management measures that will be implemented to manage and remedy these impacts include the implementation of a health policy on HIV/AIDs and tuberculosis, working together with local and regional authorities to address social service constraints and to monitor and prevent the development of informal settlements. In addition to this, no housing will be established on-site and formal communication structures and procurement procedures will be developed (Refer to Section 27 for further detail).

7 MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT ON THE SITE INCLUDING THE PROCESS FOLLOWED TO DEFINE THE PREFERRED DEVELOPMENT ALTERNATIVES

7.1 DETAILS OF THE DEVELOPMENT FOOTPRINT CONSIDERED

This section describes land use or development alternatives, alternative means of carrying out the operation, and the consequences of not proceeding with the proposed project.

The main project alternatives considered include:

- Property or locality
- Type of activity
- Design or layout
- Technology
- Operational aspects
- The "no-go" alternative

7.1.1 PROPERTY OR LOCALITY

The property on which mining related activities takes places is dependent on the location of the ore body. It follows that only the remaining extent (portion 0) and portion 1 of the farm Jenkins 562 were considered for the location of the open cast mine given that this is where the ore body is located.

7.1.2 TYPE OF ACTIVITY TO BE UNDERTAKEN

Opencast mining activities will be undertaken as part of the proposed project. Underground mining was considered, however due to the shallow nature of the ore body and the lack of stable ground (for underground roofing) within the shallow area this option was not considered feasible.

7.1.3 DESIGN OR LAYOUT

In order to reduce the carbon footprint and impacts, reduce energy use, limit haulage costs and to optimise mining, infrastructure is placed in close proximity to the ore body. In addition, infrastructure has been placed in such a way that as far as is practically possible, sensitive areas such as wetland depressions and drainage lines can be avoided. If follows that the majority of infrastructure and mining activities will be located in the eastern section of the proposed project site (Figure 8)). Moreover, the placement of infrastructure has been optimised so as to allow environmentally sensitive areas and heritage resources to remain largely undisturbed.

In terms of the placement of infrastructure, two main site layout alternatives were considered (Figure 8). While the open pit position is dictated by the location of the ore body, the aim is to place the remaining infrastructure as close to the open pit so as to limit the overall project footprint and also in a manner which allows environmentally sensitive areas and heritage resources identified on site to remain largely undisturbed. In this regard, Option 1 presents an infrastructure layout which is deemed to be the most economically preferable layout and Option 2 allows for infrastructure to be minimally shifted in order to avoid sensitive areas (Figure 8). Section 7.7 provides a discussion of the advantages and the disadvantages of the site layout options. The outcome of the discussion concluded that Option 2 is the preferred site layout.

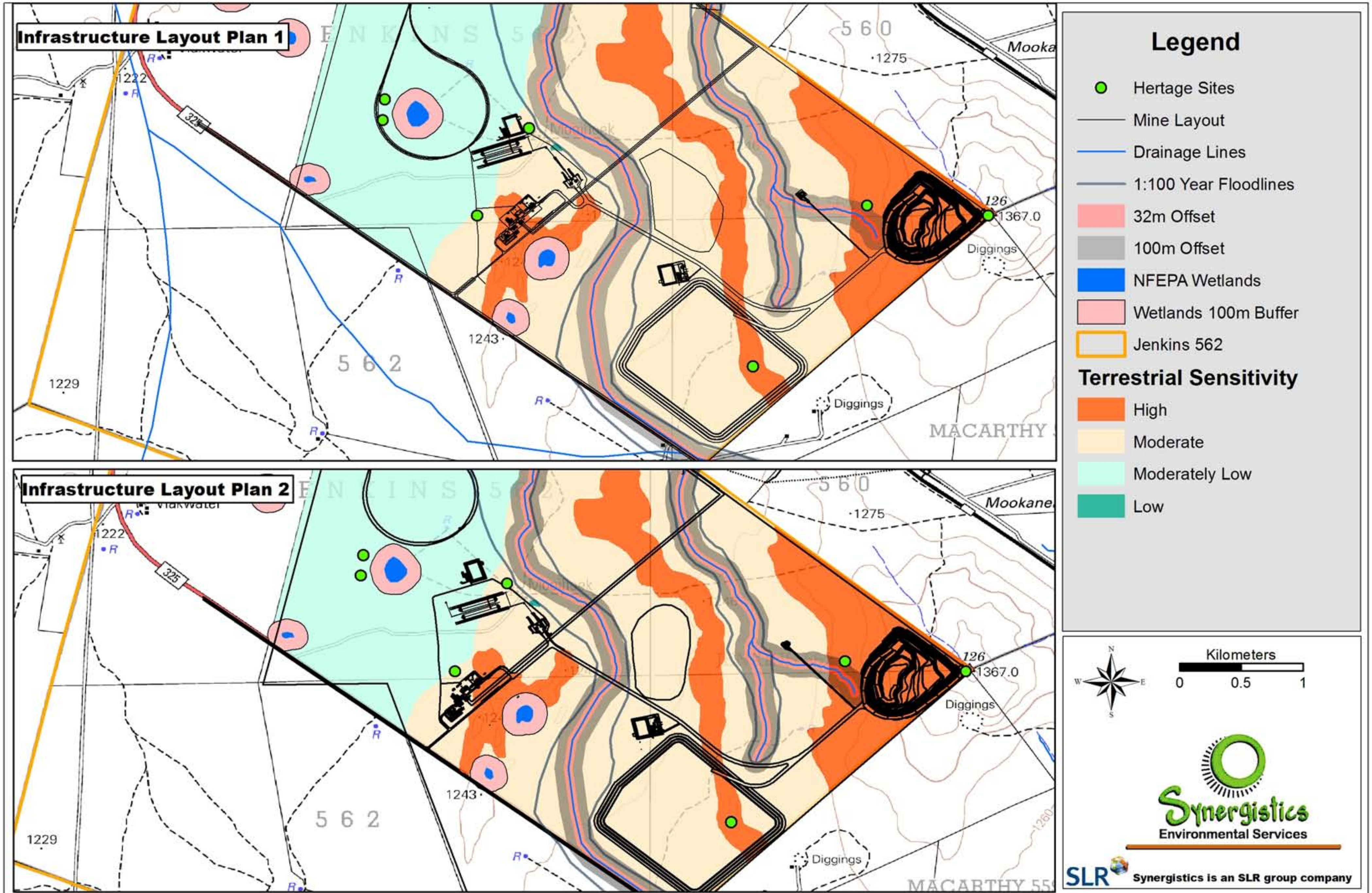


Figure 8: Site Layout Option 1 (Economically Preferred Alternative) and Site Layout Option 2 (Environmnentally Preferred Alternative)

755.03048.00001

Coordinate System DMS	
Spheroid WGS84	Central Meridian LO

7.1.4 TECHNOLOGY

Given the simplicity of the proposed project, it is expected that the currently proposed conventional opencast mining method and basic crushing and screening operation are deemed to be the preferable technology alternative. It follows that no further technical alternatives were considered as part of the proposed project.

7.1.5 OPERATIONAL ASPECTS

WATER SUPPLY ALTERNATIVES

As part of the environmental assessment process, Coza investigated various sources for water supply. This included sourcing water from boreholes which would be drilled on site, sourcing water from the municipal scheme (Vaal Gamagara) or sourcing water from neighbouring mines. Sourcing water from groundwater is the preferred option due to potential unreliability associated with sourcing water from the municipal water supply system or from third party (neighbouring mines),

POWER SUPPLY ALTERNATIVES

Alternative substations from where power will be sourced have been investigated as part of the Coza Concept Study. These include the BKM substation which is situated approximately 10km North-West of the site and the Bulkop substation located approximately 12 km South-East. In addition, the Lylyveld substation located approximately 15 km North-East from the site was considered. It is expected that sourcing power from the BKM substation is the preferred alternative.

TRANSPORT ALTERNATIVES

Two main transportation alternatives for the transportation of product from site to Vanderbijlpark have been considered as part of the proposed project. The first option is to construct rail infrastructure at the mine that will link to Transnet Freight Rail’s domestic route, and the second alternative is to truck ore to existing mines for rail transportation. Based on current planning, it follows that the first alternative (construction of rail infrastructure to link the mine to the main Transnet line) is the preferred alternative.

7.1.6 THE “NO-GO” ALTERNATIVE

The assessment of this option requires a comparison between the options of proceeding with the proposed project with that of not proceeding with the proposed project. Proceeding with the proposed project attracts potential economic benefits and potential negative environmental and social impacts. Not proceeding with the proposed project leaves the status quo.

7.2 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

This section describes the information provided to landowners, adjacent landowners, regulatory authorities and other interested and affected parties (IAPs) to inform them in sufficient detail of what the proposed project will entail on the land, in order for them to assess what impact the operation will have on them or the use of the land.

7.2.1 DATABASE

The proposed project's public involvement database was developed by sourcing IAPs details relating to immediate landowners and adjacent landowners by means of a deed search. This information was verified during social scans including site visits in the surrounding area, networking and direct consultation with IAPs. In addition to this, the project's public involvement database was supplemented with information on IAPs provided in the scoping meetings. A copy of the project's public involvement database is included in Appendix E. The database will be updated on an on-going basis throughout the environmental process.

7.2.2 BACKGROUND INFORMATION DOCUMENT (BID)

A BID was compiled and distributed via e-mail and/or post to IAPs and regulatory authorities on the project's public involvement database. The purpose of the BID was to inform IAPs and regulatory authorities about the proposed project, the environmental assessment process, the current status of the environment, possible environmental impacts, and means of providing input into the environmental assessment process. Attached to the BID was a registration and response form, which provided IAPs with an opportunity to submit their names, contact details and comments on the project. A copy of the BID is provided in Appendix E.

7.2.3 REGULATORY AUTHORITIES NOTIFICATIONS

Regulatory authorities were informed in writing of the proposed project. Proof of this notification is provided in Appendix E.

7.2.4 SITE NOTICES AND ADVERTISEMENTS

Site notices in English and Afrikaans were placed at key conspicuous positions in and around the proposed project site and block advertisements were placed in the Kathu Gazette and Volksblad on 4 July 2015 and 9 July 2015, respectively. Photographs of the site notices and copies of the newspaper advertisements are provided in Appendix E.

7.2.5 PUBLIC/FOCUSED MEETINGS – IAPS

If required, a public/focused EIA feedback meeting will be held in order to assist IAPs with the review of the EIA and EMP report. The date of this meeting (which will take place during the EIA public review period) will be communicated to IAPs.

7.2.6 RELEVANT REGULATORY AUTHORITIES AND IAPS

The relevant regulatory authorities, agencies and institutions responsible for the various aspects of the environment, land and infrastructure that may be affected by the proposed project are listed below:

- Regulatory authorities:
  - Department of Mineral Resources (DMR)
  - Department of Water and Sanitation (DWS)
  - Department of Environment and Conservation (DENC)
  - South African Heritage Resource Agency (SAHRA)
  - Department of Agriculture, Forestry and Fisheries (DAFF)
  - The Northern Cape Department of Rural Development and Land Reform (DRDLR)
  - Department of Public Works, Roads and Transport (DPWRT)
  - ZF Mgcawu District Municipality (formerly known as the Siyanda District Municipality)
  - Tsantsabane Local Municipality
  - Ward councillor (Ward 6).
- Parastatals:
  - Transnet
- Others:
  - Landowners and land users
  - Surrounding mines

7.2.7 REVIEW OF THE SCOPING REPORT

The scoping report was made available for public and regulatory authorities review from **2 November to 1 December 2015**. Full copies of the scoping report were made available for public review at the following venues:

- Tsantsabane library
- SLR's offices in Johannesburg

Compressed electronic copies of the scoping report were sent by post or e-mail to all IAPs and authorities that were registered on the public involvement database.

The scoping report that was subjected to public and regulatory authority review was updated with any comments received during the review period. This updated scoping report was submitted to the DMR for on 2 December 2015.

7.2.8 REVIEW OF THE EIA AND EMP REPORT

The EIA and EMP report will be made available for public and regulatory authorities review from **18 April 2016 to 20 May 2016**. Full copies of the EIA and EMP report will be made available for public review at the same venues that the scoping report was made available (Section 7.2.7). Electronic copies of the EIA and EMP report will be made available on request.

Summaries of the EIA and EMP report will be sent by post or e-mail to all IAPs and authorities that were registered on the public involvement database.

7.3 SUMMARY OF ISSUES RAISED BY IAPS

A summary of the issues and concerns raised by IAPs and regulatory authorities is provided in Table 14 below.

TABLE 14: SUMMARY OF ISSUES RAISED BY IAPS AND REGULATORY AUTHORITIES

Interested and Affected Parties	Date Comments Received	Issues raised	EAPs response to issues (adapted for the EIA process)
AFFECTED PARTIES			
Landowner/s and lawful occupiers			
Harry Dul	25 August 2015, via email	We put on record that Main Street has no record of any application by a 3rd party (for that matter COZA Mining (Pty) Ltd) for any prospecting right over the Property and no consultation of whatever nature has taken place with Main Street as is required in terms of Section 16 (4) (b) of the MPRDA. Main Street would request you to put us in direct contact with your client COZA Mining (Pty) Ltd to demand proof of consultation with Main Street. Main Street (or for that matter SIOC) is also not listed as an interested and affected party in COZA Mining (Pty) Ltd application for a mining right and has not received a copy of the attached document annexed hereto (Jenkins Final Bid) and confirm that this document was received via a 3rd party. Main Street also put on record that it was never approached to conduct any prospecting operations of whatever nature on the Property and was quite surprised to learn that your client has already completed its prospecting operations in order apply for a mining right and to commence with mining operations. You are also requested to register SIOC as an affected and interested party in this regard as the new holder of the surface rights over the Property.	These comments were passed onto the Jenkins Project Manager (Mr Tabi Kowet). It is understood by SLR that COZA provided documentation to SIOC indicating that an access agreement was concluded between COZA and SIOC during the prospecting phase. SIOC acknowledged the access agreement and recommended that Jenkins 562 Remaining Extent be sold to COZA should a Mining Right be awarded. A formal notification letter to SIOC (as the landowner) was emailed on 21October 2015 and SIOC was registered on the project database.

Interested and Affected Parties	**Date Comments Received**	**Issues raised**	**EAPs response to issues (adapted for the EIA process)**
Harry Dul	6 November 2015, via email: comments on draft scoping report	The abovementioned matter and Coza Mining (Pty) Ltd's (Coza) planned mining activities and pending mining right application over inter alia the Remaining Extent of Portion 1 of the farm Jenkins 562 (the Property) have reference. As stated before in earlier emails , SIOC is the registered owner of the surface rights. SIOC acknowledges receipt of the draft scoping report as submitted under cover of your email dated 2 November 2015. From this scoping report it is abundantly clear that the Property is clearly earmarked for opencast mining operations and for the construction of infrastructure associated with the planned mining operations. SIOC as the holder of the surface rights has no other option than to put on record that Coza's planned mining operations will, inter alia: 1. Result in the Property being of no further use to SIOC as it will be occupied and virtually be destroyed by Coza's planned mining operations; 2. Will have serious environmental consequences for the Property and put SIOC at risk from an environmental perspective. 3. Diminish the value of the Property from an agricultural perspective which will have financial consequences for SIOC. Under the circumstances SIOC will have to object against the planned mining operations by Coza and will not allow any mining operations to take place on the Property unless SIOC can reach agreement with Coza on the selling of the Property as a whole to Coza or any other company of Coza's choice.	Your comment has been noted. It is understood that SIOC has requested that Coza purchase the property in question prior to the commencement of any project related activities. Jenkins Project Manager (Mr Tabi Kowet) has been made aware of your concern and will contact you directly to discuss this matter.

Interested and Affected Parties	Date Comments Received	Issues raised	EAPs response to issues (adapted for the EIA process)
Surrounding landowner/s and lawful occupiers			
Leon Venter	18 August 2015, via email: Response to BID	I am the surface owner of one of the portions of Jenkins, that Coza is applying for a mining right on. I am logging a dispute on the following grounds. 1. No consultation has happened yet. 2. The portion of Jenkins is not going to be mined on. 3. No prospecting happened on this portion of Jenkins. Please arrange consultation meeting, that we can discuss the purpose of applying for a mining right on portion of Jenkins.	Although Portion 3 of the farm Jenkins has been included in the Mining Right application, mining and related activities are expected to be limited only to Portion 1 and Remaining Extent (Portion 0) of the farm Jenkins 562. Should you still wish to arrange a focussed meeting where this can be discussed, kindly advise so that this can be arranged.
Nick Steyn	15 July 2015, via email Response to BID	I have a large shortage of water on my farm. The only water source is at 30m. There isn't water deeper, and if you mine deeper than the water table and affect my water and I will no longer be able to farm and go about my activities, then you will have to pay me for damage compensation until the water level returns. You will also have to sink a monitoring borehole on my farm and install an in-time water monitoring system and give me access to the results so that there aren't any misunderstandings. I see that my farm is part of the application on the map. Are you going to rezone the land to mining? What are you planning to do on my farm? What will the mine do for the affected parties and surrounding environment, will you be able to provide us with electricity?	Potential groundwater impacts (which include impacts on both groundwater quality and quantity) have been assessed in Appendix F (Impact Assessment) as well as in the Groundwater specialist study in Appendix H. The Groundwater specialist study included in Appendix H indicates that groundwater impacts on 3rd party boreholes (with the exception of CJBH01 which will be destroyed for the purposes of mining) are not expected. Groundwater monitoring will be done in boreholes identified in Section 29 and Figure 24. These monitoring results will be made available to IAPs on request. Although Coza's mining right application includes the whole of Jenkins 562, mining and related activities will be limited to Portion 1 and Remaining Extent (Portion 0) only. In this regard, no mining activities are currently proposed on Portion 2 of the farm Jenkins 562. The Social and Labour Plan (SLP) is currently being compiled and will include local economic

Interested and Affected Parties	Date Comments Received	Issues raised	EAPs response to issues (adapted for the EIA process)
			development projects aimed at supporting the local communities. More information will be provided when the SLP is available.
Other interested and affected parties			
Jim Bredenkamp	13 July 2015, via email Response to BID	We as Agri Postmasburg would like to be registered as we are an organization that needs to be part of the consulting. Please let me know what information you need from us to be registered.	Thank you for your interest in the project. You have been registered as an Interested and Affected Party.
Leon Venter	21 August 2015, telephonically	When will the application be lodged? Which municipalities have been consulted?	The mining right application was lodged in October 2015 The Tsantsabane Local Municipality and the Siyanda District Municipality have been included in the consultation process to date.
Regulatory Authorities			
Jacoline Mans (Department of Agriculture, Forestry and Fisheries (DAFF))	16 November 2015, via email: comments on draft scoping report	The Branch: Forestry and Natural Resource Management in the Department of Agriculture, Forestry and Fisheries (DAFF) is responsible for the implementation of the Nation Forests Act, Act 84 of 1998 (NFA) and the National Veld and Forests Act, Act 101 of 1998 as amended. The proposed developer must comply with the following sections of the NFA: 1. Section 12(1)(d) "The minister may declare – 1.1 A particular tree 1.2 A particular group of trees 1.3 A particular woodland; or 1.4 Trees belonging to a particular species, to be a protected tree, group of trees, woodland of species." 2. Section 15(1) "No person may – 2.1 Cut, disturb, damage or destroy any protected tree; or 2.2 Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire of	Coza will ensure that the requirements of the NFA are adhered to.

Interested and Affected Parties	Date Comments Received	Issues raised	EAPs response to issues (adapted for the EIA process)
		dispose of any protected tree, or any forest product derived from a protected tree, except- (i) Under a license granted by the minister, or (ii) In terms of an exemption from the provision of this subsection published by the Minister in the Gazette on the advice of the Council" 3. Section 62(2)(c): "Any person who contravenes the prohibition of – 3.1 The cutting, disturbance, damage or destruction of temporarily protected trees or groups of trees referred to in Section 14(2) or protected trees referred to in section 15(1)(a); or 3.2 The possession, collection, removal, transport, export, purchase or sale of temporarily protected trees of groups of trees referred to in section 14(2) or protected trees referred to in Section 15(1)(b), or any forest product derived from a temporarily protected tree, group of trees of protected tree, is guilty of a first category offence. 4. Section 58 (1) "Any person who is guilty of a first category offence referred to in Section 62 and 63 may be sentenced to a fine or imprisonment for a period of up to three years, or to both a fine and such imprisonment. Comments on Scoping Report • Page 3-9: 250 to 350 ha site clearance will be required, in the Griqualand West Centre of Endemism. Pages 5-33 refers to the affected vegetation units. The *Acacia (Vachellia) erioloba* Bushveld Habitat Unit identified on site was classified as moderately sensitive and dominated by the protected *A. (V) erioloba* and *A. (V) haemotoxylon*. Kindly provide estimates of numbers of protected trees per size classes (<3m; 3-6m; and >6m) that would be directly destroyed as a result of the proposed mining and vegetation clearance activities. For *Boscia Albitrunca* an additional size	The purpose of the biodiversity specialist study was in order to inform the EIA and the methodology used for the investigation has been detailed in the specialist study included in Appendix J. It should therefore be noted that the qualitative data required for removal permit applications will need to be collected at such time when the applications are lodged. SAS will ensure that the data gathered will adhere to the DAFF permit requirements.

Interested and Affected Parties	Date Comments Received	Issues raised	EAPs response to issues (adapted for the EIA process)
		class of <1.5m should be included. This information is required to determine whether or not an environmental offset may be required. Please also describe the methodology used to provide the information and show on a map the plots surveyed, as well as the percentage total area surveyed. • Page 5-53 indicated that the project area is zoned for agricultural use. Agricultural land cannot be changed to another land use without the supported recommendation under the sub-division of Agricultural Land Act, Act 70 of 1970. A local authority cannot change the zoning of demarcated agricultural land to any other zoning without a letter from the Registrar of the Act. The contact person are: Ms Mashudu Marubini (Delegate of the Minister for Act 70 of 1970, MashuduMa@daff.gov.za, tel 012 319 7619; Ms Thoko Buthelezi (AgriLand Liasion office, thokob@daff.gov.za, tel 012 319 7634; or Miss Hettie Buys Act 70/70 Registry, hettieb@daff.gov.za • It should be noted that dewatering from boreholes may result in a decline and death of deep protected trees, thus indirect impacts. It is therefore recommended that a long term tree health monitoring programme be implemented to monitor protected tree mortality as a result of dewatering (if water level is being affected) and/or as a result of contamination of groundwater. • Obtaining an Environmental Authorisation does not exempt the developer from complying with the NFA. Prior to any disturbance of NFA Listed protected tree species, the developer must obtain a valid Forest Act License. Since some of the tree species are dually protected, a Flora Permit must also be obtained from the provincial Department of Environment and Nature Conservation (DENC).	

7.4 ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PROJECT AND ALTERNATIVES

The baseline information provided is aimed at giving the reader perspective on the existing status of the cultural, socio-economic and biophysical environment. Where appropriate it includes the detail derived from the specialist reports and other research undertaken for the EIA.

7.4.1 BASELINE ENVIRONMENT AFFECTED BY THE PROPOSED ACTIVITY

7.4.1.1 Geology

INTRODUCTION AND LINK TO IMPACT

As a baseline, the geology and associated structural features provides a basis from which to understand:

- The potential for sterilisation of mineral reserves
- The geochemistry and related potential for the pollution of water from mineralised waste facilities and stockpiles
- The related potential for geological lineaments such as faults and dykes. Faults, dykes and other lineaments can act as preferential flow paths of groundwater which can influence both the dispersion of potential pollution plumes and the inflow of water into mine workings.

Geological processes also influence soils forms (see Section 7.4.1.4) and the potential for palaeontological resources (see Section 7.4.1.13).

To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCES

Information in this section was sourced from the groundwater study (Groundwater Complete, January 2016) included in Appendix H and information obtained by PGS Heritage in 2013. In addition information has been sourced from the geophysical investigation was conducted in June 2015 to delineate geological structures such as faults and intrusive features like dolerite dykes. Further detail on the data collected during each study and the methodologies used can be found in the respective specialist report(s).

Information pertaining to regional and local geology was sourced from available literature as well as borehole logs.

Geochemical analysis was undertaken on different lithologies located within the proposed project area that are likely to be stockpiled as overburden or used as part of construction for roads and platforms. These samples were selected from cores on-site and were used to determine the potential for acid mine drainage and the potential for leachate from stockpiled material. The methodologies used are detailed in the groundwater specialist report (Appendix H).

RESULTS

Regional geology

Iron ore in the wider project area is preserved in chemical and clastic sediments of the Proterozoic Transvaal Supergroup. These sediments define the western margin of the Kaapvaal Craton in the Northern Cape Province. The stratigraphy has been deformed by thrusting from the west and has also undergone extensive karstification. The thrusting has produced a series of open, north south plunging, anticlines, synclines and grabens. Karstification has been responsible for the development of deep sinkholes. The iron ore in the project area has been preserved from erosion as low hills due to high hardness. The iron ore deposits that are actively mined in the area are all located on the Maremane anticline structure.

The Transvaal Supergroup lithologies have been deposited on a basement of Archaean granite gneisses and greenstones, and/or lavas of the Ventersdorp Supergroup. In the Jenkins region, the oldest rocks of the Transvaal Supergroup form a carbonate platform sequence (dolomites with minor limestone, chert and shale) known as the Campbell Rand Subgroup. The upper part of the Transvaal Supergroup comprises a banded iron formation unit, the Asbestos Hills Subgroup, which has been conformably deposited on carbonates of the Campbell Rand Subgroup. The upper portion of the banded iron formations has in places been supergene-enriched to ore grade, i.e. Fe $\geq$ 60%. The ores found within this Subgroup comprise the bulk of the higher-grade iron ores in the region.

An altered, intrusive sill (originally of gabbroic composition) usually separates the ore bodies from the underlying host iron formation. It intruded into the Transvaal Supergroup in late Proterozoic times. A thick sequence of younger clastic sediments (shale's, quartzite's and conglomerates) belonging to the Gamagara Subgroup unconformably overlies the banded iron formations. Some of the conglomerates consist almost entirely of hematite and are of lower-grade ore quality.

The unconformity separating the iron formations from the overlying clastic sediments represents a period of folding, uplift and erosion. At the time, dissolution and karstification took place in the upper dolomitic units. A residual dissolution breccia, referred to as the 'Manganese Marker' or 'Wolhaarkop Breccia', developed between the basal dolomites and overlying banded iron formations. This breccia is known to contain/yield vast volumes of groundwater. In places, deep sinkholes developed in the dolomites, into which the overlying iron formation and mineralized iron ore bodies collapsed. The sinkholes are considered to have resulted from a combination of folding and collapse of overlying iron-bearing strata. At Jenkins, however, the iron ore has been preserved through resistance to weathering and occurs as part of a low hill similar to adjacent deposits such as the Mokaning reserves of Assmang's Khumani Mine.

Diamictite of the Makganyene Formation and lava belonging to the Ongeluk Formation have been thrusted over the Gamagara sediments. It is now preserved only within the larger synclinal structures. A considerable portion of the upper parts of the stratigraphy have been eroded during Dwyka glaciation and re-deposited as tillite. The entire, folded sequence was later truncated by Tertiary erosion. A thick (10 to around 60 m) blanket of calcrete, dolocrete, clays and pebble layers belonging to the Kalahari Supergroup was unconformably deposited over the older lithologies.

<u>Local and operational geology</u>

According to Moen (Moen HFG, 1977) the farm Jenkins is underlain by rocks of the Gamagara Subgroup (Vg), Asbestos Hills Subgroup as well as rocks of the Lime Acres Member of the Ghaap Plato Formation (Vgl) of the Campbell Rand Subgroup. The rocks of the Gamagara Subgroup underlie the eastern corner of the Jenkins farm. This subgroup consists of quartzites, conglomerates, flagstones and shales and constitutes the base of the Postmasburg Group.

Lenticular basal conglomerates contain pebbles of jasper and banded iron stone and are completely ferruginised in places. The shales contain lenses of conglomerate and are also locally ferruginised or manganised. Ferruginous flagstone and white, purple and brown quartzites form the top of the Subgroup.

Rocks of the Lime Acres Member of the Ghaap Plato Formation of the Campbell Rand Subgroup consist of dolomitic limestone with subordinate coarsely crystalline dolomite and chert with lenses of limestone. Stromatolitic puckered limestone consisting of alternating dark and light bands can be found. Lenticular bodies of limestone occurring in the dolomite are probably the result of irregular dolomitisation of the original limestone.

A simplified geological map of the Jenkins Project area is provided in Figure 9 below.

<u>Lineaments</u>

Dykes are widespread throughout the study area (see Figure 10) and some of the more prominent ones are easily identifiable on aerial and satellite imagery. Fractures are typically formed along the sides of a dyke due to rapid cooling during the intrusion process. These fractures are wholly responsible for most dykes being able to hold significant volumes of groundwater and also to act as preferred pathways. However, these fractures are generally superficial and do not affect the structural integrity of the dyke.

The southern border of the Sishen geological formation compartment is defined by a geological structure located approximately 600 meters north of the proposed Jenkins pit and has a strike of west-east. This structure is believed to be a dolerite dyke and may therefore act as a barrier between groundwater level impacts caused by the mines to the north and the Jenkins Project area located south of the dyke.

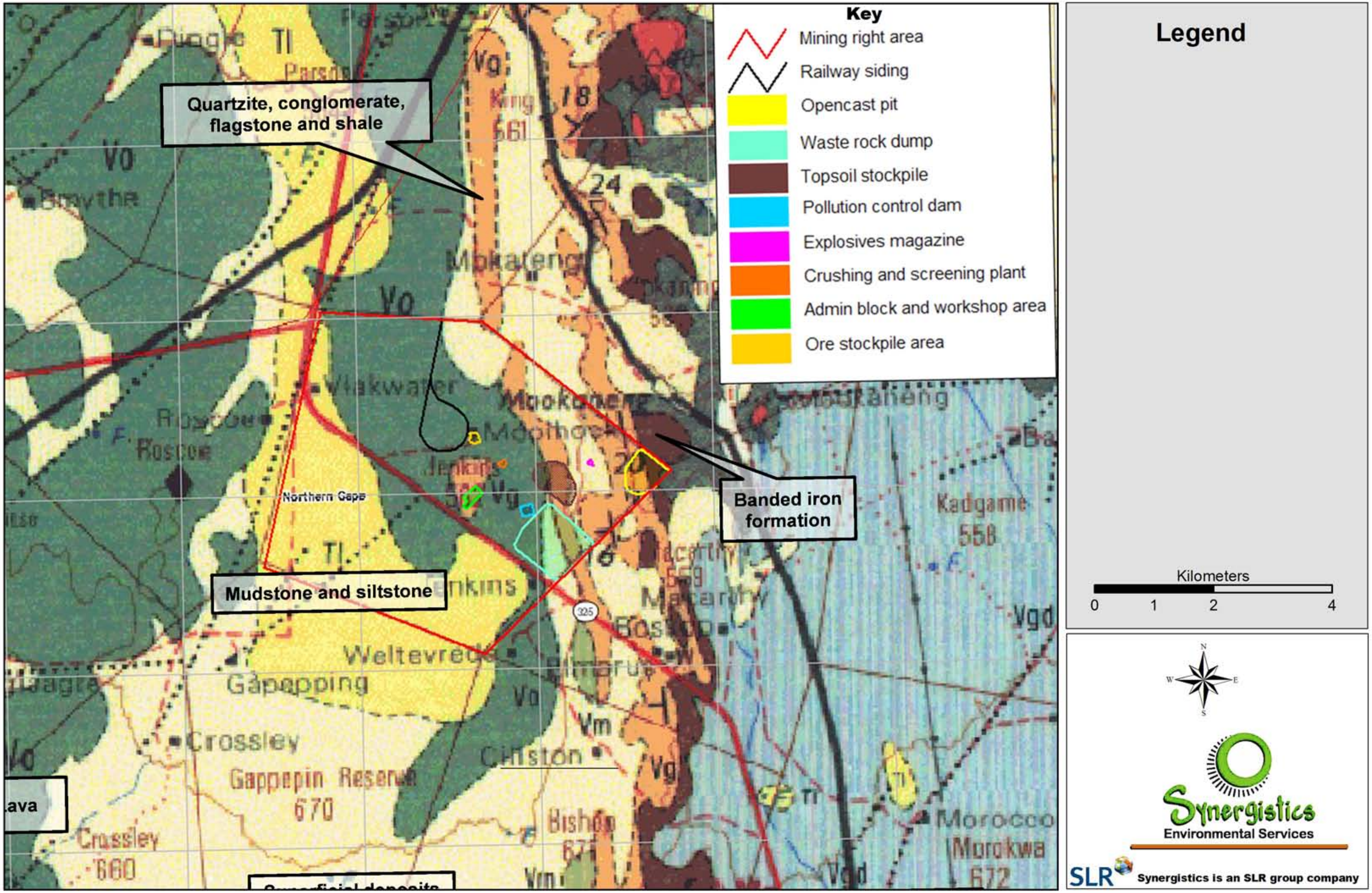


Figure 9: Local Geological Setting of the Project Area (Groundwater Complete, January 2016)

755.03048.00001

Coordinate System DMS	
Spheroid WGS84	Central Meridian LO

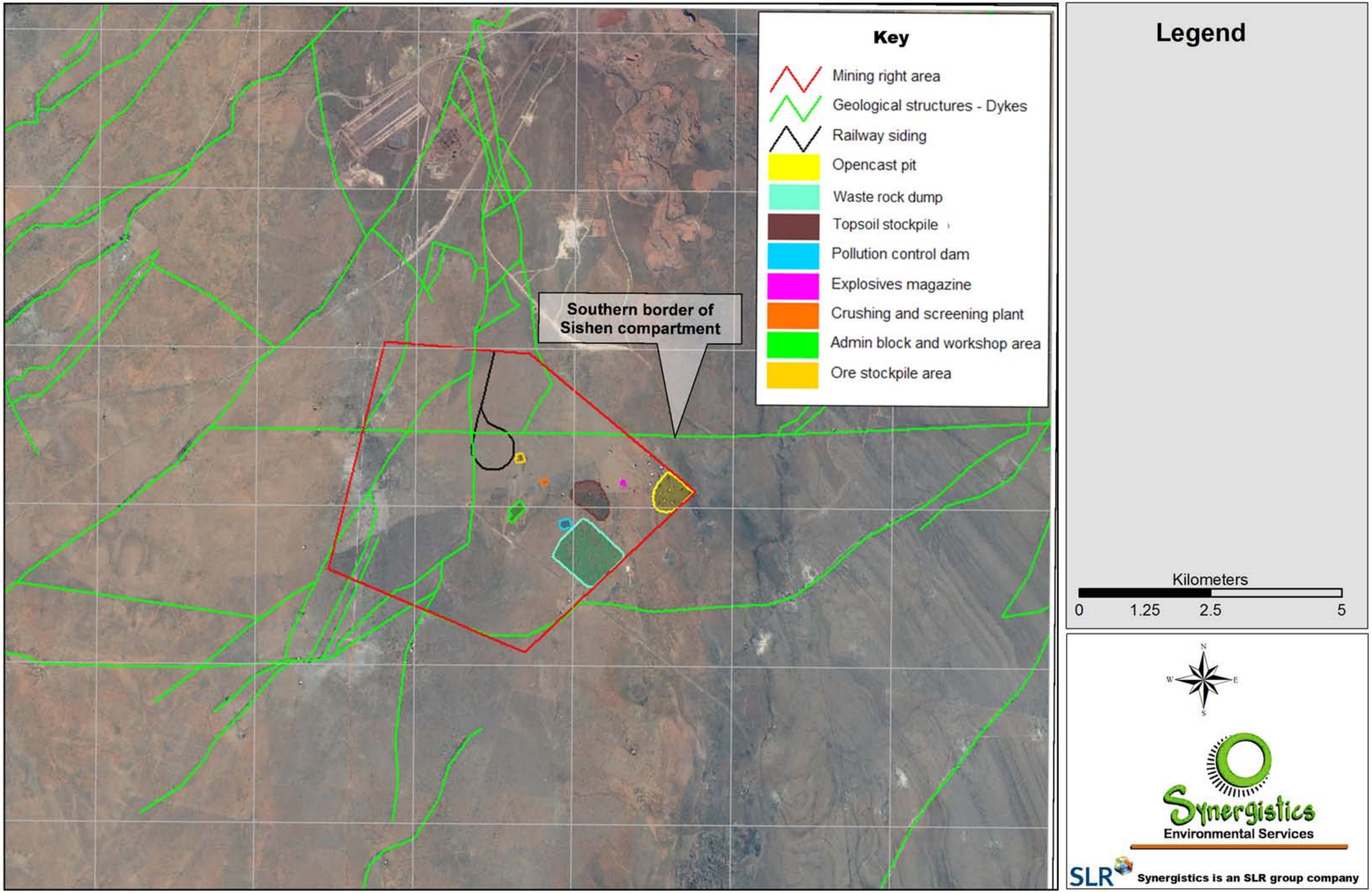


Figure 10: Occurance of Dykes Within and Surrounding Project Area (Complete Groundwater, January 2016)

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Coordinate System DMS	
Spheroid WGS84	Central Meridian LO

Geochemistry analysis – Acid Base Accounting (ABA)

Acid–Base Accounting (ABA) is an internationally accepted analytical procedure that was developed to screen the acid-producing and acid-neutralizing potential of rocks. Two samples were obtained from the drilling of exploration boreholes and were used to determine the acid drainage potential associated with the waste rock dump (WRD) and material to be used as part of the construction of road and platforms.

The two most common processes by which groundwater is contaminated include “interstitial release” and “ion exchange release”. Argillaceous sediments such as shale and mudstone are known to contain pore water with high saline content. Significant amounts of contaminants may therefore be released as these sediment structures disintegrate because of weathering or when exposed and crushed through the mining process. The most commonly released ions during this weathering process are sodium and chloride. Pyrite and base metal sulphides are very prone to oxidation when brought into contact with water under oxidation conditions. The chemical reactions are collectively referred to as acid mine drainage (AMD). The root of the problem lies in chemical and bacteriological oxidation of pyrite typically occurring in coal, other carbonaceous material and base metals.

Results of various studies conducted for the surrounding iron ore mines have however shown that none of these reactions or contaminants applies to the iron ore mining environment. The in situ ore and host rock are chemically inert and ion exchange and accompanying groundwater contamination do not occur (Sishen South Iron Ore Project, 2005).

The Acid Base Accounting (ABA) results indicate that both samples collected from the Jenkins Project area are classified as Type III (non-acid forming) according to the sulphur content and NPR classification. Similar to the surrounding iron ore mines the conclusion is therefore drawn that both the ore and overburden material are non-acid forming.

In both samples the neutralising potential (NP) exceeds the acid potential (AP), which results in positive NNP values. According to the NNP classification both samples are therefore considered to be non-acid forming

Geochemistry analysis – Leachate potential

In addition to ABA tests, leachate tests were undertaken. In basic terms a leaching test involves the percolation of a liquid through a finely crushed rock sample after which the leachate retrieved from the sample (extract) is analysed to determine what chemical changes have occurred.

The results of the leach tests are provided in Table 15 and Table 16 and are compared against the South African National Standards for drinking water (Table 17). Parameters highlighted with red are those that exceed the SANS guideline concentrations. All physical parameters and concentrations of macro element anions are below the permissible SANS values for drinking water purposes. Metal concentrations are largely below the detection limits, however the aluminium content of leachate from both samples exceeds the SANS permissible concentration of 0.3 mg/l, as did the manganese content of leachate from the ore sample.

TABLE 15: RESULTS OF LEACH TESTS - PHYSICAL PARAMETERS AND MACRO ELEMENT ANIONS (GROUNDWATER COMPLETE, JANUARY 2016)

Analyses	**Jenkins Ore Composite**		**Jenkins Hanging Wall Composite**	
TCLP / Acid Rain / Distilled Water / H_2O_2	**Distilled Water**		**Distilled Water**	
Dry Mass Used (g)	**250**		**250**	
Volume Used (mℓ)	**1000**		**1000**	
pH Value at 25˚C	6.6		7.0	
Electrical Conductivity in mS/m at 25°C	3.7		5.7	
Inorganic Anions	**mg/ℓ**	**mg/kg**	**mg/ℓ**	**mg/kg**
Total Alkalinity as $CaCO_3$	<5	<20	20	80
Chloride as Cl	6	24	5	20
Sulphate as SO_4	<5	<20	6	24
Nitrate as N	<0.2	<0.8	<0.2	<0.8
Fluoride as F	<0.2	<0.8	0.2	0.8
ICP-OES Scan	See Table 16		See Table 16	

TABLE 16: RESULTS OF LEACH TESTS - METALS (MG/L) (GROUNDWATER COMPLETE, JANUARY 2016)

Sample Id	Ag	Al	As	Au	B	Ba
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Jenkins Ore Composite	<0.010	0.661	<0.010	<0.010	0.385	0.418
Jenkins Hanging Wall Composite	<0.010	0.883	<0.010	<0.010	0.441	0.710
Sample Id	**Be**	**Bi**	**Ca**	**Cd**	**Ce**	**Co**
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Jenkins Overburden Composites	<0.010	<0.010	2.10	<0.010	<0.010	<0.010
Jenkins Ore Composites	<0.010	<0.010	3.88	<0.010	<0.010	<0.010
Sample Id	**Cr**	**Cs**	**Cu**	**Dy**	**Er**	**Eu**
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Jenkins Overburden Composites	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Jenkins Ore Composites	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sample Id	**Fe**	**Ga**	**Gd**	**Ge**	**Hf**	**Ho**
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Jenkins Overburden Composites	1.06	0.163	<0.010	<0.010	<0.010	<0.010
Jenkins Ore Composites	0.410	0.276	<0.010	<0.010	<0.010	<0.010
Sample Id	**In**	**Ir**	**K**	**La**	**Li**	**Lu**
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**
Jenkins Overburden Composites	<0.010	<0.010	1.3	<0.010	0.056	<0.010
Jenkins Ore Composites	<0.010	<0.010	2.0	<0.010	0.026	<0.010
Sample Id	**Mg**	**Mn**	**Mo**	**Na**	**Nb**	**Nd**
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**
Jenkins Overburden Composites	0.796	0.363	<0.010	6.30	<0.010	<0.010
Jenkins Ore Composites	1.25	0.785	<0.010	6.32	<0.010	<0.010
Sample Id	**Ni**	**Os**	**P**	**Pb**	**Pd**	**Pt**
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**
Jenkins Overburden Composites	0.026	<0.010	<0.010	<0.010	<0.010	<0.010
Jenkins Ore Composites	0.017	<0.010	<0.010	<0.010	<0.010	<0.010
Sample Id	**Rb**	**Rh**	**Ru**	**Sb**	**Sc**	**Se**
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**
Jenkins Overburden Composites	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Jenkins Ore Composites	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sample Id	**Si**	**Sm**	**Sn**	**Sr**	**Ta**	**Tb**
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**
Jenkins Overburden Composites	0.9	<0.010	<0.010	0.040	<0.010	<0.010
Jenkins Ore Composites	2.0	<0.010	<0.010	0.074	<0.010	<0.010
Sample Id	**Te**	**Th**	**Ti**	**Tl**	**Tm**	**U**
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**
Jenkins Overburden Composites	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Jenkins Ore Composites	<0.010	<0.010	0.025	<0.010	<0.010	<0.010
Sample Id	**V**	**W**	**Y**	**Yb**	**Zn**	**Zr**
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Det Limit	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**	**<0.010**
Jenkins Overburden Composites	<0.010	<0.010	<0.010	<0.010	0.217	<0.010
Jenkins Ore Composites	<0.010	<0.010	<0.010	<0.010	0.274	<0.010

TABLE 17: SOUTH AFRICAN NATIONAL STANDARDS FOR DRINKING WATER *(SANS 241:2011)*

Determinant	Risk	Unit	Standard limits
Physical and aesthetic determinants			
Free chlorine	Chronic health	mg/L	≤ 5
Monochloramine	Chronic health	mg/L	≤ 3
Colour	Aesthetic	mg/L Pt-Co	≤ 15
Conductivity at 25 °C	Aesthetic	mS/m	≤ 170
Odour or taste	Aesthetic	–	Inoffensive
Total dissolved solids	Aesthetic	mg/L	≤ 1 200
Turbidity	Operational	NTU	≤ 1
	Aesthetic	NTU	≤ 5
pH at 25 C	Operational	pH units	≥ 5 to ≤ 9.7
Chemical determinants - macro-determinants			
Nitrate as N	Acute health – 1	mg/L	≤ 11
Nitrite as N	Acute health – 1	mg/L	≤ 0.9
Sulfate as SO_4^{2-}	Acute health – 1	mg/L	≤ 500
	Aesthetic	mg/L	≤ 250
Fluoride as F^-	Chronic health	mg/L	≤ 1.5
Ammonia as N	Aesthetic	mg/L	≤ 1.5
Chloride as Cl^-	Aesthetic	mg/L	≤ 300
Sodium as Na	Aesthetic	mg/L	≤ 200
Zinc as Zn	Aesthetic	mg/L	≤ 5
Chemical determinants - micro-determinants			
Aluminium as Al	Operational	µg/L	≤ 300
Antimony as Sb	Chronic health	µg/L	≤ 20
Arsenic as As	Chronic health	µg/L	≤ 10
Cadmium as Cd	Chronic health	µg/L	≤ 3
Total chromium as Cr	Chronic health	µg/L	≤ 50
Cobalt as Co	Chronic health	µg/L	≤ 500
Copper as Cu	Chronic health	µg/L	≤ 2 000
Cyanide (recoverable) as CN^-	Acute health – 1	µg/L	≤ 70
Iron as Fe	Chronic health	µg/L	≤ 2 000
	Aesthetic	µg/L	≤ 300
Lead as Pb	Chronic health	µg/L	≤ 10
Manganese as Mn	Chronic health	µg/L	≤ 500
	Aesthetic	µg/L	≤ 100
Mercury as Hg	Chronic health	µg/L	≤ 6
Nickel as Ni	Chronic health	µg/L	≤ 70
Selenium as Se	Chronic health	µg/L	≤ 10
Uranium as U	Chronic health	µg/L	≤ 15
Vanadium as V	Chronic health	µg/L	≤ 200

CONCLUSION

Where permanent infrastructure is placed within close proximity to mineable ore there is the possibility that sterilisation of minerals can occur.

Geochemical tests and analysis indicate that in both the ore and waste rock material, the neutralising potential (NP) exceeds the acid potential (AP). Accordingly, both samples are therefore considered to be non-acid forming. Similarly, the results of the leach tests indicate that both the ore and waste rock from the project area are mostly inert and any leachate generated by planned ore stockpiles and/or WRDs should be of an acceptable quality. The only metal found to be present in the leachate at significant concentrations were aluminium and manganese.

7.4.1.2 Topography

INTRODUCTION AND LINK TO IMPACT

Changes to topography through the development of the proposed project may impact on surface water drainage (Section 7.4.1.7), visual aspects (Section 7.4.1.11) and the safety of both people and animals. To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCES

Information in this section was sourced from site visits undertaken by the specialist and EIA project team.

RESULTS

The project area lies in an area with altitudes ranging between 1 220 and 1 250 metres above mean sea level (mamsl) with flat to gently undulating topography. Notable topographical features within the project area include a hill on the eastern boundary of the farm Jenkins with steeper slopes reaching a height of 1367 mamsl.

CONCLUSION

Mining activities and infrastructure have the potential to alter the topography and the natural state of areas. An alteration of the natural topography has the potential to present dangers to both animals and people.

7.4.1.3 Climate

INTRODUCTION AND LINK TO IMPACT

Climate can influence the potential for environmental impacts and related mine design. Specific issues are listed below:

- Rainfall could influence erosion, evaporation, vegetation growth, rehabilitation planning, dust suppression, and surface water management planning;

- Temperature could influence air dispersion through impacts on atmospheric stability and mixing layers, vegetation growth, and evaporation which could influence rehabilitation planning; and
- Wind could influence erosion, the dispersion of potential atmospheric pollutants, and rehabilitation planning.

To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCES

Information in this section was sourced from the air quality study (Airshed, February 2016) included in Appendix L and the hydrology study (Jeffares and Green, January 2016) included in Appendix K. Further detail on the data collected during each study and the methodologies used can be found in the respective specialist reports.

RESULTS

The proposed project area falls within the Northern Steppe Climatic Zone, as defined by the South African Weather Bureau. This is a semi-arid region characterised by seasonal rainfall, hot temperatures in summer, and colder temperatures in winter (SLR, October 2015).

Precipitation and Evaporation

Monthly rainfall data for the project area was obtained from the SAWS rainfall station 0320828 W. This rainfall station is located approximately 54 km south of the project site. The mean monthly rainfall over the period 1950 to 2000 is presented in Figure 11 below. It is evident that the precipitation tends to fall in summer and autumn (November to April). It is also noted that small amounts of rainfall are recorded over the winter and spring months (May to October).

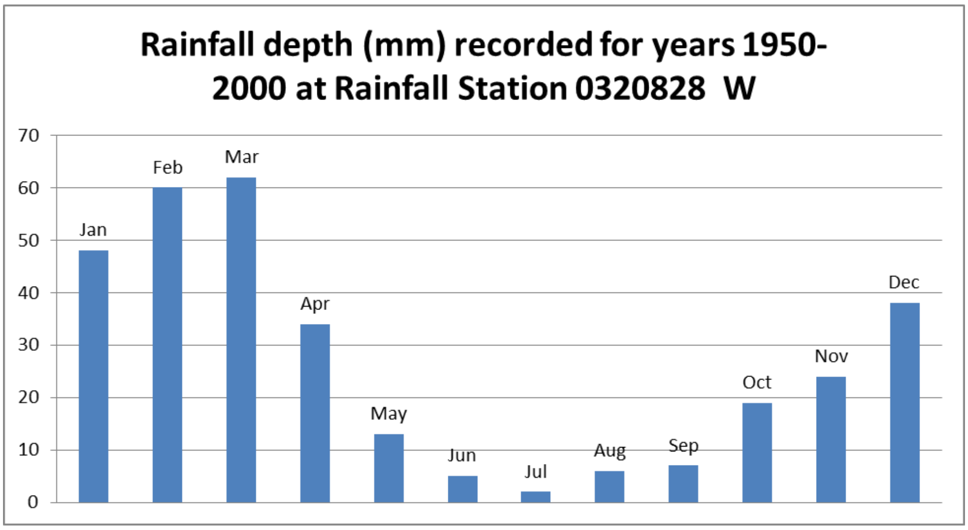


FIGURE 11: LONG-TERM AVERAGE MONTHLY RAINFALL FOR THE STUDY AREA FOR THE PERIOD 1950 TO 2000 (JEFFARES &GREEN, 2015)

The annual potential evaporation rate for the project area is 2 450 mm. From Table 18 below, the highest evaporation rates occur during the hotter summer months of October to March. The mean annual evaporation is higher than the mean annual precipitation (318 mm) which results in a net moisture deficit of 2 312 mm over the year.

TABLE 18: CALCULATED MONTHLY MEAN EVAPORATION RATES FOR THE STUDY AREA (JEFFARES & GREEN, 2015)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Evaporation Rate (mm)	333	256	221	154	111	85	98	133	184	247	292	336	2450

<u>Temperature</u>

Diurnal and average monthly temperature trends are presented in Table 19. Monthly mean and hourly maximum and minimum temperatures are included in Table 19. Temperatures ranged between -7.3 °C and 40 °C. The highest temperatures occurred in December, January and February and the lowest in June, July and August. During the day, temperatures increase to reach maximum at around 15:00 in the afternoon. Ambient air temperature decreases to reach a minimum at around 07:00 i.e. just before sunrise.

TABLE 19: MONTHLY TEMPERATURE SUMMARY (POSTMASBURG, NOV 2011 TO OCT 2014) (AIRSHED, FEBRUARY 2016)

Hourly Minimum, Maximum and Monthly Average Temperatures ºC			
Months	**Minimum**	**Maximum**	**Average**
January	8.9	40	26.6
February	7.8	38.9	25.2
March	5	37.8	22.6
April	1.8	32.8	17
May	-5	32.3	14.6
June	-6.1	27.3	10
July	-7.3	28.3	10.3
August	-6.1	32.3	12.7
September	-5	35	16.3
October	1.1	36.1	20.1
November	2.3	37.8	23.5
December	6.1	40	24.3

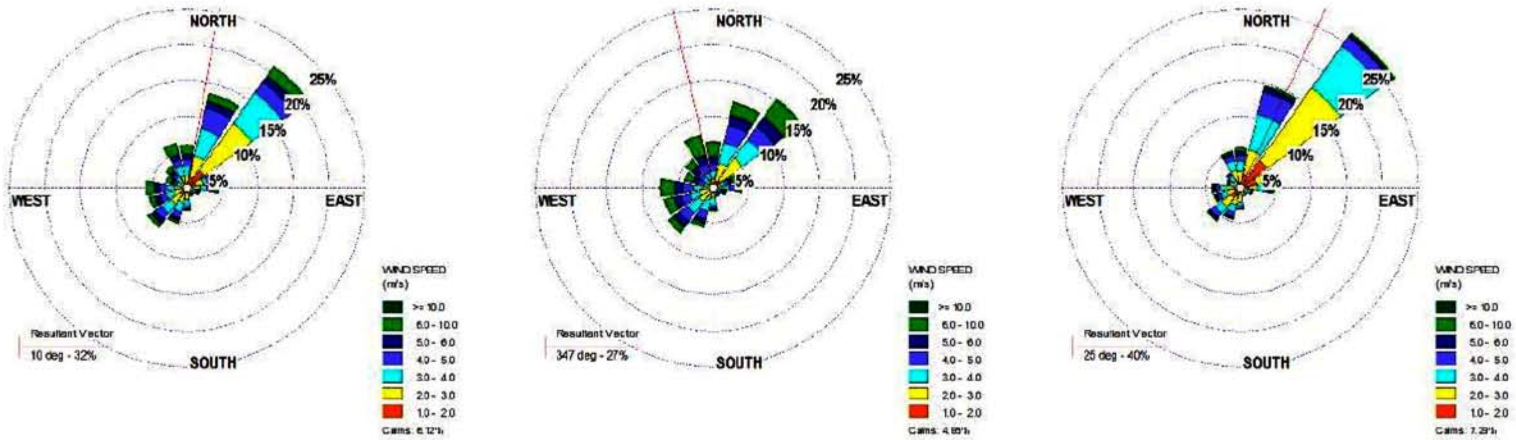
<u>Wind</u>

Wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period. The colours used in the wind roses below, reflect the different categories of wind speeds; the red area, for example, representing winds in between 6 and 10 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. The frequency with which calms occurred, i.e. periods during which the wind speed was below 1 m/s are also indicated.

The period wind field and diurnal variability in the wind field are shown in Figure 12. During the recording period, the wind field was dominated by winds from the north-east with an average wind speed of 3.4 m/s. The strongest winds (more than 6 m/s) were from the northern to north-western sectors and occurred mostly during the day. The average wind speed decreased from 4.1 m/d during the day to 2.7 m/s during the night.

CONCLUSION

The proposed project area is characterised by hot summers and cool winters with rain generally occurring in the form of thunderstorms that last for short periods at a time during rainy periods. High evaporation rates reduce infiltration, while rainfall events can increase the erosion potential and the formation of erosion gullies. The presence of vegetation does however reduce the effects of erosion. The mixing of layers resulting in the formation of temperature inversions, and the presence of cloud cover limits the dispersion of pollutants into the atmosphere. Wind significantly affects the amount of material that is suspended from exposed surface to the atmosphere. The wind speed determines the distance of downward transport as well as the rate of dilution of pollutants in the atmosphere. On average, wind speeds are not high enough to be able to carry all types of dust particles. These climatic aspects need to be taken into consideration during rehabilitation and surface water management planning.



(a) Period average wind field | (b) Day-time wind field (06:00 to 18:00) | (c) Night-time wind field (18:00 to 06:00)

Legend

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Figure 12: Period, Day-and-Night-Time Wind Roses (Airshed, February 2016)

755.03048.00001

Coordinate System DMS	
Spheroid WGS84	Central Meridian LO

7.4.1.4 Soil

INTRODUCTION AND LINK TO IMPACT

Soils are a significant component of most ecosystems. As an ecological driver, soil is the medium in which most vegetation grows and a range of vertebrates and invertebrates exist. In the context of mining operations, soil is even more significant if one considers that mining is a temporary land use where after rehabilitation (using soil) is the key to re-establishing post closure land capability that will support post closure land uses.

Mining projects have the potential to damage soil resources through physical loss of soil and/or the contamination of soils, thereby impacting on the soils' ability to sustain natural vegetation and altering land capability. Contamination of soils may in turn contribute to the contamination of surface and groundwater resources. Loss of the topsoil resource reduces chances of successful rehabilitation and restoration. To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCES

Information in this section was sourced from the soils and agricultural potential study for the proposed project (ARC-Institute for Soil, Climate and Water, January 2016) included in Appendix I. Further detail on the data collected during the study and the methodologies used can be found in the specialist report.

A soil survey was undertaken in order to identify the soil forms located within the proposed project area. Existing information was obtained from the map sheet 2722 Kuruman (Eloff, Idema & Bennie, 1986) from the national Land Type Survey, published at a scale of 1:250 000 (ARC, 2016).

RESULTS

<u>Land Types and Soil forms</u>

The soil types identified within the project area are summarised in Figure 13. These include AR2 which is comprised of red and yellow, well drained sandy soils with a high base status and LP2 comprising soils with minimal development , usually shallow, on hard or weathering rock, with or without intermittent diverse soils. Lime is generally present in part or most of these soils.

The land types identified within the project area can be summarised as follows (Figure 14):

- Ae12 which corresponds with LP2 above (Red, freely-drained, structureless soils, high base status) dominated by Hutton soil type
- Ag110 and Ag111 which corresponds with LP2 above (Shallow, red, freely-drained, structureless soils, high base status) dominated by Hutton and Mispah soil types
- Ib238 which corresponds with AR2 above (Rocky areas with shallow soils) dominated by Mispah with rocky outcrops

The distribution of the soil forms within the proposed project area is illustrated in Figure 13.

Agricultural potential

Soil forms located within the proposed project area have limited to no agricultural potential (crop production) as the soils are shallow and therefore not appropriate for sustaining cropping activities. In addition to this, the hot, dry climate is not suitable for dry crop production. In this regard, agricultural potential within the proposed project area is limited to grazing.

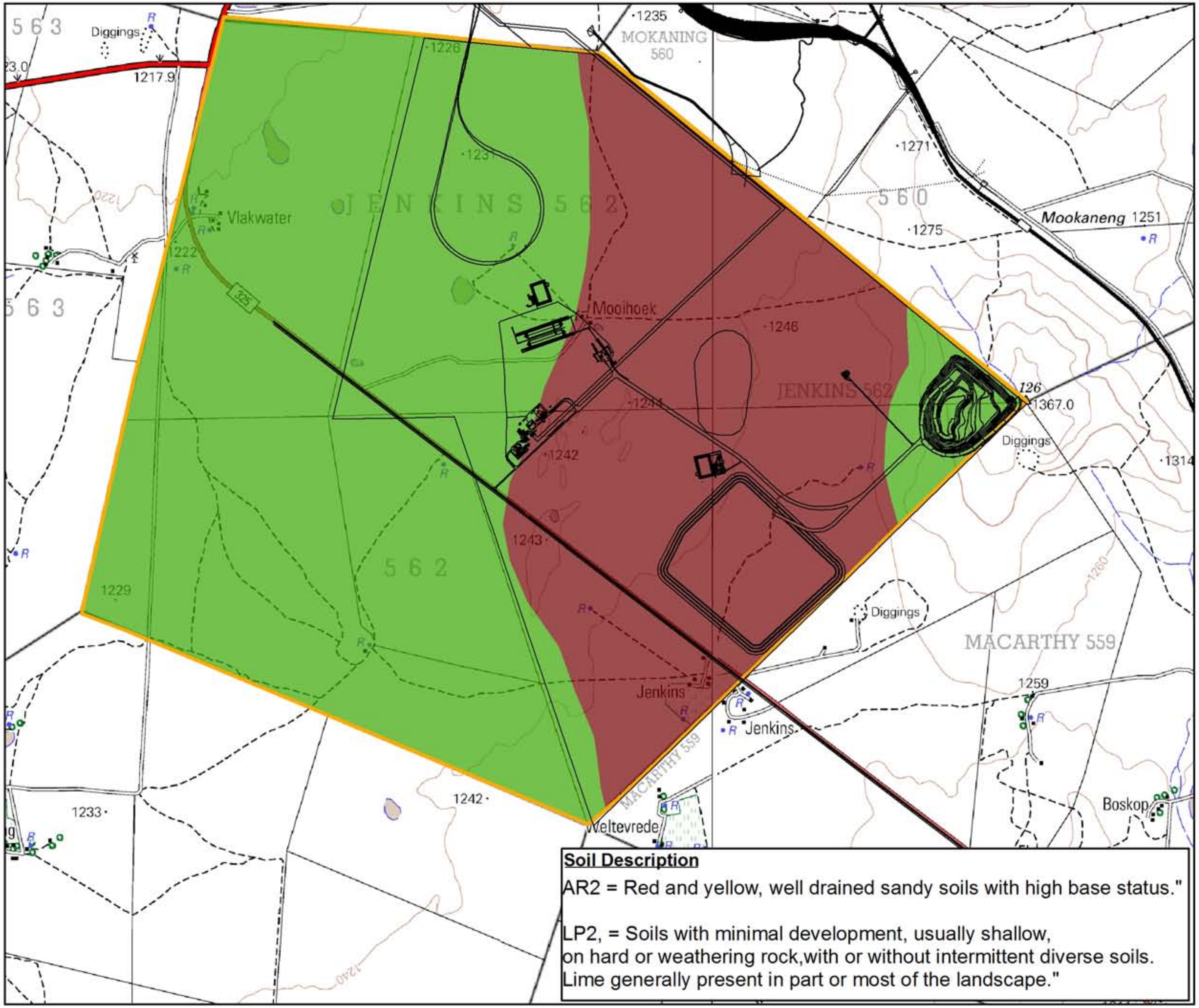
Irrigation potential

The irrigation potential for the soil forms identified within the proposed project area is low because of the very low water holding capacity of the soils as a result of the shallow nature of the soils.

CONCLUSION

In general soils (Mispah and Hutton) located within the proposed project area are shallow, free-draining, structureless soils, with a high base status. Due to the hot, dry climate and land capability, the soils have limited to no agricultural and low irrigation potential.

These soils will require appropriate management measures during construction and operation to prevent the loss of soil resources through pollution and erosion as soil resources form a crucial role during rehabilitation.



Soil Description

AR2 = Red and yellow, well drained sandy soils with high base status."

LP2, = Soils with minimal development, usually shallow, on hard or weathering rock,with or without intermittent diverse soils. Lime generally present in part or most of the landscape."

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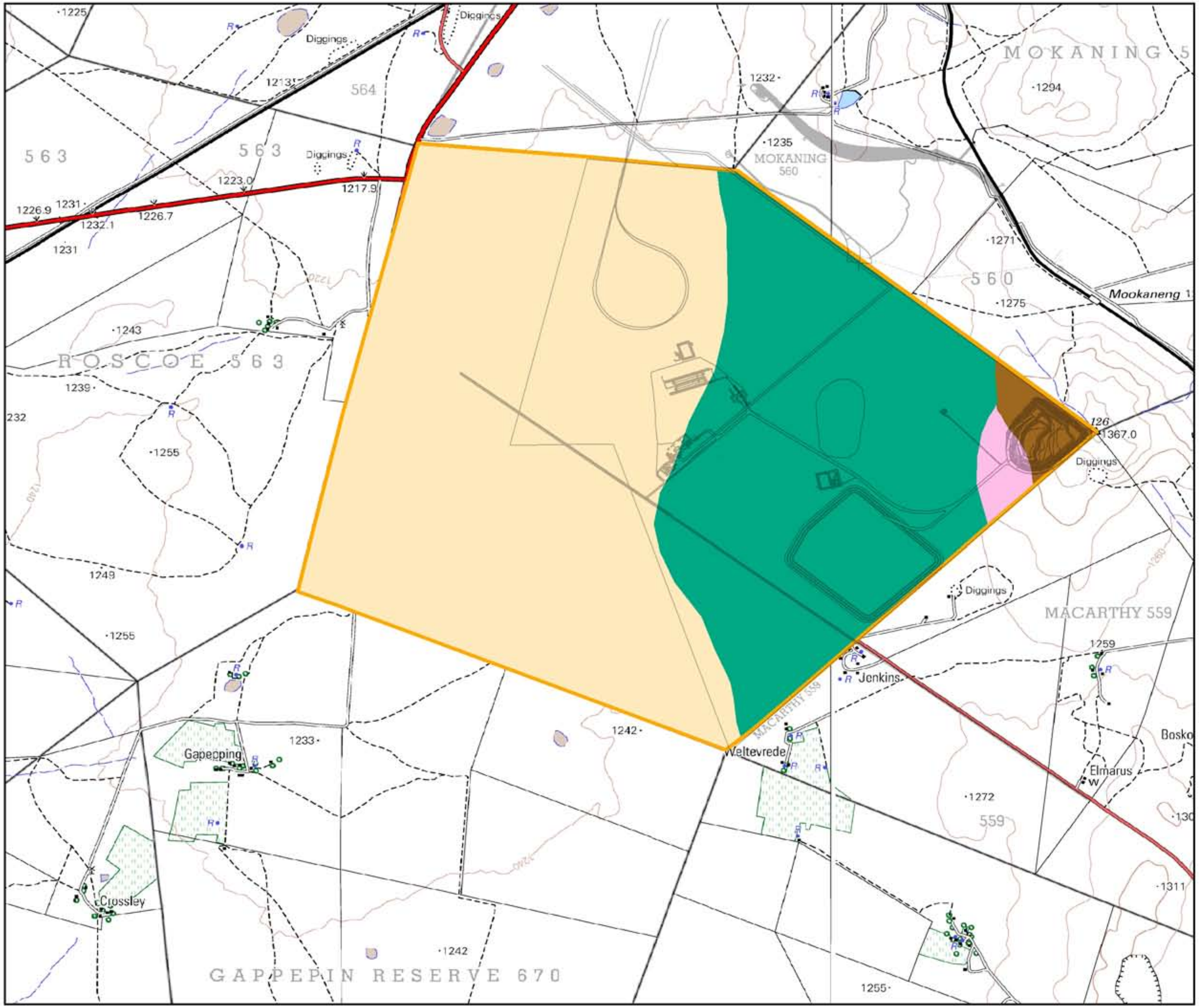
Figure 13: Soil Types (ARC, January 2016)	755.03048.00001	Coordinate System DMS; Spheroid WGS84; Central Meridian LO



Legend

Mine Layout

Land Types

- Ae12
- Ag110
- Ag111
- Ib238
- Jenkins 562

Kilometers
0 0.75 1.5

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Figure 14: Land Types (ARC, January 2016)

755.03048.00001

Coordinate System DMS	
Spheroid WGS84	Central Meridian LO

7.4.1.5 Land capability

INTRODUCTION AND LINK TO IMPACT

The land capability classification is based on the soil properties and related potential to support various land use activities. Mining operations have the potential to significantly transform the land capability. To understand the basis of this potential impact, a baseline situational analysis is described below.

DATA SOURCES

Information in this section was sourced from the soils and agricultural potential study for the proposed project (ARC-Institute for Soil, Climate and Water, January 2016) included in Appendix I. Further detail on the data collected during the study and the methodologies used can be found in the specialist report.

The Land capability system for South Africa (Schoeman et al., 2002), was used to identify the land capability for this area.

RESULTS

The project area falls within land capability class VII, with land use options largely restricted to grazing, woodland or wildlife. Although there are wetland depressions on site these are not identified as having a typical wetland potential (see Section 7.4.1.6 for more detail regarding the wetland depressions).

CONCLUSION

The land capability within the proposed project area is a mixture of grazing, woodland or wildlife potential. The land capability within the proposed project area will be changed with the placement of infrastructure. Therefore, impact management and rehabilitation planning is required to achieve acceptable post rehabilitation land capabilities.

7.4.1.6 Biodiversity

INTRODUCTION AND LINK TO IMPACT

In the broadest sense, biodiversity provides value for ecosystem functionality, aesthetic, spiritual, cultural, and recreational reasons. The known value of biodiversity and ecosystems is as follows:

- Soil formation and fertility maintenance
- Primary production through photosynthesis, as the supportive foundation for all life
- Provision of food and fuel
- Provision of shelter and building materials
- Regulation of water flows and water quality
- Regulation and purification of atmospheric gases
- Moderation of climate and weather
- Control of pests and diseases
- Maintenance of genetic resources.

The establishment of infrastructure as well as certain supportive activities have the potential to result in the loss of vegetation, habitat and related ecosystem functionality through physical disturbance and/or contamination of soil and/or water resources.

As a baseline, this section provides an outline of the type of vegetation occurring on site and the status of the vegetation, highlights the occurrence of sensitive ecological environments including sensitive/ endangered species (if present) that require protection and/or additional mitigation should they be disturbed.

DATA SOURCE - FLORA

Information in this section was sourced from the biodiversity study undertaken for the proposed project (SAS, January 2016) included in Appendix J. Further detail on the data collected during the study and the methodologies used can be found in the specialist report.

A site visit was undertaken during June 2015 to determine the ecological status of the study area. A reconnaissance “walkabout” was undertaken to determine the habitat types found throughout the study area. Sites were investigated to identify the occurrence of dominant floral species and habitat diversities, where special emphasis was placed on potential areas that support Species of Conservational Concern (SCC). The overall vegetation survey was conducted by first identifying different habitat units and then analysing the floral species composition. Vegetation analyses were conducted within the study area that is perceived to best represent the various plant communities. Species were recorded and a species list was compiled for each habitat unit. These species lists were compared with the vegetation expected to be found within the Kathu Bushveld and Kuruman Thornveld vegetation types, which serves to provide an accurate indication of the ecological integrity and conservation value of each habitat unit (Evans & Love, 1957; Owensby, 1973) (SAS, 2016).

Prior to the field visit a record of Red Data Listed (RDL) or SCC floral species and their habitat requirements was acquired from the South African National Biodiversity Institute (SANBI) for the Quarter Degree Square (QDS's) 2722DD and 2723CC and important and protected species as listed in the National Environmental Management Biodiversity Act (NEMBA), 2004 (Act 10 of 2004) Threatened or Protected Species (TOPS) document and the List of Protected Tree Species (2012) under the National Forest Act, 1998 (Act No. 945 of 1998). Throughout the floral assessment, special attention was paid to the identification of any RDL floral species, as listed by the QDS (SANBI), the NEMBA TOPS list or the protected tree species list. Identification of suitable habitat that could potentially sustain these species was also assessed.

DATA SOURCES - FAUNA

Faunal species located within the proposed project area were identified by means of a site survey which focussed on on-site observations, bird and mammal calls, spoor, faeces and the presence of burrows and nests. Further to this, existing databases were reviewed in order to confirm the likelihood of the occurrence of protected species within the proposed project area (SAS, January 2016). Further detail on the data collected during the study and the methodologies used can be found in the specialist report.

RESULTS - FLORA

<u>Floral habitat types</u>

Four floral habitat types were determined to occur within the study area. The distribution of the various floral habitat types within the proposed project area are illustrated in Figure 15.These habitat units include:

- *Vachellia erioloba* (formally known as *Acacia erioloba*) Bushveld Habitat Unit;
- Kathu Bushveld Habitat Unit;
- Rocky Ridge Habitat Unit; and
- Wetland Habitat Unit (Wetland Pans and Ephemeral Drainage Lines).

Vachellia erioloba Bushveld Habitat

The *Vachellia erioloba* woodland habitat unit is located within the eastern portions of the project area. This habitat unit is characterised by the dominance of the protected tree species *Vachellia erioloba* which is listed as declining in the region. Additional dominant floral species encountered include *Grewia flava, Tarconanthus camphoratus, Elephantorrhiza elephantina, Senegalia mellifera, Ziziphus mucronata, Prosopis glandulosa, Senna italica, Tribulus terrestris, Schmidtia pappophoroides, Aristida meridionalis, Aristida congesta subsp. congesta and Eragrostis lehmanniana*.

Four floral SCC, namely *Vachellia erioloba, Vachellia haematoxylon, Boophane disticha and Babiana framesii*, which are protected under various national and provincial acts, were encountered within this habitat unit.

The vegetation associated with the habitat unit has been disturbed as a result of historic livestock grazing (cattle and goats), other agricultural activities such crop cultivation and general anthropogenic activities. Overall, the ecological integrity and function of this habitat unit was moderately intact when compared to surrounding, more natural sections of this vegetation type, which are well represented in the region.

Kathu Bushveld Habitat Unit

The Kathu bushveld habitat unit is located within the western portions of the project area, where vegetation seems to have been cleared historically for agricultural purposes. The habitat unit is characterised by a scattered shrub layer subtended by a sparse grassy layer with very few large trees. Species dominating the habitat unit include *Grewia flava, Tarconanthus camphoratus, Elephantorrhiza elephantina, Senegalia mellifera, Ziziphus mucronata, Searsia ciliata, Chrysochoma ciliata, Schmidtia pappophoroides, Digitaria eriantha, Tragus berteronianus, Aristida meridionalis, Aristida congesta subsp. congesta, Heteropogon contortus and Eragrostis lehmanniana*. The protected species, *Babiana framesii,* was encountered within the habitat unit as well as a few individuals of the protected SCC *Vachellia erioloba.*

Vegetation within the habitat unit is perceived to be in a transformed state due to clearing of vegetation for cattle and goat farming, resulting in the severe invasion of *Tarconanthus camphoratus*. Several old homesteads and cultivated fields were also encountered. Overall, the ecological integrity and function of this habitat unit was moderate to low when compared to surrounding, more natural sections of this vegetation type, which are well represented in the region.

Rocky Ridge Habitat Unit

Several rocky ridges are present in the eastern and central sections of the project area. All rocky ridge areas have undergone minor (gravel roads and overgrazing) to major (historic mining and prospecting activities) disturbance, however, the majority of the habitat is considered to be in a natural state. The high ecological functionality and intact habitat integrity of the rocky ridge areas combine to increase the ecological sensitivity ((see Figure 16) and conservation value of this habitat unit. With the exception of the proposed opencast pit, these areas should be excluded from the proposed mining activities if at all possible (SAS, January 2016)

It has been determined that the lower slopes of the rocky ridge habitat unit provide habitat for a large number of *Boscia albitrunca*, which is a protected species in terms of the National Forests Act (Act 84 of 1998, as amended in 2011). *Searsia tridactyla,* a species endemic to the region was also identified in the rocky ridge habitat unit. *Aloe grandidentata, A. hereroensis and Anacampseros filamentosa*, which are protected under the Northern Cape Nature Conservation Act (Act 9 of 2009) (NCNCA), were also encountered within this habitat unit. Furthermore, the rocky ridge areas may provide important habitat and migratory connectivity for faunal species that move through the area. The rocky ridge habitat unit is therefore deemed to be of high ecological sensitivity.

Wetland Habitat Unit: Wetland Pans

According to the NFEPA database, four wetland pans/depressions are located within the project area (Figure 19). These depressions are dominated by the facultative wetland species *Eragrostis bicolor* which was restricted to the temporary zone of the wetland, with a distinctive increase of *Pentzia calcarea* and *Lycium cinereum* within adjacent terrestrial areas. Two of the depressions have been affected by excavation and general topographic alteration, while two were in a more natural state. Furthermore, an artificial dam was also identified, however no facultative wetland species were encountered within the dam. Wetland depressions are considered to be of increased sensitivity and ecological importance as they provide the habitat necessary to sustain wetland dependent floral species in a relatively dry region.

Wetland Habitat Unit: Ephemeral Drainage Lines

When considering the terrain units within the landscape, two drainage lines are evident within the study area that would convey water during and immediately after rainfall events. However, the drainage lines do not retain water long enough for the formation of hydromorphic soils that would support facultative floral species. As a result, these systems cannot be defined as wetlands (DWA, 2005) and the National Water Act in terms of Section 21 and GN no. 1199 of 2009 as it relates to the National Water Act will not apply. Although no hydromorphic soil was encountered within the features, the abundance of woody vegetation (*Tarchonanthus camphoratus, Diospyros lycioides, Grewia flava and Ziziphus mucronata*) along each drainage line did increase. This is considered a result of soil being transported by water forming areas with increased soil depth that are able to support larger tree species. However, the drainage lines are not considered to be sensitive from a floral ecological perspective as the floral species composition was similar to the surrounding terrestrial habitat and thus not unique (see Figure 16).

<u>SCC and protected species</u>

An assessment considering the presence of any other floral species of concern, as well as suitable habitat to support any such species, was undertaken. A list was acquired from NEMBA Government Gazette Notice 389 of 2013 (Lists of species that are threatened or protected, activities that are Prohibited and exemption from restriction) and the National Forest Act, 1998 (Government Gazette No 716 of 2012 – Notice of list of protected tree species). The following species were listed for the area (see Table 20, Table 21 and Table 22 below):

TABLE 20: SPECIES OF CONSERVATION CONCERN UNDER NEMBA (SAS, JANUARY 2016)

Family	Species	Common name	Threat Status
Amaryllidaceae	*Boophane disticha*	Poison bulb	Declining
Iridaceae	*Babiana praemorsa*	Stompstertbobbejaantjie, perskussing	Rare
Pedaliaceae	*Harpagophytum procumbens*	Devil's Claw	Least Concern
Oxalidaceae	*Oxalis hirsuta*	N/A	DDD
Fabaceae	*Amphithalea minima*	N/A	CR
Aizoaceae	*Drosanthemum inornatum*	N/A	LC
Euphorbiaceae	*Euphorbia rhombifolia*	N/A	LC
Asteraceae	*Euryops mirus*	Golden Euryops	EN
Asteraceae	*Euryops rosulatus*	N/A	CR
Asteraceae	*Euryops virgatus*	Harpuisbos	CR
Iridaceae	*Geissorhiza subrigida*	N/A	CR
Aizoaceae	*Lithops dorotheae*	Living stones	EN
Hyacinthaceae	*Drimia sanguinea*	Transvaal slangkop	NT

TABLE 21: PRECIS PLANT LIST FOR THE QDS 2722DD (SANBI, WWW.POSA.SANBI.ORG)(SAS, JANUARY 2016)

Family	Species	Threat Status	Growth Forms
Fabaceae	*Acacia erioloba E.Mey.*	Declining	Shrub, tree

TABLE 22: PROTECTED TREE SPECIES LISTED UNDER THE NATIONAL FOREST ACT.

Family	Species	Common name	Threat Status
Fabaceae	*Vachellia erioloba*	Camel thorn	Protected (declining)
Fabaceae	*Vachellia haematoxylon*	Grey camel thorn	Protected (least threatened)
Capparaceae	*Boscia albitrunca*	Shepherd's Tree	Protected

The three protected tree species *Boscia albitrunca, Vachellia erioloba and V. haematoxylon* which are also listed as protected species (Government Gazette No 716, 2012), were encountered within the Vachellia erioloba and Kathu Bushveld and also the Rocky Ridge habitat units. Furthermore, Aloe *grandidentata, A. hereroensis, Babiana framesii* and *Anacampseros filamentosa*, which are protected under the Northern Cape Nature Conservation Act (Act 9 of 2009) (NCNCA), were also encountered in the Kathu Bushveld and Rocky Ridge habitat units.

Alien and invasive species

Alien and invasive species located within the proposed project area are provided in Table 23 below.

TABLE 23: DOMINANT EXOTIC VEGETATION SPECIES IDENTIFIED DURING THE GENERAL SITE ASSESSMENT (SAS, JANUARY 2016)

Scientific name	Common name	Category
Trees		
Prosopis glandulosa	Honey Mesquite	3
Schinus molle	Brazilian pepper tree	3

Scientific name	**Common name**	**Category**
Shrubs and Forbs		
Opuntia sp.	Prickly pear	1b
Chenopodium album	Bloubossie	N/A
Salsola kali	Russian tumbleweed	1b
Solanum sp.	Bitter apple	1b
Tagetes minuta	Tall khaki weed	N/A
Hibiscus canabinus	Wild stockrose	N/A
Datura ferox	Large thorn apple	1b
Alternanthera pungens	Khakiweed	N/A
Tribulus terrestris	Devils thorn	N/A
Schkuhria pinnata	Kleinkakiebos	N/A

Categories according to NEMBA (Alien and Invasive Species Regulations, 2014)
Category 1a - Invasive species that require compulsory control.
Category 1b - Invasive species that require control by means of an invasive species management programme.
Category 2 - Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.
Category 3 - Ornamentally used plants that may no longer be planted.

Alien and invasive species are controlled in terms of Regulation 15 and Regulation 16 (R. 280 of 2001) of the Conservation of Agricultural Resources Act (No. 43 of 1993). In this regard, plants classified in terms of Category 1 must be removed and destroyed immediately. These plants serve no economic purpose and possess characteristics that are harmful to humans, animals and the environment. Category 2 plants may only be grown under controlled conditions. These plants have certain useful qualities and are allowed in demarcated areas. In other areas they must be eradicated and controlled.

Ecological sensitivity

Figure 16 conceptually illustrates the areas considered to be of increased ecological sensitivity in relation to the proposed project. The areas are depicted according to their sensitivity in terms of floral habitat integrity and their suitability to provide habitat to faunal and floral communities.

Wetland Depressions are considered to be of increased sensitivity and ecological importance as they provide the habitat necessary to sustain wetland dependent floral species in a relatively dry region. As such, impacts systems associated with the project area are likely to be significant on a local and regional scale and must be avoided. It should however be noted that project infrastructure will be placed in such a way that the sensitive wetland depression areas are not disturbed.

The Rocky Ridge habitat unit has general high ecological functionality and overall high levels of habitat integrity and is in a relatively undisturbed condition. The species composition of this habitat unit is also representative of the vegetation type in which it occurs. Furthermore, this habitat unit contains several floral SCC. Thus, this habitat unit is considered to be highly sensitive.

The ecological integrity and function of the *Vachellia erioloba* habitat unit was moderately intact when compared to surrounding, more natural sections of this vegetation type, which are well represented in the region.

Vegetation within the Kathu Bushveld habitat unit is perceived to be in a transformed state due to clearing of vegetation for cattle and goat farming, resulting in the severe invasion of Tarconanthus camphoratus. Overall, the ecological integrity and function of this habitat unit was moderate to low when compared to surrounding, more natural sections of this vegetation type, which are well represented in the region.

According to the NPSDF (2012), the study area is located within Griqualand West Centre of Endemism in the Northern Cape Province and is located within an area that is still intact, although extremely poorly conserved.

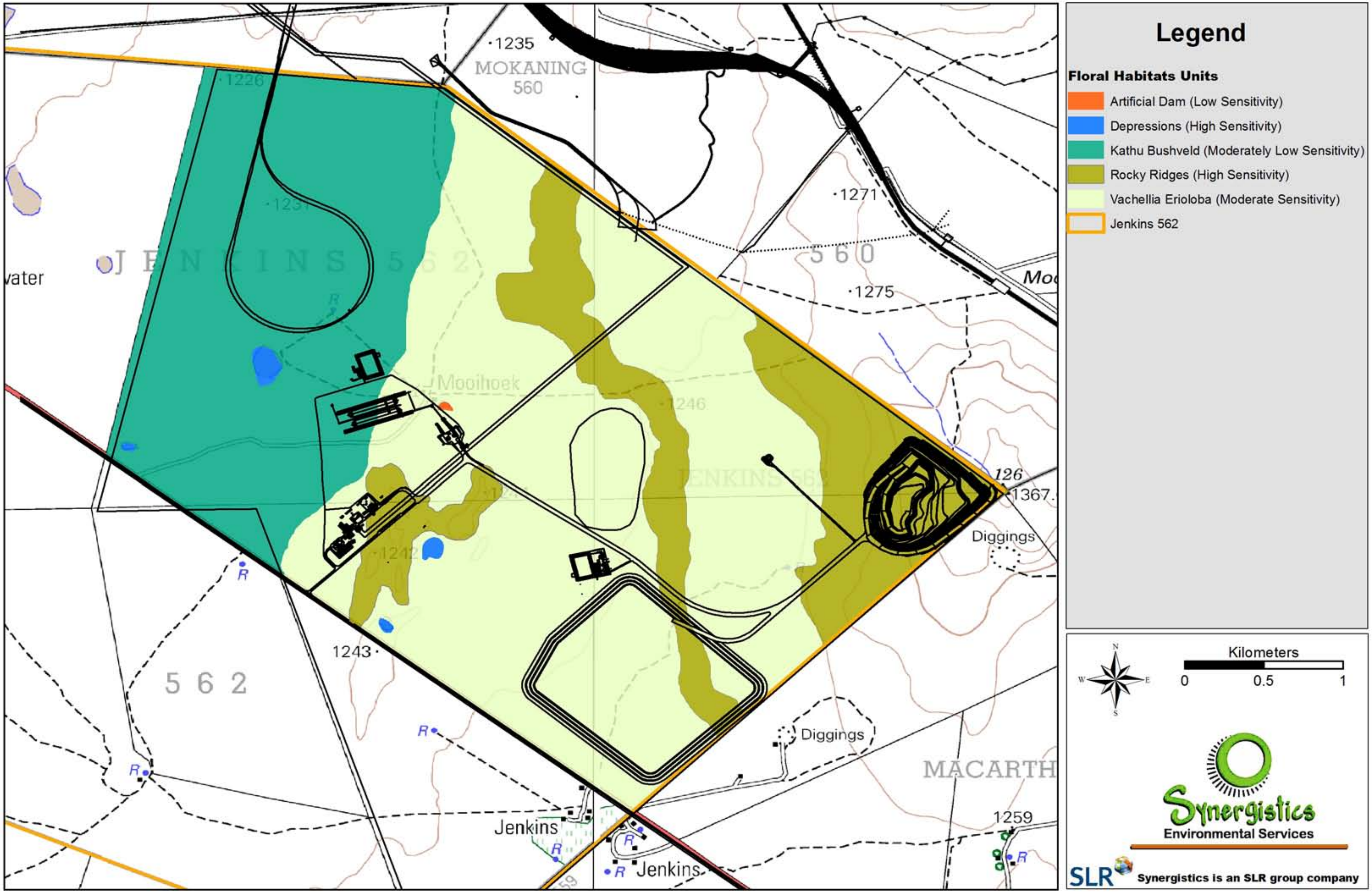


Figure 15: Floral Habitat Types (SAS, January 2016)

755.03048.00001

Coordinate System DMS	
Spheroid WGS84	Central Meridian LO

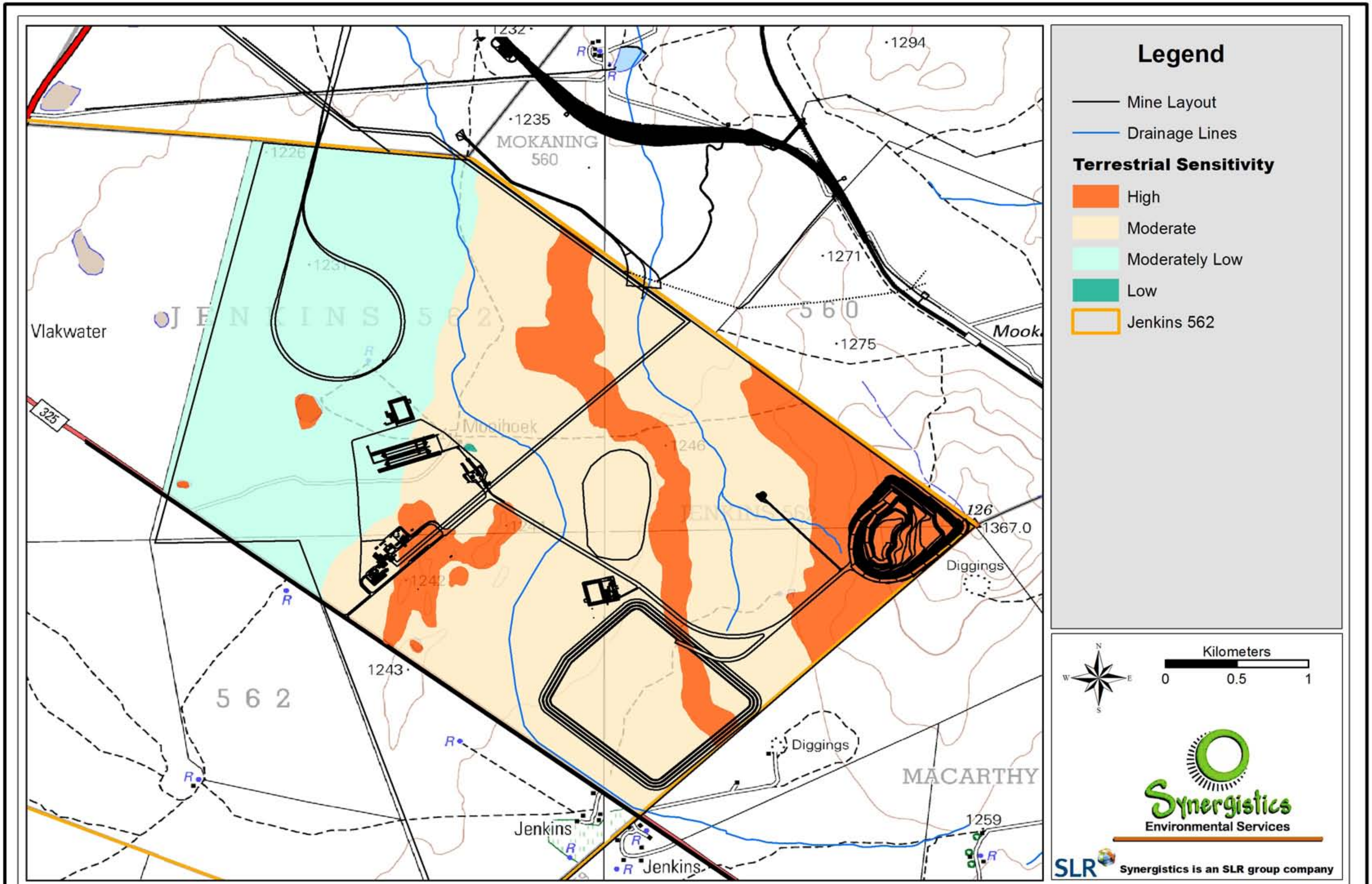


Figure 16: Biodiversity Sensitivity (SAS, 2016)	755.03048.00001	Coordinate System DMS	
		Spheroid WGS84	Central Meridian LO

RESULTS – FAUNA

The project area historically was utilised for the grazing of goats and cattle, however this has ceased in the last few years, and as such the veld has recovered to a degree, evident through the increased observation rates of faunal species. Overall the project area has suitable habitat for faunal species, with a mixture of habitat types being found within the study area. The rocky ridges and rocky outcrops are more suited to reptile species, as well as arachnid species, however small mammals were also found to inhabit these rocky areas. The bushveld and shrubland areas had the highest diversity of avifaunal species, with these areas also being utilised by small to medium sized mammals.

Mammals

The assessment of the study area resulted in the observation of numerous signs of mammal species, most notably in the form of scat and spoor, however, direct observations of *Tragelaphus strepsiceros* (Kudu), *Suricata suricatta* (Meerkat), *Saccostomus campestris* (Pouched Mouse) and *Aethomys namaquensis* (Namaqua Rock Mouse) were made (full lists of mammal species identified on site have been provided in Appendix J). No mammal SCC were observed within the study areas, nor are any expected to occur within the project area. The habitat conditions within the project area are still relatively intact and as such are able to support a number of large and small mammal species, notably so as a result of the ceasing of cattle grazing practices within the study area. Due to the overall aridity of the study area, as well as the lack of surface water, only mammal species which can move long distances to find water, or species that are water independent are likely to be found within the study area.

Birds

Avifaunal surveys were conducted covering the entire project area, and all avifaunal species seen or heard during the time of the field assessment were recorded. Full lists of avifaunal species identified on site have been provided in Appendix J.

All avifaunal species identified within the project area are common species known to reside within or utilise the arid bushveld, thornveld and open grassland habitat in the region and may be permanent or occasionally present within the area.

Of importance is that a pair of *Ardeotis kori* (Kori Bustard), listed as Near Threatened (NT) by the IUCN, which was observed on two occasions within the project area, notably in the Kathu bushveld habitat stretching across the western and northern half of the project area. The reason for this species decline is as of yet not fully understood, however power line collisions and habitat degradation are thought to be main contributors.

Reptiles

Three reptile species were observed during the assessment of the study area, namely the Cape Cobra, Puff Adder and Variegated Skink. The rocky outcrops as well as the dense shrub areas provide suitable for reptile species, and it is possible that not all the reptile species within the study area will have been recorded as a result of the seasonality of the site assessment. Of the species recorded in the study area, none are classified by the IUCN as of yet, however from present data and knowledge, it appears that they are widespread throughout Southern Africa.

Amphibians

No amphibians were observed within the project area. This can primarily be attributed to the arid ecology of the study area and the lack of surface water during the time of assessment. Although evidence suggests the occurrence of ephemeral pans within the study area, these were notably dry and from observations appear to have been dry for an extended period of time. As such, it is unlikely that these pans will contain suitable amounts of water for a sufficient period to ensure amphibian habitation and breeding.

Invertebrates

Invertebrate diversity throughout the study area was low, and can be attributed to the cold weather experienced during the site assessment combined with the seasonal nature of invertebrates. All the species observed are considered common and fairly widespread in Southern Africa, whilst many of them have yet to be listed by the IUCN. Many invertebrate species that are found within arid regions of South Africa generally tend to be dictated by season and food resources. As such the arid nature of the project area and the low levels of food resources as a result of grazing pressure will preclude the occurrence of invertebrate species in large numbers from the study areas. Furthermore, no invertebrate SCC are expected to occur within the project area.

Arachnids

The general aridity of the environment combined with the lower prey (invertebrate) abundance and diversity, is likely to decrease the likelihood of arachnid detection within the project area, as well as limit the overall abundance of species within the project area. No arachnid SCC are expected to occur within the study area. The only evidence of arachnid habitation was that of a scorpion carapace and the locating of a very young scorpion within the rocky ridge areas. The rocky ridges will likely provide suitable habitat for arachnid species during suitable seasonal times.

Red data/SCC

No red data faunal species were observed on-site (SAS, January 2016). In terms of SCC, the only species observed within the project area that needs to be noted is *Ardeotis kori* (Kori Bustard). This avifaunal SCC was the only SCC observed, with no other SCC expected to occur within the project area.

Ardeotis kori (Kori Bustard) population numbers are currently declining, likely as a result of habitat degradation amongst other impacts. This species is generally observed within open sparse shrublands, as can be found within the western and northern section of the study area. As such, it is recommended that as far as possible mining infrastructure and activities does not take place within these areas, in order to maintain suitable habitat for Ardeotis kori. The preservation of habitat for *Ardeotis kori* will in turn have a positive knock on effect for other species, as they will also be able to utilise the habitat in the undisturbed areas, resulting in a greater protection and conservation effort of species.

CONCLUSION

In terms of the mining and biodiversity guideline the proposed project area does not fall into any biodiversity priority areas and is therefore not deemed a risk for mining.

The placement of infrastructure as well as mining activities in general have the potential to disturb and/or destroy vegetation, habitat units and related ecosystem functionality including the disturbance of sensitive/ endangered species. Sensitive biodiversity environments such as rocky ridges and wetland depressions do exist. Protected species in accordance with the NFA located within the proposed project area include *Acacia erioloba* (Camel thorn), *Acacia haematoxylon (*Grey camel thorn) and *Boscia albitrunca* (Shepherd's Tree). The *Vachellia erioloba* (Camel Thorn) is also listed as declining in terms of the IUCN.

During the design of the infrastructure layout, areas of sensitivity should be taken into consideration in order to minimise the disturbance and destruction of these areas. In addition to this, mitigation measures need to be formulated to conserve and reduce the impacts that the proposed project may have towards these areas. It is however expected that project infrastructure has been planned in such a manner that these wetland depression areas will be avoided.

7.4.1.7 Surface water

INTRODUCTION AND LINK TO IMPACT

Surface water resources include drainage lines and paths of preferential flow of stormwater runoff. Mine related activities have the potential to alter the drainage of surface water through the establishment of infrastructure and/or result in the contamination of the surface water resources through seepage and/or spillage of process materials, non-mineralised (general and hazardous) and mineralised wastes (WRD). To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCES

Information in this section was sourced from the hydrology assessment undertaken for the proposed project (Jeffares & Green, January 2016) included in Appendix K and the biodiversity assessment (SAS, January 2016) included in Appendix J. Further detail on the data collected during the studies and the methodologies used can be found in the specialist reports.

RESULT

Catchments within the context of South Africa

South Africa is divided into 19 water management areas (National Water Resource Strategy, 2004), managed by separate water boards. Each of the water management areas (WMA) is made up of quaternary catchments which relate to the drainage regions of South Africa. The proposed project area falls within the Lower Vaal water management area.

Regional hydrology

The project area is located within quaternary catchment D41J, which in turn forms part of the greater Orange River catchment area. The Orange River is located approximately 140 km southwest of the project area, however, water draining from quaternary catchment D41J drains northwards along the Ga-Mogara River, a tributary of the Kuruman River, which eventually drains southwards along the Molopo River and joins the Orange River at Augrabies Falls. According to the Water Resources of South Africa 2012 study (WR2012), quaternary catchment D41J has a Mean Annual Runoff (MAR) of 1.75 million m^3 (MCM). The total catchment area of the quaternary catchment is 3 878 km2, however, only 2 518 km2 of this catchment area contributes to flows out of the catchment. The remainder of the catchment is described as endorheic (catchment area with no outlet, i.e. rainfall falling on the catchment does not exit the catchment as surface flow, but may only leave as evaporation or seepage). The MAR depth is particularly low due to the arid nature of the catchment, relatively flat topography and largely sandy soils.

Local hydrology

Two drainage lines (unnamed) are evident within the project area that would convey water during and immediately after rainfall events. Although no hydromorphic soil was encountered within the features, the abundance of woody vegetation *(Tarchonanthus camphoratus, Diospyros lycioides, Grewia flava and Ziziphus mucronata)* along each drainage line did increase. This is considered a result of soil being transported by water forming areas with increased soil depth that are able to support larger tree species. However, the drainage lines are not considered to be sensitive from a floral ecological perspective as the floral species composition was similar to the surrounding terrestrial habitat and thus not unique. Infrastructure within the project area has been planned in such a way that disturbance to these two drainage lines will be limited. With the exception of a single road crossing over one of these unnamed drainage lines, both drainage lines are expected to remain outside of the project footprint. The most significant drainage line in the vicinity of the Jenkins property is that of the Ga-Mogara River, which is located approximately 6.5 km north of the project boundary and flows just south of the Sishen mining area.

<u>Wetlands</u>

Four wetland pans/depressions are located within the project area (Figure 19). Two of the depressions have been affected by excavation and general topographic alteration, while two were in a more natural state. The disturbed wetland depressions fall under Class D (wetlands that are not ecologically important and sensitive in any scale). The undisturbed wetlands fall under Category B (wetlands that are considered to be ecologically important and sensitive). Furthermore, an artificial dam was also encountered, however no facultative wetland species were encountered within the dam. Wetland depressions are considered to be of increased sensitivity and ecological importance as they provide the habitat necessary to sustain wetland dependent floral species in a relatively dry region. Figure 19 shows the location of these wetlands and the different classes.

<u>Water quality</u>

Since both the ephemeral drainage lines as well as the wetland depressions were dry at the time of assessment and exhibited no evidence of recent surface water flow/containment, no surface water quality data is available.

CONCLUSION

The nature of the proposed project and activities are such that they present potential to alter drainage patterns and for pollution of water resources. The proposed project must therefore be managed/implemented in a way that pollution of water resources is prevented. Moreover, care is required to ensure that surface run-off patterns are disturbed as little as possible to promote the continued flows of water and nutrients.

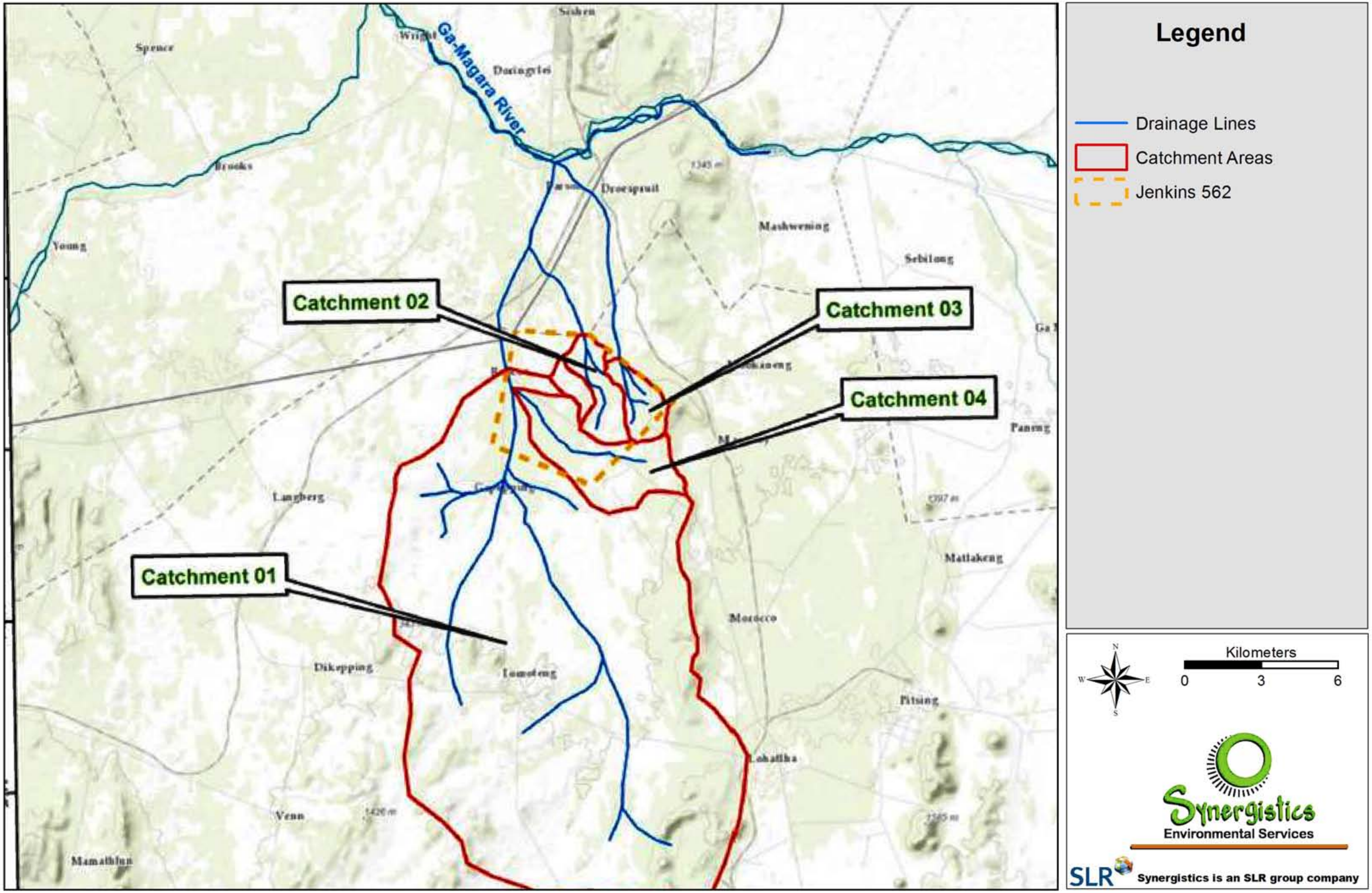


Figure 17: Drainage and Catchments

755.03048.00001	Coordinate System DMS	Spheroid WGS84	Central Meridian LO

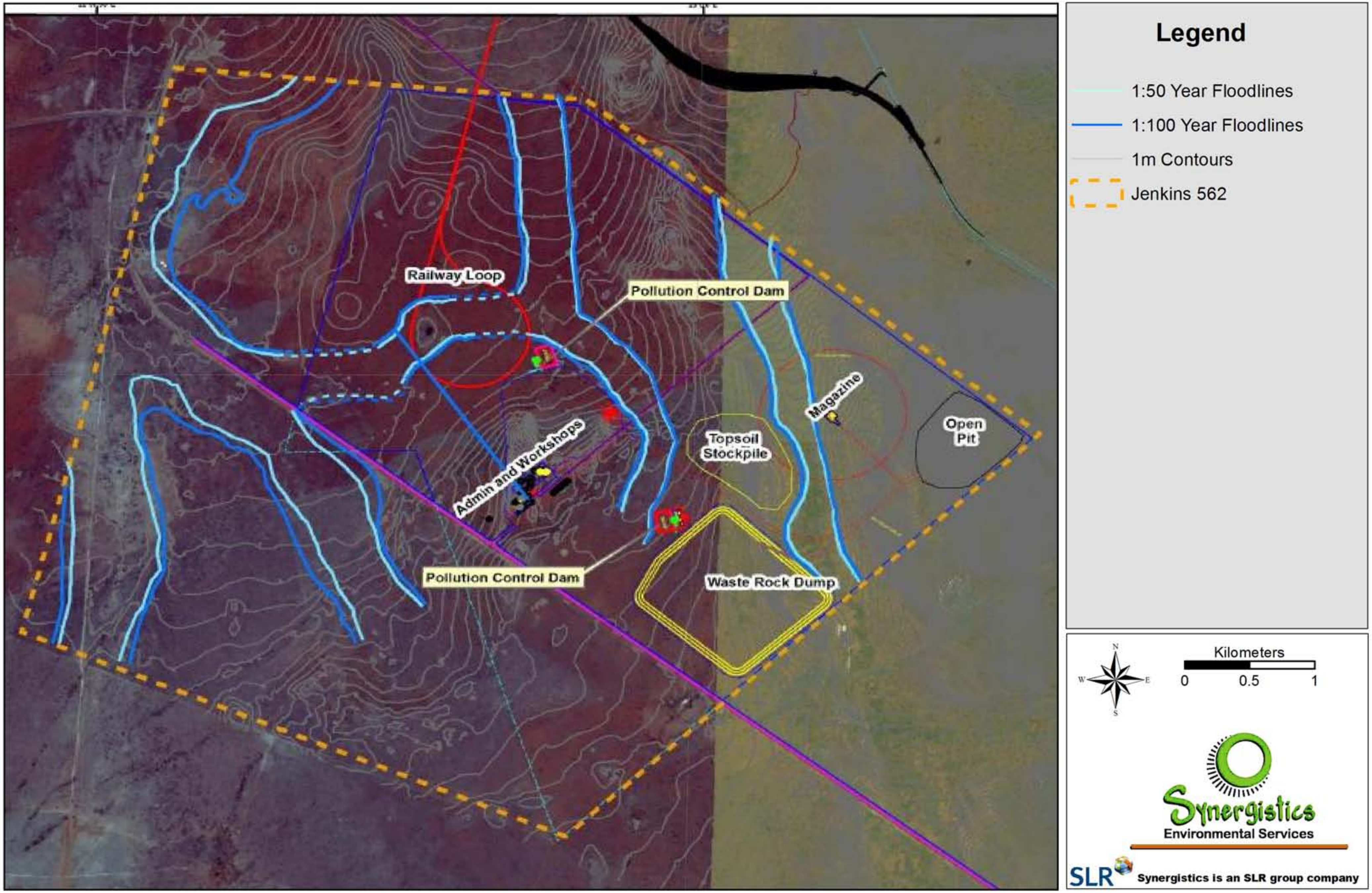


Figure 18: Floodlines (SLR, 2015)

755.03048.00001	Coordinate System DMS	
	Spheroid WGS84	Central Meridian LO

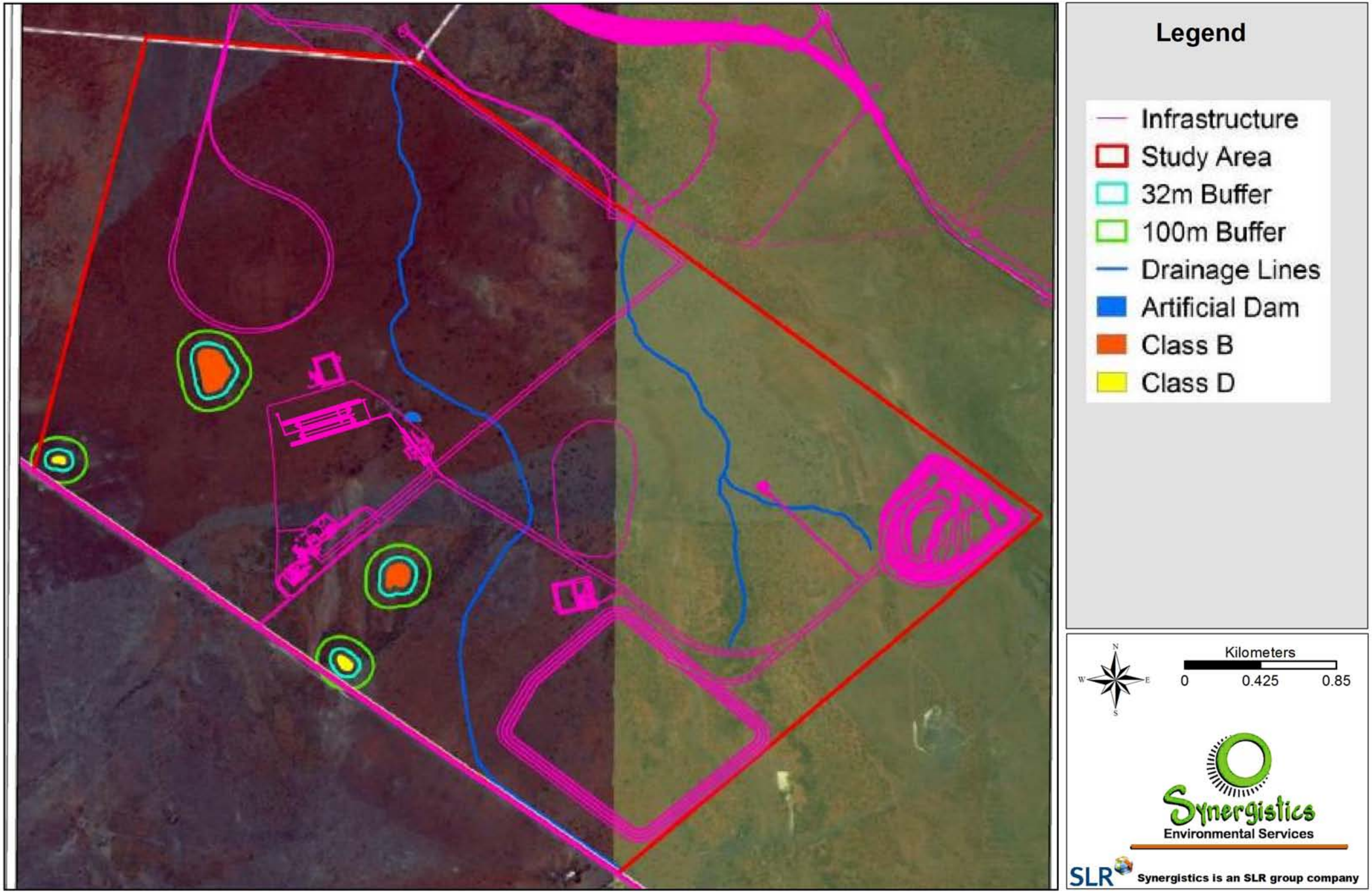


Figure 19: Wetland Depression within the Project Area (SAS, January, 2016)

Figure 19: Wetland Depression within the Project Area (SAS, January, 2016)	755.03048.00001	Coordinate System DMS	
		Spheroid WGS84	Central Meridian LO

7.4.1.8 Groundwater

INTRODUCTION AND LINK TO IMPACT

Groundwater is a valuable resource and is defined as water which is located beneath the ground in soil/rock pore spaces and in the fractures of lithological formations. Activities such as the handling and storage of hazardous materials and handling and storage of mineralised and non-mineralised wastes have the potential to impact groundwater resources, both to the environment and third party users, through pollution. In addition, where mining requires dewatering in order to provide a safe working environment and for water supply, there is the potential for a dewatering cone to develop and this can result in a loss of water supply to surrounding users. To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCES

Information in this section was sourced from the groundwater assessment (Groundwater Complete, February 2016) included in Appendix H. Further detail on the data collected during the study and the methodologies used can be found in the specialist report.

Information pertaining to aquifer characteristics was sourced from available information including borehole logs and pumping tests.

A hydrocensus was undertaken to identify water users as well as to determine the quality and quantity of groundwater resources within and surrounding the proposed project area. In addition to this, groundwater samples were also taken as part of pumping test to determine the groundwater quality.

The regional groundwater flow pattern was determined by linear interpolation of available groundwater levels and hydraulic heads. Water levels measured during the hydrocensus, water level information in the National Groundwater Database (NGDB), and water level information from published literature was used.

Groundwater yields for the proposed project area were determined through pumping tests.

RESULTS

<u>Presence of groundwater</u>

The geohydrological regime in the project area is made up of two main aquifer systems. The first, the upper, unconfined to semi-confined aquifer occurs in the weathered zone. The aquifer is usually developed on the contact between the weathered zone at surface and the underlying un-weathered clay or hard rock formations. Although relatively low yields occur in this shallow aquifer, it is developed widely throughout most of the project area and has been the sole reliable source of water supply to most of the farms in the area. Yields of up to 2l/s occur in this aquifer with a shallow water table and spring formation common, especially in the lower-lying topography.

The second aquifer is associated with fractures, fissures, joints and other discontinuities within the consolidated bedrock and associated intrusives of the Transvaal/Griqualand West Sequences. The aquifer occurs at depths of more than 50 meters below surface in the project area. It is semi-confined and has greatly varying yields that are directly associated with the geology and geological structure.

Groundwater levels and flow

It is expected that groundwater levels in the wider area have been affected by large scale dewatering activities at nearby large scale mining operations. Groundwater levels of boreholes unaffected by the mining activities generally vary between ± 2 and 34 mbgl, whilst boreholes believed to be affected display water levels of between ± 43 and 275 mbgl. In addition to the expected effects of dewatering in the area, variations in groundwater levels are mainly the result of aquifer heterogeneity and significant compartmentalisation.

Hydrocensus and groundwater use

A hydrocensus and groundwater user survey was conducted on the Jenkins mining right area and surrounding properties. A total of 52 boreholes were located of which 23 are exploration boreholes that were drilled by Coza. Twenty user boreholes were located in the survey area, while the remaining nine boreholes are dedicated groundwater level monitoring boreholes and are the property of Assmang's Khumani Mine. No springs were recorded in the area under investigation. Groundwater within the survey area is mainly used for domestic purposes, small scale irrigation (household gardens) and livestock watering.

A total of seven monitoring boreholes were drilled by COZA on targets identified during a geophysical investigation of the project area and their positions are indicated in Figure 20.

Water levels associated with the proposed project area are provided in Table 24 below.

TABLE 24: SUMMARY OF HYDROCENSUS AND GROUNDWATER USER SURVEY (GROUNDWATER COMPLETE, JANUARY 2016)

BH	Coordinates		Elevation	Depth	Water level	Owner	Comment	Sampled
	South	East						
MAC01	-27.91051	23.04963	1254.00	80	8.9	Assmang	None	Yes
MAC02	-27.91082	23.04951	1254.00	237	8.7	Assmang	None	Yes
MAC03	-27.93744	23.04451	1279.00	90	-	Assmang	Probe on borehole	No
MAC04	-27.93728	23.04429	1279.00	106	-	Assmang	Probe on borehole	No
MAC09	-27.89091	23.00488	1231.00	68	13.6	Assmang	Submersible pump	No
MOKGANENG	-27.89423	23.00630	1235.00	130	21.4	Assmang	None	No
PBW01	-27.84286	22.96164	1201.00	39.5	7.7	Assmang	Submersible pump	No
WGK09	-27.89605	22.96769	1223.00	60	17.5	Assmang	None	Yes
WGK12	-27.89337	22.98133	1224.00	60	20.9	Assmang	None	Yes
CJBH01	-27.92297	23.01644	1294.00	-	80.6	Coza Mining (Pty) Ltd	Submersible pump	No
CJBH02	-27.92176	22.99778	1244.00	-	-	Coza Mining (Pty) Ltd	Windmill blocking access	No
CJBH03	-27.94182	22.99780	1250.00	54	13.2	Coza Mining (Pty) Ltd	Submersible pump	Yes
CJBH04	-27.93983	22.99918	1251.00	-	-	Coza Mining (Pty) Ltd	Windmill blocking access	No
PC-A21	-27.91238	23.01132	1258.00	92	-	Coza Mining (Pty) Ltd	Borehole blocked at 13m	No
PC-A25	-27.91679	23.01151	1254.00	113	-	Coza Mining (Pty) Ltd	Welded shut	No
PC-A29	-27.92116	23.01157	1259.00	68	-	Coza Mining (Pty) Ltd	Welded shut	No
PC-A32	-27.92040	23.00625	1251.00	99	-	Coza Mining (Pty) Ltd	Welded shut	No
PC-A33	-27.91438	23.00682	1245.00	119	-	Coza Mining (Pty) Ltd	Welded shut	No
RC-JNR02	-27.91893	23.01990	1327.00	93	-	Coza Mining (Pty) Ltd	Dry at 103m	No
RC-JNR12	-27.91842	23.01645	1294.00	134	-	Coza Mining (Pty) Ltd	Dry/Blocked at 16m	No
RC-JNR15	-27.91632	23.01434	1272.00	132	14.0	Coza Mining (Pty) Ltd	None	No
RC-JNR19	-27.92324	23.01504	1277.00	177	-	Coza Mining (Pty) Ltd	Dry/Blocked at 9.5m	No
RC-JNR20	-27.92075	23.02067	1340.00	122	121.3	Coza Mining (Pty) Ltd	None	No
RC-JNR27	-27.91865	23.01817	1316.00	168	109.1	Coza Mining (Pty) Ltd	None	No
RC-JNR29	-27.92402	23.01946	1322.00	158	101.9	Coza Mining (Pty) Ltd	None	No
RC-JNR31	-27.92282	23.01885	1320.00	104	-	Coza Mining (Pty) Ltd	Borehole deeper than 150m	No
RC-JNR35	-27.91703	23.01675	1302.00	170	88.4	Coza Mining (Pty) Ltd	None	No
RC-JNR41	-27.92249	23.01727	1299.00	108	81.0	Coza Mining (Pty) Ltd	None	No
RC-JNR43	-27.92424	23.01623	1285.00	145	-	Coza Mining (Pty) Ltd	Dry/Blocked at 89.4m	No
RC-JNR46	-27.92086	23.01823	1312.00	163	89.2	Coza Mining (Pty) Ltd	None	No

BH	Coordinates		Elevation	Depth	Water level	Owner	Comment	Sampled
	South	East						
RC-JNR54	-27.91479	23.01441	1275.00	158	61.7	Coza Mining (Pty) Ltd	None	No
RC-JNR55	-27.91826	23.01501	1278.00	153	68.1	Coza Mining (Pty) Ltd	None	No
RC-JNR56	-27.91975	23.01456	1277.00	123	43.0	Coza Mining (Pty) Ltd	None	No
RC-JNR58	-27.91997	23.01630	1293.00	130	66.4	Coza Mining (Pty) Ltd	None	No
RC-JNR60	-27.92127	23.01676	1296.00	119	79.1	Coza Mining (Pty) Ltd	None	No
RC-JNR63	-27.92182	23.01496	1271.00	103	63.9	Coza Mining (Pty) Ltd	None	No
GP01	-27.98470	22.96437	1261.00	32	22.0	Danelle Family Trust	Windmill	Yes
GP02	-27.98305	22.96396	1261.00	-	19.1	Danelle Family Trust	Windmill	Yes
GP03	-27.95054	22.96783	1246.00	19	18.4	Danelle Family Trust	Windmill	No
GP04	-27.94843	22.96906	1244.00	-	-	Danelle Family Trust	Probe on borehole	No
GP05	-27.94758	22.96915	1244.00	150	17.5	Danelle Family Trust	No pump on borehole	Yes
GP06	-27.94242	22.94755	1243.00	-	15.1	Danelle Family Trust	Windmill	Yes
GP07	-27.95003	22.94744	1243.00	-	-	Danelle Family Trust	Monopump	No
GP08	-27.95419	22.94774	1244.00	21.5	17.8	Danelle Family Trust	Windmill	No
ROC01	-27.91095	22.95095	1231.00	-	-	Roscoe Farm	Solar pump obstruction	No
ROC02	-27.93102	22.94825	1239.00	29.5	19.1	Roscoe Farm	Windmill	No
ROC03	-27.91095	22.95063	1231.00	26.5	20.2	Roscoe Farm	Windmill	Yes
ROC05	-27.90738	22.95014	1229.00	23.5	18.0	Roscoe Farm	Windmill	No
ROC06	-27.91472	22.92540	1236.00	-	-	Roscoe Farm	Windmill blocking access	Yes
ROC07	-27.90915	22.90977	1228.00	21.5	-	Roscoe Farm	Windmill	Yes
ROC08	-27.89714	22.92297	1224.00	55	24.5	Roscoe Farm	Windmill	Yes
ROC09	-27.89623	22.95847	1222.00	21	16.9	Roscoe Farm	Windmill	Yes

<u>Groundwater quality and use</u>

Groundwater quality data is available for a total of 14 user boreholes located during the hydrocensus/user survey and two dedicated source monitoring boreholes. Groundwater quality data were evaluated with the aid of diagnostic chemical diagrams and by comparing the inorganic concentrations to the South African National Standards for drinking water (SANS 241:2011). In summary, groundwater is of good quality and is suitable for human consumption according to the South African National Standards for drinking water (SANS241:2011). Exceptions do however occur as the nitrate content measured in GP06, JKN02, ROC03, ROC06 and ROC09 exceeds the permissible SANS concentration of 11 mg/, rendering the groundwater unfit for human consumption. The once-off analyses do not allow for accurate source identification however the specialist is of the opinion that the nitrate contamination is likely to have originated from kraals or feedlots. Exceptionally high fluoride and iron concentrations were measured in borehole WGK12, however the once-off monitoring data available does not provide any reasonable explanation for these anomalies. The groundwater is mainly dominated by magnesium cations, while bicarbonate alkalinity dominates the anion content. A full summary of groundwater quality is provided in Table 25.

TABLE 25: CONCENTRATIONS OF INDICATOR CHEMICAL PARAMETERS FOR SAMPLING LOCALITIES IN THE PROJECT AREA (MG/L)

BH	Al	Ca	Cl	F	Fe	K	Mg	Na	NO_3	pH	PO_4	SO_4	TDS
CJBH03	<0.006	57.5	35.4	0.3	<0.006	2.7	54.8	18.4	0.2	7.8	<0.025	1.9	410.0
GP01	<0.006	75.2	11.9	0.3	<0.006	1.2	36.9	33.9	5.3	8.2	<0.025	15.3	436.0
GP02	<0.006	70.4	12.4	0.2	<0.006	1.1	39.3	23.0	7.7	8.3	<0.025	15.0	393.0
GP05	<0.006	12.0	23.8	0.3	<0.006	1.4	0.6	73.6	0.3	8.9	<0.025	102.0	244.0
GP06	<0.006	65.9	11.4	0.3	<0.006	1.2	35.0	19.7	13.4	8.0	<0.025	11.5	360.0
JKN02	<0.006	79.1	43.4	0.4	<0.006	2.2	54.4	18.5	13.5	7.6	<0.025	22.4	470.0
JKN03	<0.006	83.1	52.2	0.8	<0.006	2.0	59.2	20.8	10.2	7.7	0.04	27.1	501.0
MAC01	<0.006	15.7	28.1	0.5	<0.006	3.2	72.2	20.7	1.1	8.4	<0.025	4.1	383.0
MAC02	<0.006	102.0	35.7	0.4	<0.006	2.5	87.4	18.3	0.5	7.9	<0.025	28.4	665.0
ROC03	<0.006	89.1	20.7	0.3	<0.006	3.1	50.5	22.2	15.6	7.9	<0.025	14.1	519.0
ROC06	<0.006	32.9	16.2	0.2	<0.006	2.9	33.1	20.4	11.8	8.9	<0.025	10.1	299.0
ROC07	<0.006	52.7	14.8	0.2	<0.006	3.4	39.2	22.9	9.7	8.4	<0.025	9.9	354.0
ROC08	<0.006	62.0	16.6	0.3	<0.006	3.0	44.4	28.4	7.9	8.5	<0.025	16.4	420.0
ROC09	<0.006	68.4	31.1	0.3	<0.006	2.9	45.0	48.6	15.4	8.4	<0.025	21.1	479.0
WGK09	<0.006	72.1	27.8	0.4	<0.006	3.5	36.8	78.9	0.5	8.1	<0.025	14.4	509.0
WGK12	<0.006	64.8	11.2	1.7	8.5	3.1	30.0	21.2	0.2	7.6	<0.025	1.0	337.0

<u>Groundwater yields</u>

Although relatively low yields occur in this shallow aquifer, it is developed widely throughout most of the project area and has been the sole reliable source of water supply to most of the farms in the area. Yields of up to 2 liters per second occur in this aquifer with a shallow water table and spring formation common, especially in the lower-lying topography. It is expected that the deeper aquifer yield may be as high as 40 liters per second. Contrary to general beliefs, the dolomite in the mining area is not a significant aquifer and yields of no more than 2 to 4 liters per second have been recorded. The dolomite is however considered to have good storage properties for groundwater (Groundwater Complete, January 2016)

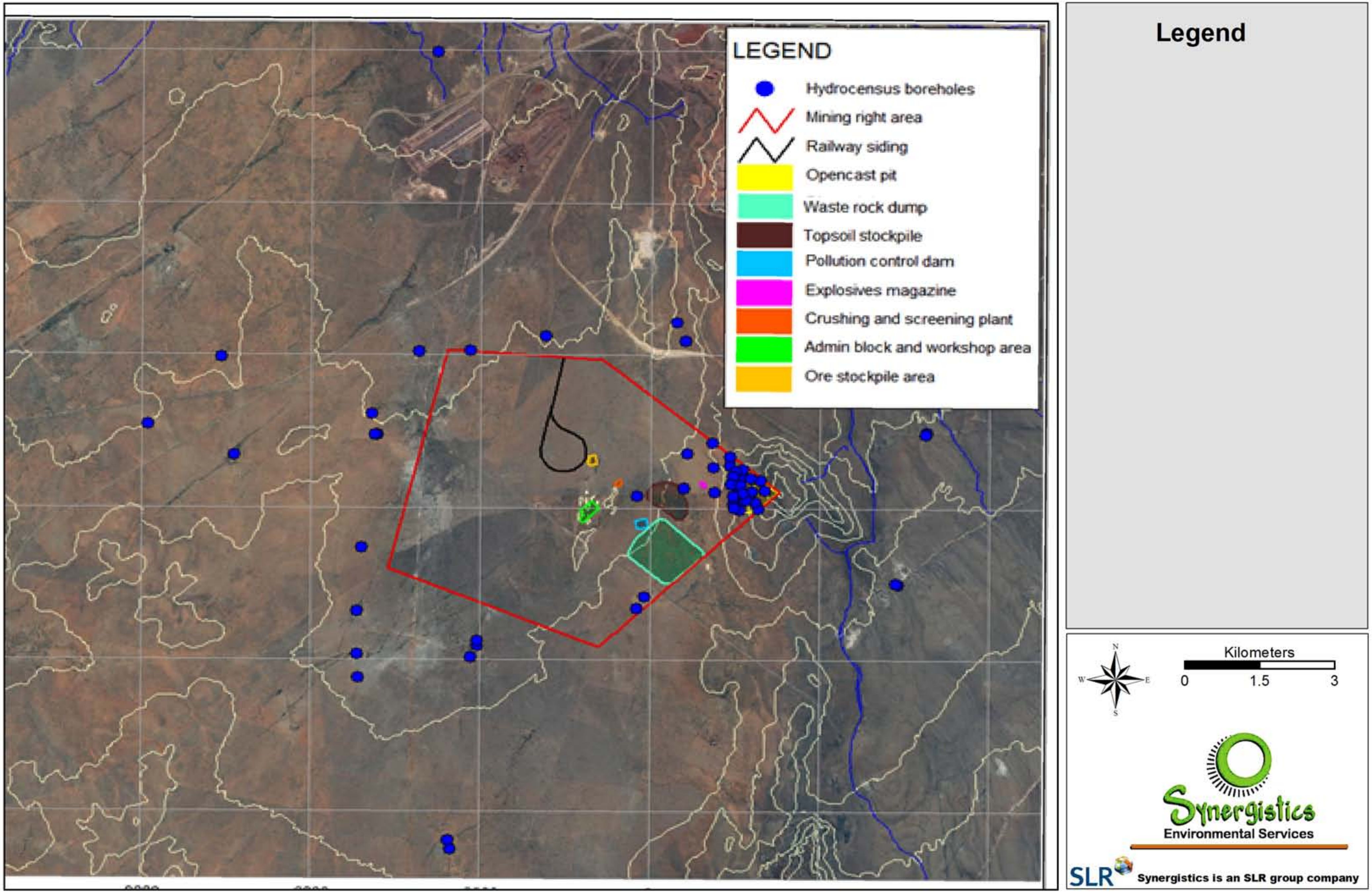


Figure 20: Hydrocensus (Groundwater Complete, January 2016)

755.03048.00001	Coordinate System DMS	
	Spheroid WGS84	Central Meridian LO

CONCLUSION

The nature of the proposed infrastructure and activities are such that they present potential for pollution of groundwater resources and the lowering of groundwater levels. The proposed project must be implemented/ managed in a way that pollution and reduction of groundwater resources is prevented.

7.4.1.9 Air quality

INTRODUCTION AND LINK TO IMPACT

Existing sources of emissions in the region and the characterisation of existing ambient pollution concentrations is fundamental to the assessment of cumulative air impacts. A change in ambient air quality can result in a range of impacts which in turn may cause a disturbance and/or health impacts to nearby receptors. To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCES

Information in this section was sourced from the air quality specialist study undertaken by Airshed Planning Professionals (Airshed, February 2016) for the proposed project and included in Appendix L. Further detail on the data collected during the study and the methodologies used can be found in the specialist report.

RESULTS

Ambient air quality within the region

There are several mining operations around the Jenkins farm which presently contribute to levels of atmospheric pollution. Given the arid nature of the area in combination with existing mining operations, current levels of particulate matter (PM) in the atmosphere are expected to be elevated. Existing land-uses such as mining and agriculture contribute to baseline pollutant concentrations via the following sources:

- Mining sources: Particulates represent the main pollutant of concern at mining operations. The amount of dust emitted by these activities depends on the physical characteristics of the material, the way in which the material is handled and the weather conditions.
- Unpaved and paved roads: Emissions from unpaved roads constitute a major source of emissions to the atmosphere in the South African context. Dust emissions from unpaved roads vary in relation to the vehicle traffic and the silt loading on the roads. Emission from paved roads are significantly less than those originating from unpaved roads, however they do contribute to the particulate load of the atmosphere. Particulate emissions occur whenever vehicles travel over a paved surface. The fugitive dust emissions are due to the re-suspension of loose material on the road surface.
- Wind erosion and open areas: Windblown dust generates from natural and anthropogenic sources. Erodible surfaces may occur as a result of agriculture and/or grazing activities.

- Vehicle tailpipe emissions: Emissions resulting from motor vehicles can be grouped into primary and secondary pollutants. While primary pollutants are emitted directly into the atmosphere, secondary pollutants form in the atmosphere as a result of chemical reactions. Significant primary pollutants emitted combustion engines include carbon dioxide (CO_2), carbon (C), sulphur dioxide (SO_2), oxides of nitrogen (mainly NO), particulates and lead. Secondary pollutants include NO_2, photochemical oxidants such as ozone, sulphur acid, sulphates, nitric acid, and nitrate aerosols (particulate matter). Transport in the vicinity of the proposed project area is via trucks and private vehicles along the R325 (public) road, which are the main sources of vehicle tailpipe emissions.

<u>Potential air receptors</u>

Potential air receptors surrounding the proposed project area have been illustrated in Figure 22). Although a total of ten air quality receptors have been identified, it should however be noted that those most likely to be impacted by the proposed project are limited to the following:

- the farmhouse and offices approximately 400 m south of the WRD (indicated as no. 1 in Figure 22)
- the farmstead approximately 900 south-west of the product stockpile (indicated as no. 2 in Figure 22)
- railway housing at Mookaneng approximately 1 km north-east of the pit edge (indicated as no. 4 in Figure 22)

CONCLUSION

The proposed project area is situated within a region that is surrounded by activities and infrastructure that contribute towards sources of emissions such as dust fallout and PM10. The proposed project will present additional sources of pollutants that may influence existing pollutant concentrations. The proposed activities should therefore be carefully designed and managed to ensure that contributions from the proposed project remain within acceptable limits.

7.4.1.10 Noise

INTRODUCTION AND LINK TO IMPACT

Certain noise generating activities associated with the proposed project infrastructure/activities could cause an increase in ambient noise levels in and around the proposed project area. This may cause a disturbance to nearby receptors. To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCE

Information in this section was sourced from the noise investigation undertaken by Airshed Planning Professionals (Airshed, February 2016) and included in Appendix M.

Data provided in this section was sourced through the review of available literature including on-site observations. Further to this, day-time and night-time ambient noise levels for the proposed project area were obtained through an on-site noise sampling survey that was undertaken in accordance with the International Finance Corporation (IFC) General Environmental Health and Safety Guidelines and the South African National Standards (SANS) 10103 of 2008 (Airshed, February 2016).

RESULTS

For estimating an overall increase in ambient noise levels as a result of the project, the following representative background noise levels were calculated from survey results:

- LReq,d (The L_{Aeq} rated for impulsive sound and tonality in accordance with SANS 10103 for the day-time period, i.e. from 06:00 to 22:00) – 56.8 dBA;
- LReq,n (The L_{Aeq} rated for impulsive sound and tonality in accordance with SANS 10103 for the night-time period, i.e. from 22:00 to 06:00) – 46.4 dBA; and
- LR,dn (The L_{Aeq} rated for impulsive sound and tonality in accordance with SANS 10103 for the period of a day and night, i.e. 24 hours, and wherein the $L_{Req,n}$ has been weighted with 10dB in order to account for the additional disturbance caused by noise during the night) – 56.7 dBA.

The sampling results are provided in Table 26 below (Airshed, February 2016).

TABLE 26: SUMMARY OF THE NOISE SURVEY CONDUCTED BY SLR (ON BEHALF OF AIRSHED) FROM 30 JUNE TO 2 JULY 2015

	S1		S2		S3		S4	
Latitude	S 27°54'55.9"		S 27°54'33.6"		S 27°56'22.33"		S 27°55'50.6	
Longitude	E 22°59'28.2"		E 22°57'49.5"		E 23°0'7.16"E		E 23°00'13.5"	
Time of Day	Day	Night	Day	Night	Day	Night	Day	Night
Start Date and Time	1-Jul-15 12:52:00	1-Jul-15 22:29:00	1-Jul-15 14:33:00	2-Jul-15 02:05:00	30-Jun-15 11:28:00	2-Jul-15 00:52:00	1-Jul-15 11:15:00	1-Jul-15 23:154200
Duration	01:00:00	01:00:00	01:00:00	01:00:00	01:00:00	01:00:00	01:00:00	01:00:00
Weather Conditions	Clear sunny day with southerly winds, wind speed up to 4.4 m/s.	Clear, wind still conditions.	Clear sunny day with southerly winds up to 1 m/s.	Clear, southerly winds up to 0.1 m/s.	Clear sunny day with southerly winds up to 2 m/s.	Clear night with wind speed up to 2 m/s	Clear sunny day with southerly winds up to 2 m/s.	Clear, wind still conditions
Acoustic Observations	Birds, insects and wind constantly audible. Traffic on R325	Traffic in R325. Insects.	Goats, chickens, birds, insects and rustling wind. R325 traffic.	Insects, distant mining/industrial noise. Distant traffic.	Traffic along R325, birds, trucks, rustling vegetation, children playing, adults in conversation.	Intermittent traffic along R325, insects and wind rustling grass.	Birds, insects and rustling leaves. Traffic on R325 audible at times.	Traffic on R325 audible at times.
L_{AFmin} (dBA)	25.6	25.3	29.4	25.6	29.1	24.8	24.5	26.5
L_{AFmax} (dBA)	56.1	53.0	65.5	69.3	77.2	70.7	52.6	51.9
L_{Aeq} (dBA) Comparable to IFC Noise Level Guidelines	35.7	37.0	47.6	51.6	62.7	43.6	32.8	36.7

Noise monitoring results suggest that ambient noise levels are greatly affected by traffic on the R325 and natural noise sources such as birds and insects. Noise from the R325 is expected to mask mining noise to a large extent. During very quiet conditions the distant low frequency noise of mining/industrial activities is audible. Sampled noise levels above vary between what SANS 10103 states is typically found in rural or suburban areas. Insect noise at night often results in night-time noise levels that are slightly higher than during the day.

Potential noise receptors

Potential noise receptors surrounding the proposed project area have been illustrated in Figure 23. Although a total of ten noise receptors have been identified, it should however be noted that those most likely to be impacted by the proposed project are limited to the following:

- the farmhouse and offices approximately 400 m south of the WRD (indicated as no. 1 in Figure 23)
- the farmstead approximately 900 south-west of the product stockpile (indicated as no. 2 in Figure 23)
- railway housing at Mookaneng approximately 1 km north-east of the pit edge (indicated as no. 4 in Figure 23)

CONCLUSION

The proposed project has the potential to increase disturbing noise levels within and surrounding the project area. It is however important to note that the mining activities associated with surrounding mines including traffic along the R325 already generate noise. Careful planning is required for the proposed project in order to minimise increasing disturbing noise levels.

7.4.1.11 Visual aspects

INTRODUCTION AND LINK

Project-related activities have the potential to alter the landscape character of the site and surrounding area through the establishment of both temporary and permanent infrastructure. To understand the basis of these potential impacts, a baseline situational analysis is described below.

DATA SOURCE

Information in this section was sourced from on-site observations and through the review of satellite imagery.

RESULTS

Landscape character

The proposed project area lies in a flat, open area characterised by semi-arid vegetation and ephemeral drainage lines. Isolated rocky ridges do occur. Livestock and game farms and associated isolated farmsteads are typical of the region. To the south, north and south east of the proposed project site the landscape is characterised by scattered operational and closed mining operations and supportive infrastructure such as rail and road networks and powerlines (Figure 23).

Scenic quality

The scenic quality of the proposed project site and surrounding area is linked to the type of landscapes that occur within an area. In this regard, scenic quality can range from high to low as follows:

- High – these include the natural features such as ridges and drainage systems;
- Moderate – these include agricultural activities, farmsteads, and recreational areas; and
- Low – these include towns, communities, roads, railway line, industries and existing mines.

Although numerous mining related structures dominate the landscape in the vicinity of the proposed project area and the R325 traverses the proposed project mining right area, the overall scene is characterised by open views of the bushveld. The result is a landscape with a moderate scenic quality.

Sensitivity of Visual Resource

It follows that the highest value visual resource described above is also the most sensitive to changes. In contrast, areas that are not considered to have a high scenic value, are expected to be the least sensitive to change such as the mining and infrastructure areas.

Sense of place

The sense of place results from the combined influence of landscape diversity and distinctive features. The primary informant of these qualities is the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historic use and habitation of the area. The proposed site is located within a "mining belt". The mining activity, and the infrastructure that supports these mines, dominates the agricultural type landscape characteristics of the area. The fact that the proposed project will take place within the context of these existing mining activities, gives the immediate study area a relatively weak sense of place (when the viewer is within the mining belt). However, seen in context with the site surrounded by large open spaces of arid vegetation the harsh nature of the mining activities is "softened". When the viewer views the area from outside the "mining belt", the larger area has a stronger sense of place.

Visual receptors

When viewed from the perspective of people and residences within the area, mining activities could be associated with a sense of disenchantment. People who benefit from the proposed project (employees, contractors, service providers etc.) may not experience this disenchantment but rather see the mine with a sense of excitement and anticipation.

It follows that the sensitive viewers are a combination of landowners/land users on surrounding farms.

CONCLUSION

The project will be developed in an area where mining and related activities currently take place. The related quality of the visual resource ranges between high (for natural areas) and low (man-made intrusions). Visual impacts will require consideration, particularly as part of closure planning. .

7.4.1.12 Traffic

INTRODUCTION AND LINK

Traffic from mining developments has the potential to affect the capacity of existing road networks as well as result in noise, air quality and public road safety issues. This section provides an overview of the current road network, conditions and road use. Understanding the layout, use and conditions of transport systems relevant to the proposed project site provides a basis for understanding a change as a result of project contributions.

DATA COLLECTION

Information was sourced from the traffic specialist study (TTT Africa, January 2016) included in Appendix N. Further detail on the data collected during the study and the methodologies used can be found in the specialist report.

The study comprised sourcing relevant data from a site inspection of the existing road network, consultations with the roads authorities, traffic counts, calculations and reference to relevant traffic impact assessment guideline documents. Further detail is provided in the traffic study.

RESULTS

The proposed project area is located approximately 24km south of the town Kathu. The proposed mining right application area is bisected by the R325, however all mining activities will be limited to the north of the R325. The R325 (via which access to the Jenkins mine will be obtained) then joins the N14 at the north western boundary of the proposed mining rights area. The two-lane R325 road has recently been upgraded by the Province with paved shoulders.

Table 27 below shows the projected 2016 background traffic volumes passing through Jenkins farm on the R325 route. There are approximately 323 two-way vehicles during the morning peak hour (between 06h00 and 07h00) and 493 two-way vehicles during the afternoon peak hour (between 15h45 and 16h45). The highest 12 hour volume was 3 629 two-way vehicles.

TABLE 27: TRAFFIC COUNTS ALONG THE R325 (AT THE JENKINS MINE ACCESS ROAD)

Peak Hour	Time		Traffic Volumes Per Direction		
			To North	To South	Two-way
AM Peak	05:45	06:45	216	107	323
Off Peak	13:00	14:00	201	128	329
PM Peak	15:45	16:45	304	189	493
12 Hour			2 213	1 416	3 629
ADT (Estimated)			2 679	1 714	4 393

CONCLUSION

Traffic along the R325 in the vicinity of the proposed project area is free-flow and access will be stop-controlled on the Jenkins mine access road. The two-lane R325 road has recently been upgraded by the Province with paved shoulders and the current levels of service are considered to be very good. Any changes to the road network or designs of traffic management measures will need consider both road capacity and safety-related issues.

7.4.1.13 Heritage/cultural and palaeontological resources

INTRODUCTION AND LINK

This section describes the existing status of the heritage and cultural environment that may be affected by the proposed project. Heritage (and cultural) resources include all human-made phenomena and intangible products that are the result of the human mind. Natural, technological or industrial features may also be part of heritage resources as places that have made an outstanding contribution to the cultures, traditions and lifestyles of the people or groups of people of South Africa.

Paleontological resources are fossils, the remains or traces of prehistoric life preserved in the geological (rock stratigraphic) record. They range from the well-known and well publicized (such as dinosaur and mammoth bones) to the more obscure but nevertheless scientifically important fossils (such as palaeobotanical remains, trace fossils, and microfossils). Paleontological resources include the casts or impressions of ancient animals and plants, their trace remains (for example, burrows and trackways), microfossils (for example, fossil pollen, ostracodes, and diatoms), and unmineralised remains (for example, bones of Ice Age mammals).

DATA SOURCE

Information was sourced from the heritage/cultural/palaeontological specialist studies (PGS, February 2016) included in Appendix O. Further detail on the data collected during the studies and the methodologies used can be found in the specialist reports.

As part of the heritage/cultural and palaeontological study information was sourced from the review of available literature and through on-site observations.

RESULTS

A number of heritage resources were identified within the proposed project area as indicated in Table 28. The location of the heritage sites within the proposed project area are illustrated in Figure 21. The significance of each site as per the SAHRA classification standards is also provided in Table 28.

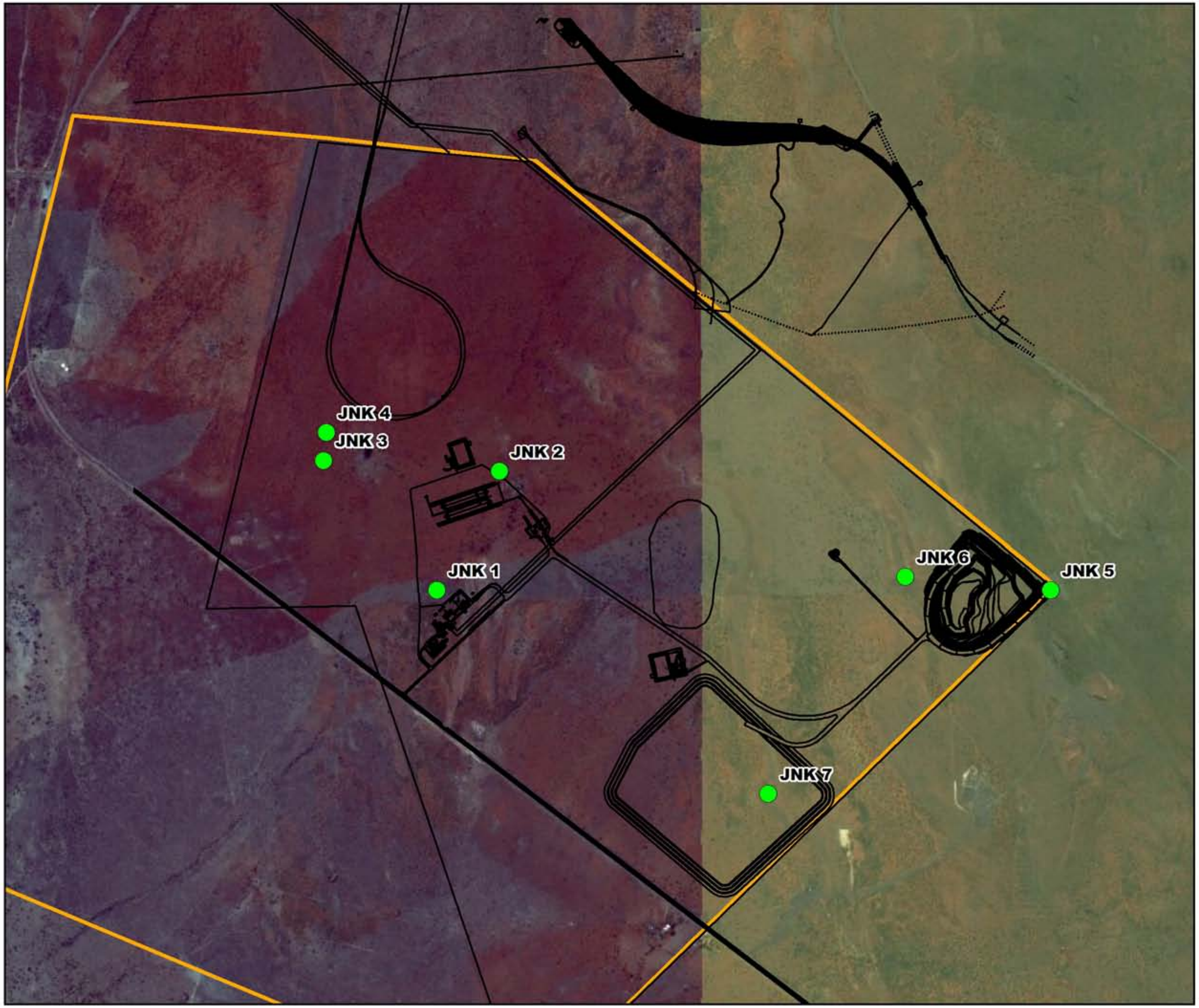
TABLE 28: HERITAGE RESOURCES LOCATED WITHIN THE PROPOSED PROJECT AREA

Site identification	Description	Significance
JNK 1	Surface scatter of MSA and LSA lithics	Medium
JNK 2	Historic farmstead older than 60 years and associated low density midden	Medium
JNK 3	MSA/LSA lithics around a pan	Medium
JNK 4	Rectangular stone structure, possible grave	Medium-High
JNK 5	Low density surface scatter of MSA lithics	Medium
JNK 6	Rock shelter with rock art and low density surface scatter LSA lithics	High
JNK 7	Five crescent-shaped stone structures	Medium-High

The Vaalian aged Gamagara and Ongeluk Formations underlying the project area are allocated a moderate palaeontological sensitivity whilst a high sensitivity rating for palaeontological heritage is allocated to the area of the farm underlain by surface limestone. Mining activity in this area is however restricted to surface infrastructure and no significant fossil finds are expected.

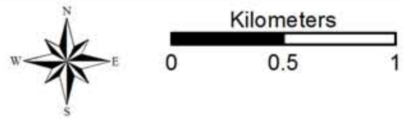
CONCLUSION

Numerous middle and late stone age resources were identified within the proposed project area which are important to the history of South Africa and are protected by national legislation and require permits from the SAHRA prior to disturbance. A possible grave was also identified.



Legend

- Heritage Sites
- Jenkins 562



Synergistics Environmental Services

SLR Synergistics is an SLR group company

Figure 21: Heritage Sites Located within the Proposed Project Area (PSG, February 2016)	755.03048.00001	Coordinate System DMS	
		Spheroid WGS84	Central Meridian LO

7.4.1.14 Socio-economic

INTRODUCTION AND LINK

The proposed project has the potential to result in both positive and negative socio-economic impacts. The positive impacts are usually economic in nature with mines contributing directly towards employment, procurement, skills development and taxes on a local, regional and national scale. In addition, mines indirectly contribute to economic growth in the national, local and regional economies by strengthening the national economy and because the increase in the number of income earning people has a multiplying effect on the trade of other goods and services in other sectors.

The negative impacts can be both social and economic in nature. In this regard, mines can cause:

- Influx of people seeking job opportunities which can lead to increased pressure on basic infrastructure and services (housing, health, sanitation and education), informal settlement development, increased crime, introduction of diseases and disruption to the existing social structures within communities
- A change to not only pre-existing land uses, but also the associated social structure and meaning associated with these land uses and way of life. This is particularly relevant in the closure phase when the economic support provided by mines ends, the natural resources that were available to the pre-mining society are reduced, and the social structure that has been transformed to deal with the threats and opportunities associated with mining finds it difficult to readapt

DATA SOURCE

Socio-economic profile data was sourced from the ZF Mgcawu District Municipality (previously known as the Siyanda District Municipality) and the Tsantsabane Local Municipality Integrated Development Plans.

RESULTS

Population

The Northern Cape Province has a population number of 1 145 861. The ZK Mgcawu District Municipality has a population number of 236 783 while the Tsantsabane Local Municipality has a total population of 35 093 people. The Project area had an estimated population of 63 243 or 17 931 households in 2013. The population growth is averaged at 1.4% per annum (Demacon, 2013).

Dwellings

The most dominant type of dwelling utilized within the area is a formally constructed house or brick structure. This comprises 76% of dwelling typies in the Northern Cape Province, 79.4% within the ZF Mgcawu District Municipality and 73% within the Tsantsabane Local Municipality. Traditional dwellings (e.g. huts/ structures made of traditional material) are the second highest used dwelling type with a percentage of 25% in the Tsantsabane Local Municipality.

The population profile of the Northern Cape Province demonstrates a slightly higher household size of 4 people per household in comparison to that of the ZF Mgcawu District Municipality and the Tsantsabane Local Municipality which average at approximately 3.5 people per household. These results are relatively typical of rural or semi-rural developing communities established for and servicing surrounding mines. See Table 29 below for more information.

TABLE 29: SOCIO ECONOMIC PROFILE - POPULATION

Category	**Northern Cape Province**	**ZF Mgcawu District Municipality**	**Tsantsabane Municipality**
Number of households	301 405	61 097	9 839
Average number of people per household	4	3.5	3.5

<u>Basic services</u>

In general, despite the relatively formalised housing infrastructure, basic services infrastructure appears to be far less formalised. According to the Tsantsabane Local Municipality Fact Sheet (2011 census), the majority of the Northern Cape Province have access to flush toilets. The percentages of flush toilet connected to sewage lines is 63.90% and 66.70% in ZF Mgcawu District Municipality and Tsantsabane Local Municipality respectively. Although there has been an improvement in sanitation and sewage provision in comparison to 2001, 8.1% of households are still using the bucket toilet system.

Similarly, while in general the Northern Cape Province has access to piped water inside dwellings and yards, a large percentage of households still rely on piped water to community stands at varying distances from their dwellings in both the ZF Mgcawu District Municipality and Tsantsabane Municipality. A total of 64% of the households in the Northern Cape Province have their waste removed by the local municipality or a private company once a week. Although this depicts that basic services are not provided to the whole province, with 36% of the province not receiving refuse removal service, the occurrence of refuse removal by the ZF Mgcawu District Municipality and Tsantsabane Local Municipality constitutes 57.40% and 70.30% of households respectively.

The provision of electricity for lighting is relatively good with 86.6% and 83.50% for ZF Mgcawu District Municipality and Tsantsabane Local Municipality respectively.

In general, the Jenkins project area is well formalised in terms of basic services. This may be attributed to the area being more urbanised having been developed and supported by surrounding mines in recent years.

The above results are summarised in Table 30, Table 31 and Table 32 below.

TABLE 30:SOCIO-ECONOMIC PROFILE – TOILET FACILITIES

Category	Northern Cape Province (%)	Tsatsabane Local Municipality (%)
None	8%	13.2
Flush toilet (connected to sewerage system)	60%	73.7
Flush toilet (with septic tank)	6%	1.7%
Chemical toilet	1%	0.9%
Pit toilet with ventilation (VIP)	9%	2.5%
Pit toilet without ventilation	11%	1.5%
Bucket toilet	4%	5.1%
Other	2%	1.1%

TABLE 31: SOCIO-ECONOMIC PROFILE– POTABLE WATER ACCESS

Category	Northern Cape Province	ZF Mgcawu District Municipality
Piped (tap) water inside dwelling/institution/yard	78%	86.2%
Piped (tap) water on community stand	27%	9.5%
No access to piped (tap) water	3%	4%

TABLE 32: SOCIO-ECONOMIC PROFILE – REFUSE REMOVAL

Category	Northern Cape Province	Tsantsabane Local Municipality
Removed by local authority/private company at least once a week	64%	64.5%
Removed by local authority/private company less often	2%	1%
Communal refuse dump	2%	5.7%
Own refuse dump	25%	20.7%
No rubbish disposal	5%	6.6%
Other	2%	1%
Unspecified	0%	0.3%

Education

In general, statistics throughout the identified municipal areas indicate poor educational profiles. With reference to Table 33 below, significant numbers of the population have received no schooling (13.5% of Tsantsabane Local Municipality and 8% of the Northern Cape Province) or only limited primary education (35% of ZF Mgcawu, 5.2% of Tsantsabane Local Munivipality, 33% of Northern Cape Province). The average number across the regions profiled of people completing high school education were relatively consistent (on average 25%) however there is greater disparity when considering Grade 12 education, further education and training and tertiary education.

TABLE 33: SOCIO-ECONOMIC PROFILE – EDUCATION

Category	Northern Cape Province	Tsantsabane Local Municipality
No Schooling	8%	13%

Category	Northern Cape Province	Tsantsabane Local Municipality
Primary School	33%	5%
High School	34%	34.8%
Grade 12 / Std 10 / Form 5	14%	25%
Tertiary Education	4%	6.3%
Not applicable	2%	2%
Other	0%	0%

Economic profile

The majority of the population within the Northern Cape, ZF Mgcawu District Municipality and Tsantsabane Local Municipality are not economically active. Table 34 below provides an indication of the job scarcity of the area. The low level of unemployment can be ascribed to the rural nature of the study area,

TABLE 34: SOCIO-ECONOMIC PROFILE – EMPLOYMENT

Category	Northern Cape Province	Tsantsabane Local Municipality
Employed	25%	45.3%
Unemployed	9%	16%
Discouraged work-seeker	3%	1.8%
Other not economically active	27%	36.9%
Not applicable	36%	-

CONCLUSION

In general mining activities have the potential to influence socio-economic conditions both positively and negatively. In terms of the proposed project, positive socio-economic influences include contributions in various ways to the local and regional economies while negative socio-economic influences include inward migration of people with the resultant pressure on basic infrastructure and services, informal settlement development, increased crime, introduction of diseases and disruption to the existing social structures within established communities.

7.4.2 CURRENT LAND USES

INTRODUCTION AND LINK

Mining activities have the potential to affect land uses both within the project area and in the surrounding areas. This can be caused by physical land transformation and through direct or secondary impacts. The key related potential environmental impacts are: loss of soil, loss of biodiversity, pollution of water, dewatering, air pollution, noise pollution, damage from blasting, visual impacts and the influx of job seekers with related social ills. To understand the basis of the potential land use impacts, a baseline situational analysis is described below.

DATA SOURCE

Information provided in this section was sourced by SLR as part of the proposed project. Mining right and land ownership details were sourced from Coza and a deed search undertaken by SLR as part of the proposed project. On-site and surrounding land use data was sourced from site observations, and the review of topographical maps and satellite imagery.

RESULTS – MINERAL AND PROSPECTING RIGHTS

Coza currently holds a prospecting right (30/5/1/1/2/311PR) over the farm Jenkins 562. According to information provided to SLR by the Coza project team there are no other mineral right holders within the project area.

RESULTS - EXISTING ENVIRONMENTAL AUTHORISATIONS IN TERMS OF NEMA

According to information provided to SLR by the Coza project team there are no environmental authorisation in terms of NEMA within the project area.

RESULTS - LAND OWNERS WITHIN THE PROPOSED PROJECT AREA

The surface right owners and corresponding title deeds numbers of the land in and adjacent to the proposed project area is listed in Table 35 and Table 36 respectively.

TABLE 35: LANDOWNERS LOCATED WITHIN THE PROPOSED MINING RIGHTS APPLICATION AREA (PORTION BOUNDARIES INDICATED IN FIGURE 2)

Relevant farms	Relevant portion	Title deed number	Landowner
Jenkins 562	0 (Remaining Extent)	T2101/2015	Coza Mining (Pty) Ltd
	1	T2006/2012	Sishen Iron Ore Company (Pty) Ltd (SIOC)
	2	T118/1994	Nicolaas Johannes Steyn
	3	T1588/2005	Leon Marius Venter

* It should be noted that although the above four farm portions have all been applied for as part of the mining rights area, mining and related activities and infrastructure will be limited only to Portion 1 and Portion 0 (Remaining Extent)

TABLE 36: LANDOWNERS ADJACENT TO THE PROPOSED PROJECT AREA

Relevant farms	Relevant portion	Title deed number	Landowner
King 561	Portion 4	No Results Found	No Results Found
	Remaining extent	T349/1954	Assmang Ltd
Mokaning 560	Portion 1	T572/1968	Assmang Pty Ltd
	Remaining extent	T2101/2015	Sishen Iron Ore Company Pty Ltd
Parson 564	Remaining extent	T193/2006	Assmang Ltd
Gappepin Reserve 670	Remaining extent	T2323/2012	Danelle Familie Trust
Macarthy 559	Portion 2	T2803/1996	Swanepoel Hendrik Johan Smith

Relevant farms	Relevant portion	Title deed number	Landowner
	Portion 3	T182/2004	Kotze Coenraad Hendrik
	Portion 5	T2803/1996	Swanepoel Hendrik Johan Smith
	Remaining extent	T349/1954	Assmang Ltd
Roscoe 563	Portion 3	No Results found	No Results found
	Remaining extent	T343/2003	Erich Olivier Trust
Bishop 671	Portion 4	T3340/1999	Kameeldoorn 99 Boerdery Cc

RESULTS - LAND CLAIMS

According to the Department of Rural Development and Land Reform: Regional Land Claim Commissioner; no land claims have been lodged within the proposed mining right application area (see Appendix E).

RESULTS – LAND USE WITHIN THE PROPOSED MINING RIGHT APPLICATION AREA

Land users within the mining right application area include the following:

- Mr Dercksen who has a farmhouse on Portion of Portion 2 of Farm Jenkins called Vlakwater. Mr Dercksen currently undertakes farming of livestock and small scale cultivation of lucern for livestock feeding;
- Coza Mining's Farmhouse: this farmhouse is currently used for offices and accommodation of Coza mining staff. There are some subsistence agricultural activities being undertaken on the farm; and

Land uses within the proposed project area include agricultural activities such as livestock and game grazing as well as small scale lucern farming for livestock feed (located on portion 2 of Jenkins 562). In addition, the R325 connecting Sishen to Posmasburg is also a notable land use feature within the project area.

<u>Road infrastructure</u>

The tarred R325 (refer to Figure 23), that runs between the towns Sishen and Postmasburg traverses the proposed project area. It should however be noted that all proposed mining activities and related infrastructure will be located north of the road (i.e on portion 0 Remaining Extent and Portion 1)

<u>Telkom line infrastructure</u>

<u>It is not expected that any Telkom infrastructure will be affected by the proposed project.</u>

<u>Ad-hoc game and livestock grazing</u>

The majority of the farm Jenkins 562 is used for ad-hoc game and livestock grazing. With the exception of the area of disturbance (i.e portion 0 Remaining Extent and Portion 1 of Jenkins), it is expected that land uses on the remainder of the farm Jenkins will continue.

RESULTS – LAND USE SURROUNDING THE PROPOSED PROJECT AREA

Land use surrounding the proposed project area includes mining activities and infrastructure associated with active and dormant mines, road and rail networks, powerlines, and isolated farmsteads. This is discussed in more details below.

Neighbouring mines

Mining companies with existing and/or proposed operations located within the proposed project area include the Sishen Mine located approximately 3 km north of the Jenkins project area and the PMG Mine located approximately 5 km south of the project area. Immediately south of the project area is closed/dormant.

Isolated farmsteads

With reference to Figure 23 the nearest residential areas include the following:

- The farmhouse and offices approximately 400 m south of the WRD (indicated as no. 1 in Figure 23) (inside the mining right application area).
- The farmstead approximately 900 south-west of the product stockpile (indicated as no. 2 in Figure 23) (inside the mining right application area).
- Railway housing at Mookaneng approximately 1 km north-east of the pit edge (indicated as no. 4 in Figure 23) (outside the mining right application area).

No informal settlements or formal communities/villages are located in proximity to the proposed project area.

Regional powerline infrastructure

It is not expected that any regional powerline infrastructure will be affected by the proposed project.

Regional railway infrastructure

East of Farm Jenkins is the Transnet railway line that links other existing mines to Sishen Mine and ultimately to the Sishen Saldanha export line.

Local Road Network

A network of roads surrounding the proposed project area (refer to Figure 22 and Figure 23) include:

- The tarred R325 between Kathu and Postmas burg which bisects the project area and between
- The N14 between Kathu and Upington
- The R385 between Olifantshoek and Postmasburg
- Various un-tarred farm access roads

CONCLUSION

There are a number of land uses which may be influenced by the proposed project and associated potential environmental impacts. It should however be noted that areas within and surrounding the proposed project site have already been influenced to varying degrees through mining and related infrastructure, road networks, powerlines, Telkom lines, railway networks and grazing activities.

7.4.3 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE

The environmental features in the project area are described in Section 7.4.1 above, however the notable environmental features are the two ephemeral drainage lines within the project area as well as the depression wetlands and rocky ridges. Infrastructure within and close to the project area is discussed in Section 7.4.2 above. The notable infrastructure within the proposed project area is the R325 that traverses the proposed project site.

7.4.4 ENVIRONMENT AND CURRENT LAND USE MAP

A conceptual map showing topographical information as well as land uses on and immediately surrounding the proposed project area is provided in Figure 22 and Figure 23.

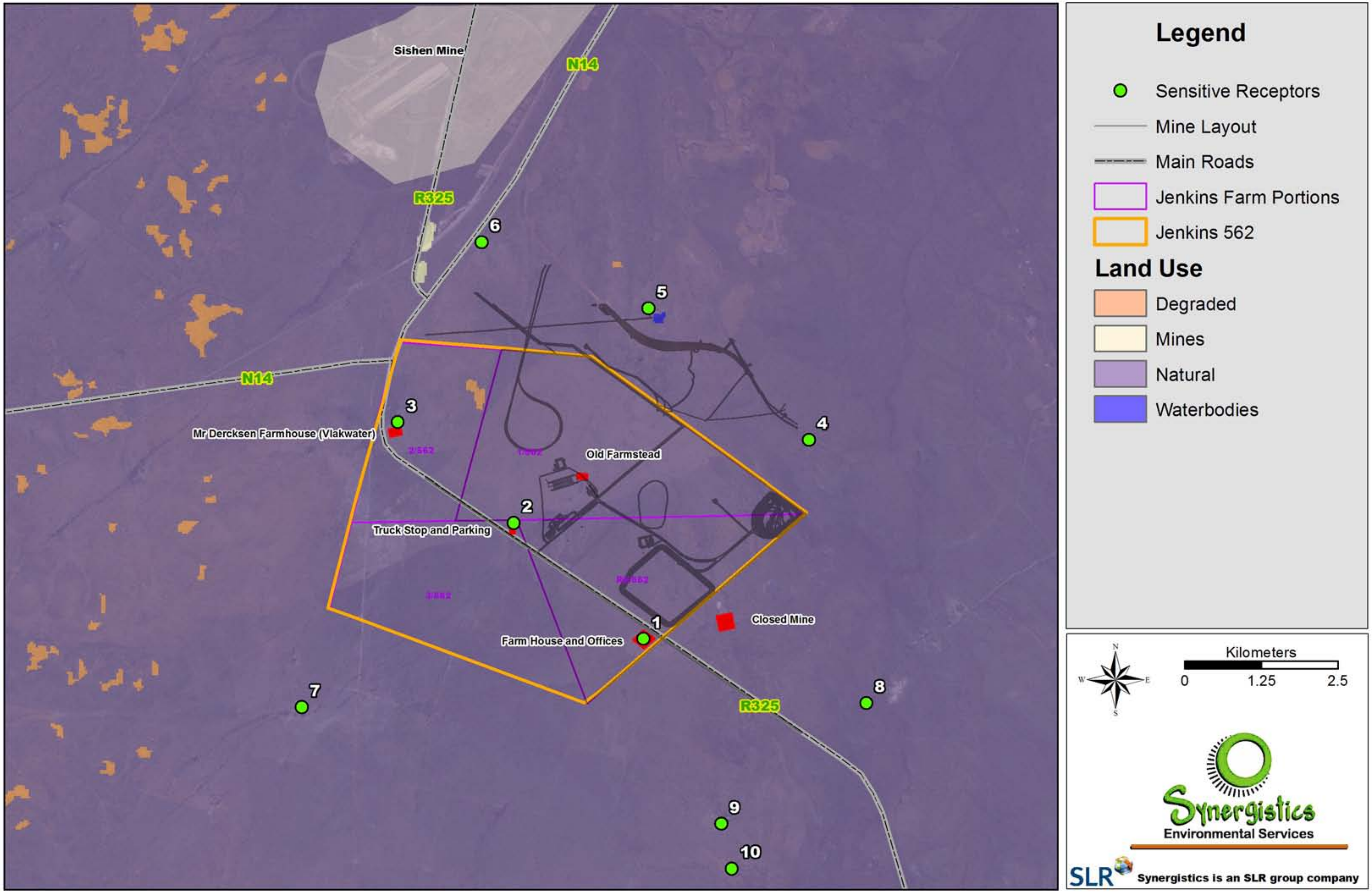


Figure 23: Local Land Use Map

755.03048.00001

Coordinate System DMS	
Spheroid WGS84	Central Meridian LO

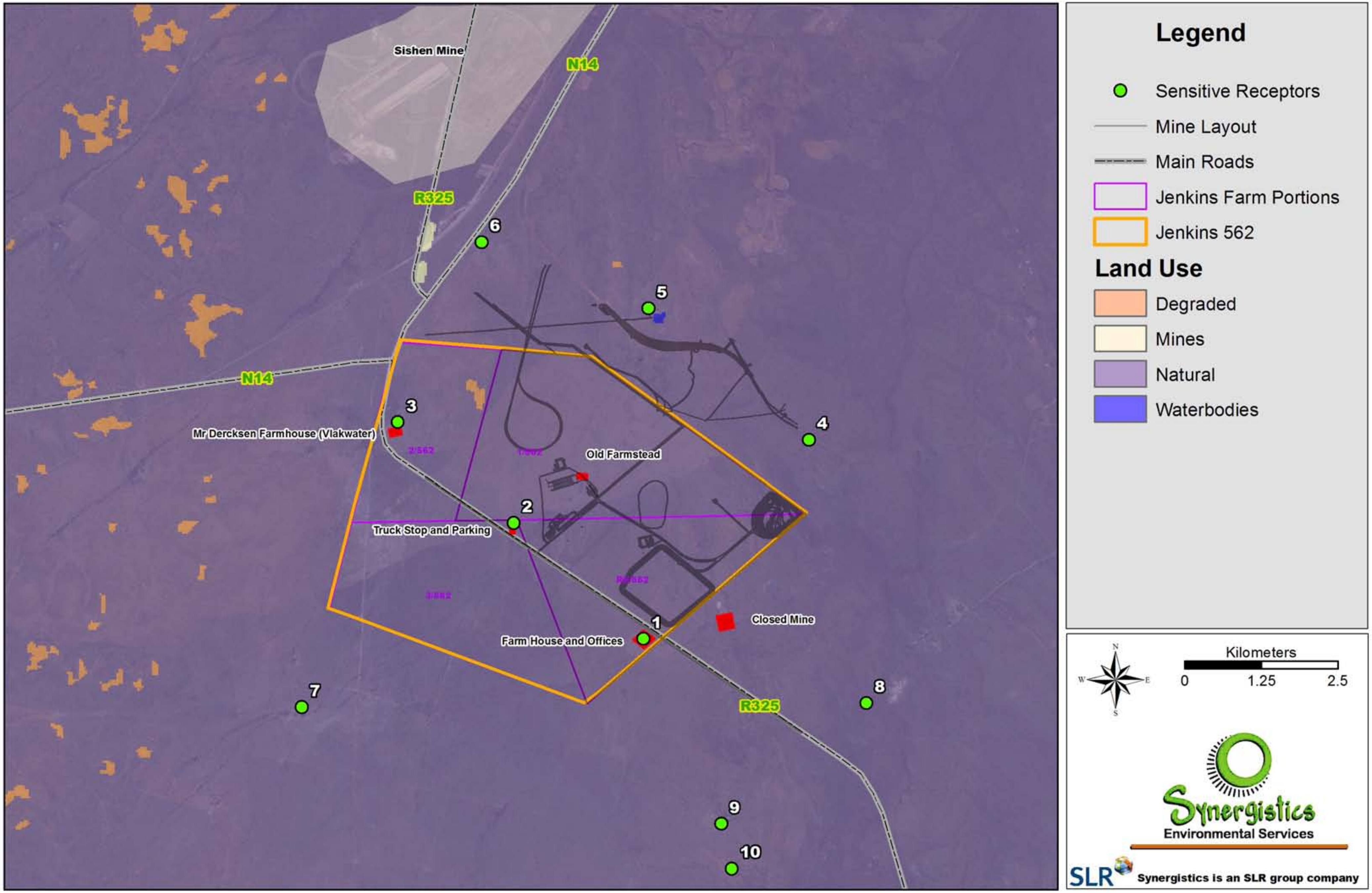


Figure 23: Local Land Use Map	755.03048.00001	Coordinate System DMS	
		Spheroid WGS84	Central Meridian LO

7.5 ENVIRONMENTAL IMPACTS AND RISKS OF THE ALTERNATIVES

This section provides a list of potential impacts on environmental and socio-economic aspects that have been identified in respect of each of the main project actions / activities and processes for each of the project phases (Table 3) in terms of the **project alternatives**. A discussion of the negative and positive impacts of the project alternatives is provided in Section 7.7. The ratings for consequence, probability and significance of each of the impacts in the **unmitigated scenario** (which assumes that no consideration is given to the prevention or reduction of environmental and social impacts) are also provided in the table below in accordance with the new DMR report template.

TABLE 37: LIST OF IMPACTS IDENTIFIED FOR THE PROPOSED PROJECT INCLUDING ALTERNATIVES

The assessment ratings provided in this table are for the unmitigated scenario only which assumes that no consideration is given to the prevention or reduction of environmental and social impacts.

Potential impact	**Alternative**	**Project phases**	**Consequence**			**Probability**	**Significance**	**Degree to which impact**		
			Severity	**Duration**	**Spatial scale**			**Can be reversed**	**Causes irreplaceable loss of resources**	**Can be avoided/ Managed/ Mitigated**
Site preparation										
Hazardous excavations and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			H	H	M	H	M	Fully	Unlikely	
Negative visual impacts			M	H	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources	1		M	H	L	H	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Earthworks										

Potential impact	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact		
			Severity	Duration	Spatial scale			Can be reversed	Causes irreplaceable loss of resources	Can be avoided/ Managed/ Mitigated
Hazardous excavations and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure and encroachment to Ga-Mogara)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			H	H	M	H	M	Fully	Unlikely	
Negative visual impacts			M	H	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources	1		M	H	L	H	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Physical destruction of biodiversity	1		H	H	M	H	H	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	H^{+}		H	H	H^{+}	Fully	Possible	Partially	Possible	Can be avoided

Potential impact	**Alternative**	**Project phases**	**Consequence**			**Probability**	**Significance**	**Degree to which impact**		
			Severity	**Duration**	**Spatial scale**			**Can be reversed**	**Causes irreplaceable loss of resources**	**Can be avoided/ Managed/ Mitigated**
General disturbance of biodiversity	1		M	H	M	H	H	Partially	Possible	Can be avoided
	2		M	M	M	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H+	H	H	H	H+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Civil works										
Hazardous excavations and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			H	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			H	H	M	H	M	Fully	Unlikely	
Negative visual impacts			M	H	M	L	M	Fully		
Positive socio – economic impacts (Economic impact)										
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Open pit mining										
Loss and sterilisation of mineral resources	1 and	Construction	H	H	M	H	H	Fully	Possible	Can be

Potential impact	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact		
			Severity	Duration	Spatial scale			Can be reversed	Causes irreplaceable loss of resources	Can be avoided/ Managed/ Mitigated
Hazardous excavations, surface subsidence and infrastructure that can be harmful to people and animals	2	Operation Decommissioning	H	H	M	H	H	Fully		managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Reducing groundwater levels and availability (Pit dewatering and abstraction of water from boreholes)	N/A		H	M	M	M	H	Fully		
Reducing groundwater levels and availability (Pit dewatering)		Operation	H	M	M	M	H	Fully		
Pollution from emissions to air	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully		
Increase in disturbing noise levels			H	H	M	H	M	Fully	Unlikely	
Blasting related impacts (Air blasts, ground vibration and fly rock)		Operational	H	H	H	M	H	Fully	Possible	
Negative visual impacts		Construction Operation	M	H	M	L	M	Fully	Unlikely	
Loss of or damage to	1		M	H	L	M	M	Cannot be	Irreplaceable loss	Cannot be avoided,

Potential impact	**Alternative**	**Project phases**	**Consequence**			**Probability**	**Significance**	**Degree to which impact**		
			Severity	**Duration**	**Spatial scale**			**Can be reversed**	**Causes irreplaceable loss of resources**	**Can be avoided/ Managed/ Mitigated**
heritage/palaeontological resources		Decommissioning						reversed if destroyed		managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Processing plant (crushing and screening)										
Hazardous excavations and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Contamination of groundwater resources			H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Increase in disturbing noise levels			H	H	M	H	M	Fully	Unlikely	
Negative visual impacts			M	H	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if	Possible	Cannot be avoided, managed or

Potential impact	Alternative	Project phases	Consequence: Severity	Consequence: Duration	Consequence: Spatial scale	Probability	Significance	Degree to which impact: Can be reversed	Causes irreplaceable loss of resources	Can be avoided/ Managed/ Mitigated
								destroyed		mitigated if destroyed
	2		M	H	L	L	L	Partially		Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Transport systems										
Hazardous excavations and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			H	H	M	H	M	Fully	Unlikely	
Disturbance of roads by project related traffic			H	H	M	M	H	Fully	Possible	
Negative visual impacts			M	H	M	L	M	Fully		

Potential impact	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact		
			Severity	Duration	Spatial scale			Can be reversed	Causes irreplaceable loss of resources	Can be avoided/ Managed/ Mitigated
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Power supply and use										
Hazardous excavations and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			H	H	M	H	M	Fully	Unlikely	

Potential impact	**Alternative**	**Project phases**	**Consequence**			**Probability**	**Significance**	**Degree to which impact**		
			Severity	**Duration**	**Spatial scale**			**Can be reversed**	**Causes irreplaceable loss of resources**	**Can be avoided/ Managed/ Mitigated**
Negative visual impacts			M	H	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Water supply and use										
Hazardous excavations and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation						Fully		
Lowering of groundwater levels (Only	N/A		H	M	M	M	M	Fully		

Potential impact	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact		
			Severity	Duration	Spatial scale			Can be reversed	Causes irreplaceable loss of resources	Can be avoided/ Managed/ Mitigated
applicable if abstraction from boreholes takes place)		Decommissioning								
Negative visual impacts	1 and 2		M	H	M	L	M	Fully	Unlikely	
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if destroyed	Irreplaceable loss	Can be avoided
	2		M	H	L	L	L	Partially	Possible	Cannot be avoided, managed or mitigated if destroyed
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Mineralised waste										
Loss and sterilization of mineral resources	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Hazardous excavations and infrastructure that can be harmful to people and animals			H	H	M	H	H	Fully		
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		

Potential impact	**Alternative**	**Project phases**	**Consequence**			**Probability**	**Significance**	**Degree to which impact**		
			Severity	**Duration**	**Spatial scale**			**Can be reversed**	**Causes irreplaceable loss of resources**	**Can be avoided/ Managed/ Mitigated**
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			H	H	M	H	M	Fully	Unlikely	
Negative visual impacts			M	H	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Non-mineralised waste management (general and hazardous)										
Loss of soil resources and land capability through pollution	1 and 2	Construction Operation Decommissioning	M	H	L	H	M	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Fully		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Partially		
Alteration of natural drainage patterns (Loss			M	H	M	H	H	Fully		

Potential impact	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact		
			Severity	Duration	Spatial scale			Can be reversed	Causes irreplaceable loss of resources	Can be avoided/ Managed/ Mitigated
from containment infrastructure)										
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			H	H	M	H	M	Fully	Possible	
Negative visual impacts			M	H	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Unlikely	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Support services										
Hazardous excavations and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		

Potential impact	Alternative	Project phases	Consequence			Probability	Significance	Degree to which impact		
			Severity	Duration	Spatial scale			Can be reversed	Causes irreplaceable loss of resources	Can be avoided/ Managed/ Mitigated
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			H	H	M	H	M	Fully	Unlikely	
Negative visual impacts			M	H	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
General site management										
Loss of soil resources and land capability through pollution	1 and 2	Construction Operation Decommissioning	M	H	L	H	M	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss			M	H	M	H	H	Fully		

Potential impact	Alternative	Project phases	Consequence: Severity	Consequence: Duration	Consequence: Spatial scale	Probability	Significance	Degree to which impact: Can be reversed	Degree to which impact: Causes irreplaceable loss of resources	Degree to which impact: Can be avoided/ Managed/ Mitigated
from containment infrastructure)										
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Negative visual impacts			M	H	M	L	M	Fully	Unlikely	
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Demolition										
Hazardous excavations and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss			M	H	M	H	H	Fully		

Potential impact	**Alternative**	**Project phases**	**Consequence**			**Probability**	**Significance**	**Degree to which impact**		
			Severity	**Duration**	**Spatial scale**			**Can be reversed**	**Causes irreplaceable loss of resources**	**Can be avoided/ Managed/ Mitigated**
from containment infrastructure)										
Contamination of groundwater resources			H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			H	H	M	H	M	Fully	Unlikely	
Negative visual impacts			M	H	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Rehabilitation										
Hazardous excavations, surface subsidence and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		

Potential impact	**Alternative**	**Project phases**	**Consequence**			**Probability**	**Significance**	**Degree to which impact**		
			Severity	**Duration**	**Spatial scale**			**Can be reversed**	**Causes irreplaceable loss of resources**	**Can be avoided/ Managed/ Mitigated**
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Contamination of groundwater resources			H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			H	H	M	H	M	Fully	Unlikely	
Negative visual impacts			M	H	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Maintenance and aftercare										
Hazardous excavations and infrastructure that can be harmful to people and animals	1 and 2	Construction Operation Decommissioning Closure	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			M	H	L	H	M	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		

Potential impact	**Alternative**	**Project phases**	**Consequence**			**Probability**	**Significance**	**Degree to which impact**		
			Severity	**Duration**	**Spatial scale**			**Can be reversed**	**Causes irreplaceable loss of resources**	**Can be avoided/ Managed/ Mitigated**
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Contamination of groundwater resources			H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Negative visual impacts			M	H	M	L	M	Fully	Unlikely	
Loss of or damage to heritage/palaeontological resources	1		M	H	L	M	M	Cannot be reversed if destroyed	Irreplaceable loss	Cannot be avoided, managed or mitigated if destroyed
	2		M	H	L	L	L	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)	1 and 2		H^+	H	H	H	H^+	Fully	Possible	Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	M	H	Fully		
Change in land use			H	H	M	H	H	Fully		

7.6 METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

The method for the assessment of environmental issues is set out in the Table 38 below. Part A in Table 38 below provides a list of criteria that can be selected in order to rank the severity, duration and spatial scale of an impact. The consequence of the impact is determined by combining the selected criteria ratings allocated for severity, spatial scale and duration in part B of Table 38. The significance of the impact is determined in Part C of Table 38 whereby the consequence determined in part B is combined with the probability of the impact occurring. The interpretation of the impact significance is given in Part D.

This assessment methodology enables the assessment of environmental issues including: cumulative impacts, the severity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated. This assessment method was used to assess impacts associated with all project alternatives.

TABLE 38: CRITERIA FOR ASSESSING IMPACTS

PART A: DEFINITION AND CRITERIA*		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of severity, spatial extent and duration**
Criteria for ranking of the SEVERITY of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PART B: DETERMINING CONSEQUENCE		

SEVERITY = L

DURATION	Long term	**H**	**Medium**	**Medium**	**Medium**
	Medium term	**M**	**Low**	**Low**	**Medium**
	Short term	**L**	**Low**	**Low**	**Medium**

			SEVERITY = M		
DURATION	Long term	**H**	**Medium**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Low**	**Medium**	**Medium**
			SEVERITY = H		
DURATION	Long term	**H**	**High**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Medium**	**Medium**	**High**
			L	**M**	**H**
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/ national
				SPATIAL SCALE	

			PART C: DETERMINING SIGNIFICANCE		
PROBABILITY (of exposure to impacts)	Definite/ Continuous	**H**	**Medium**	**Medium**	**High**
	Possible/ frequent	**M**	**Medium**	**Medium**	**High**
	Unlikely/ seldom	**L**	**Low**	**Low**	**Medium**
			L	**M**	**H**
				CONSEQUENCE	

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

***H = high, M= medium and L= low and + denotes a positive impact.**

7.7 POSITIVE AND NEGATIVE IMPACTS IN TERMS OF SITE LAYOUT ALTERNATIVES

With reference to Section 7.1.3, two site layout alternatives were considered as part of the proposed project. In this regard, Option 1 presents an infrastructure layout which is deemed to be the most economically preferable layout and Option 2 allows for infrastructure placement to have been optimised and strategically arranged in order to limit impacts to sensitive biodiversity areas (Figure 8). Table 39 presents the results of the related selection matrix process. The ranking system is a simple two score relative ranking system. For each criterion, a score of one is allocated to the best option and a score of two to the worst. The option with the lowest total score is the preferred option. It is important to note that the discussion around the advantages and disadvantages of the preferred site layout in the table below is also informed by the impacts and risks identified for the site layout options as outlined in Table 37.

TABLE 39: POSITIVE AND NEGATIVE IMPACTS ASSOCIATED WITH SITE LAYOUT ALTERNATIVES

Criteria	Relative ranking		Advantages and disadvantages
	Option 1	Option 2	
Biodiversity (terrestrial and aquatic fauna, flora)	2	1	Although it is clear from Figure 8 that both Infrastructure Layout Plan 1 and 2 are located within a combination of moderately low, moderate and high biodiversity sensitivity areas, it is evident that Infrastructure Layout Plan 1 gives less consideration to sensitive biodiversity areas, or most specifically the wetland depressions. In addition it can be seen that infrastructure such as the topsoil stockpile have been planned to be outside of high sensitivity areas as far as is practically possible. It follows that Infrastructure Layout 2 is preferable from a Biodiversity impact perspective. See Table 37 for the related impact assessments for both alternatives.
Heritage resources	2	1	With reference to Figure 8 it is clear that Infrastructure Layout Plan 2 is planned in such a way so as to avoid heritage resources (indicated as green dots) whereas Infrastructure Layout Plan 1 is not planned to avoid heritage sites. It follows that Infrastructure Layout 2 is preferable from a Heritage impact perspective. See Table 37 for the related impact assessments for both alternatives.
Soils and land capability	1	1	Soil types Mispah and Hutton are located within both proposed Infrastructure Layout Plans. Due to the hot, dry climate and land capability, the soils are limited to no agricultural and irrigation potential. It follows that there are no disadvantages or advantages with either layout option when compared together. See Table 37 for the related impact assessments for both alternatives.
Ground water regime and impacts on downstream users	1	1	The geohydrological regime in the project area is made up of two main aquifer systems and this underlies both Infrastructure Layout plans. The first, the upper, unconfined to semi-confined aquifer occurs in the weathered zone. The aquifer is usually developed on the contact between the weathered zone at surface and the underlying un-weathered clay or hard rock formations. Although relative low yields occur in this shallow aquifer, it is developed widely throughout most of the project area and has been the sole reliable source of water supply to most of the farms in the area for more than a century. Yields of up to 2l/s occur in this aquifer with a shallow water table and spring formation common, especially in the lower-lying topography. The second aquifer is associated with fractures, fissures, joints and other discontinuities within the consolidated bedrock and associated intrusives of the Transvaal/Griqualand West Sequences. The aquifer occurs at depths of more than 50 meters below surface in the project area. It is semi-confined and has greatly varying yields that are directly associated with the geology and geological structure. Dykes are widespread throughout the study area (see Figure 10) and some of the more prominent ones are easily identifiable on aerial and satellite imagery. It follows that there are no disadvantages or advantages with either site option when compared together. See Table 37 for the related impact assessments for both alternatives.
Proximity to surface water	2	1	Two ephemeral drainage lines as well as several wetland depressions are present within the proposed project area. Infrastructure Layout Plan 2 takes these wetland depressions into account and infrastructure is planned to be

Criteria	Relative ranking		Advantages and disadvantages
	Option 1	Option 2	
resources			outside of the buffer zones of these depressions (Figure 8). It follows that Infrastructure Layout Plan 2 is preferable from the perspective of proximity to surface water resources. See Table 37 for the related impact assessments for both alternatives.
Visual impact	1	1	It is expected that from a visual perspective both Infrastructure Layout Plan 1 and 2 will present equal visual impacts. No one alternative is therefore preferred to another. See Table 37 for the related impact assessments for both alternatives.
Proximity to residential areas from a dust and noise perspective	1	1	For both options, the sensitive receptors are the same and this is not affected by a minor change to the infrastructure layout plan. No disadvantages or advantages with either site option when compared together. See Table 37 for the related impact assessments for both alternatives.
Sterilization of mineral resources and project viability	1	1	For both options, the likelihood of sterilisation of minerals is expected to be the same, should it occur. See Table 37 for the related impact assessments for both alternatives.
Interference with surface infrastructure	1	1	Neither infrastructure Layout Plan 1 or 2 are expected to interfere with existing surface infrastructure. See Table 37 for the related impact assessments for both alternatives.
Change in land use	1	1	For both site layout options, land use will be changed from agricultural to mining. In addition to this the land uses surrounding the proposed project area are the same for both site layout options. It follows that no disadvantages or advantages with either site option when compared together. See Table 37 for the related impact assessments for both alternatives.
Economic impact	1	1	The proposed project will contribute towards local, regional and national economies through wages, taxes and profits regardless of the site layout options. It follows that the unmitigated significance of both site layout options is a high positive. No disadvantages or advantages with either site option when compared together. See Table 37 for the related impact assessments for both alternatives.
Inward migration	1	1	The proposed project can lead to an influx of job seekers that will place pressure on existing services regardless of the site layout options as this is the nature of mining. No disadvantages or advantages with either site option when compared together. See Table 37 for the related impact assessments for both alternatives.
Total	**15**	**12**	**Infrastructure layout option 2 is preferred**

7.8 POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RESIDUAL RISK

Section 7.3, provides a summary of issues and concerns raised by IAPs as part of the proposed project. Procedural issues have not been included in this table. This section outlines possible mitigation measures or alternatives that are available to accommodate or address issues and concerns raised by IAPs where relevant. In addition to this, this section will also provide an assessment of the impact or risks associated with the identified possible mitigation measures or alternatives.

TABLE 40: POSSIBLE MITIGATION MEASURES AND ANTICIPATED LEVEL OF RESIDUAL RISK

Issue and concern raised	Possible mitigation measure or alternative to address issue	Impact significance of the possible mitigation measure or alternative before and after mitigation (Section 9)	
		Unmitigated	**Mitigated**
From this scoping report it is abundantly clear that the Property is clearly earmarked for opencast mining operations and for the construction of infrastructure associated with the planned mining operations. SIOC as the holder of the surface rights has no other option than to put on record that Coza's planned mining operations will, inter alia: • Result in the Property being of no further use to SIOC as it will be occupied and virtually be destroyed by Coza's planned mining operations; • Will have serious environmental consequences for the Property and put SIOC at risk from an environmental perspective. • Diminish the value of the Property from an agricultural perspective which will have financial consequences for SIOC. • Under the circumstances SIOC will have to object against the planned mining operations by Coza and will not allow any mining operations to take place on the Property unless	It is understood that SIOC has reuquested that COZA purchase the land in question prior to undertaking any project related activities. This has been and will continue to be discussed by Coza and SIOC	High	Low

Issue and concern raised	**Possible mitigation measure or alternative to address issue**	**Impact significance of the possible mitigation measure or alternative before and after mitigation (Section 9)**	
		Unmitigated	**Mitigated**
SIOC can reach agreement with Coza on the selling of the Property as a whole to Coza or any other company of Coza's choice.			
I have a large shortage of water on my farm. The only water source is at 30m. There isn't water deeper, and if you mine deeper than the water table and affect my water and I will no longer be able to farm and go about my activities, then you will have to pay me for damage compensation until the water level returns. You will also have to sink a monitoring borehole on my farm and install an in-time water monitoring system and give me access to the results so that there aren't any misunderstandings.	• It is not expected that the project will result in any 3rd party loss in groundwater quantity. Should it be found that there has been a reduction in groundwater levels in 3rd party boreholes then 3rd party will be appropriately compensated for this loss by Coza. Groundwater monitoring will be done in boreholes identified in the Groundwater specialist study and in Appendix H. Results of groundwater monitoring will be made available to IAPs upon request.	Medium	Low
The Branch: Forestry and Natural Resource Management in the Department of Agriculture, Forestry and Fisheries (DAFF) is responsible for the implementation of the Nation Forests Act, Act 84 of 1998 (NFA) and the National Veld and Forests Act, Act 101 of 1998 as amended. The proposed developer must comply with the following sections of the NFA: 1. Section 12(1)(d) "The minister may declare – 1.1 A particular tree 1.2 A particular group of trees 1.3 A particular woodland; or 1.4 Trees belonging to a particular species, to be a protected tree, group of trees, woodland of species." 2. Section 15(1) "No person may – 2.1 Cut, disturb, damage or destroy any protected tree; or 2.2 Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire of dispose of any protected tree, or any forest product derived from a protected tree, except- (i) Under a license granted by the minister, or (ii) In terms of an exemption from the provision of this subsection published by the Minister in the Gazette on the advice of the Council"	• Your comment has been noted. Coza will comply with the relevant aspects of the NFA.	High	Low

Issue and concern raised	Possible mitigation measure or alternative to address issue	Impact significance of the possible mitigation measure or alternative before and after mitigation (Section 9)	
		Unmitigated	Mitigated
3. Section 62(2)(c): "Any person who contravenes the prohibition of – 3.1 The cutting, disturbance, damage or destruction of temporarily protected trees or groups of trees referred to in Section 14(2) or protected trees referred to in section 15(1)(a); or 3.2 The possession, collection, removal, transport, export, purchase or sale of temporarily protected trees of groups of trees referred to in section 14(2) or protected trees referred to in Section 15(1)(b), or any forest product derived from a temporarily protected tree, group of trees of protected tree, is guilty of a first category offence. 4. Section 58 (1) "Any person who is guilty of a first category offence referred to in Section 62 and 63 may be sentenced to a fine or imprisonment for a period of up to three years, or to both a fine and such imprisonment. Comments on Scoping Report • Page 3-9: 250 to 350 ha site clearance will be required, in the Griqualand West Centre of Endemism. Pages 5-33 refers to the affected vegetation units. The Acacia (Vachellia) erioloba Bushveld Habitat Unit identified on site was classified as moderately sensitive and dominated by the protected A. (V) erioloba and A. (V) haemotoxylon. Kindly provide estimates of numbers of protected trees per size classes (<3m; 3-6m; and >6m) that would be directly destroyed as a result of the proposed mining and vegetation clearance activities. For Boscia Albitrunca an additional size class of <1.5m should be included. This information is required to determine whether or not an environmental offset may be required. Please also describe the methodology used to provide the information and show on a map the plots surveyed, as well as the percentage total area surveyed.	• The purpose of the biodiversity specialist study was in order to inform the EIA and the methodology used for the investigation has been detailed in the specialist study included in Appendix J. It should therefore be noted that the qualitative data required for removal permit applications will need to be collected at such time when the applications are lodged. SAS will ensure that the data gathered will adhere to the DAFF permit requirements.	High	Medium

Issue and concern raised	Possible mitigation measure or alternative to address issue	Impact significance of the possible mitigation measure or alternative before and after mitigation (Section 9)	
		Unmitigated	**Mitigated**
• It should be noted that dewatering from boreholes may result in a decline and death of deep protected trees, thus indirect impacts. It is therefore recommended that a long term tree health monitoring programme be implemented to monitor protected tree mortality as a result of dewatering (if water level is being affected) and/or as a result of contamination of groundwater.	• DAFF's recommendation has been noted. Should it be found that groundwater levels are being adversely affected, Coza will implement a long term tree health monitoring programme.	High	Medium

7.9 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

Not applicable.

7.10 STATEMENT MOTIVATING THE PREFERRED ALTERNATIVE

With reference to Section 7.1, site layout alternatives, water supply, power supply and transportation alternatives are were considered as part of the proposed project. A motivation describing the preferred alternatives is provided below.

7.10.1 SITE LAYOUT ALTERNATIVES

With reference to Section 7.1.3, two plant layout alternatives were considered within portion 0 (Remaining Extent) and Portion 1 of Jenkins (refer to Figure 8). Option 1 included the initial site layout without without consideration for sensitive biodiversity areas. Option 2 catered for the avoidance of sensitive areas as far as possible through strategic planning and placement of infrastructure which avoided sensitive areas such as the wetland depressions and ephemeral drainage lines.

7.10.2 WATER SUPPLY ALTERNATIVES

With reference to Section 7.1.5, the preferred water supply alternative is sourcing water from site groundwater through boreholes.

7.10.3 POWER SUPPLY ALTERNATIVES

Alternative substations from where power will be sourced have been investigated as part of the assessment process. These include the BKM substation which is situated approximately 10km North-West of the site and the Bulkop substation located approximately 12 km South-East. In addition, the Lylyveld substation located approximately 15 km North-East from the site was considered. It is expected that the preferred alternative is to source power from the BKM substation.

7.10.4 TRANSPORTATION ALTERNATIVES

With reference to Section 7.1.4, two main transportation alternatives for the transportation of product from site to Vanderbijlpark have been considered as part of the proposed project. The first option is to construct rail infrastructure at the mine that will link to Transnet Freight Rail's domestic route, and the second alternative is to truck ore to existing mines for rail transportation. It follows that the first alternative (construction of rail infrastructure to link the mine to the main Transnet line) is the preferred alternative.

8 FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE THROUGH THE LIFE OF THE ACTIVITY

8.1 DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY IMPACTS

Environmental and socio-economic impacts associated with the proposed project were identified through site visits, undertaken by SLR and specialists (where relevant), the social scan, consideration of the project description, site layout and specialist studies.

Potential environmental and socio-economic impacts identified were outlined in material (BID and scoping report) that was distributed to IAPs and regulatory authorities (Section 7.2.2) for consideration. In addition to this, potential identified environmental and socio-economic impacts will be discussed at the public and regulatory authorities meetings (if requested) (Section 7.2.5). The feedback received from IAPs and regulatory authorities also provided input into the identification of environmental and socio-economic impacts.

8.2 DESCRIPTION OF THE PROCESS UNDERTAKEN TO ASSESS AND RANK THE IMPACTS AND RISKS

A description of the assessment methodology used to assess the severity of identified impacts including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources is provided in Section 7.6. In addition to this, the assessment methodology also assesses the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

8.3 A DESCRIPTION OF THE ENVIRONMENTAL IMPACTS AND RISKS IDENTIFIED DURING THE ENVIRONMENTAL ASSESSMENT PROCESS

This section below (Table 41) provides a description of the impacts on environmental and socio-economic aspects in respect of each of the main project actions / activities and processes that will be assessed in Appendix F and summarised in Section 9.

TABLE 41: LIST OF POTENTIAL IMPACTS AS THEY RELATE TO PROJECT ACTIONS / ACTIVITIES / PROCESSES

Main activity/process	Impacts (unmitigated)
Site preparation	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Pollution from emissions to air Noise pollution Negative visual impacts

Main activity/process	Impacts (unmitigated)
	Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Earthworks	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Civil works	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Open pit mining	Loss and sterilisation of mineral resources Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use

Main activity/process	**Impacts (unmitigated)**
Processing plant	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Transport systems	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Road disturbance and traffic safety Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Power supply and use	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Water supply and use	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Reduction of groundwater levels and availability Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Mineralised waste	Loss and sterilization of mineral resources Hazardous excavations and infrastructure

Main activity/process	Impacts (unmitigated)
	Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Non-mineralised waste management (general and hazardous)	Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Support services	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
General site management	Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Demolition	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources

Main activity/process	Impacts (unmitigated)
	Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Rehabilitation	Loss and sterilization of mineral resources Hazardous excavations, surface subsidence and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Maintenance and aftercare	Loss and sterilization of mineral resources Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use

8.4 ASSESSMENT OF THE SIGNIFICANCE OF EACH IMPACT AND RISK AND AN INDICATION OF THE EXTENT OF TO WHICH THE ISSUE AND RISK CAN BE AVOIDED OR ADDRESSED BY THE ADOPTION OF MITIGATION MEASURES

The assessment of the significance of the impacts identified for the proposed project area are included in Appendix F and summarised in Section 9. The extent to which the identified impacts can be avoided or addressed by the adoption of mitigation measures is included in Section 9.

9 ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

As stipulated by the DMR template, a summary of the assessment of the environmental and socio-economic impacts associated with the proposed project is provided in Table 42 below. A full description of the assessment is included in Appendix F. All identified impacts are considered in a cumulative manner such that the current baseline conditions on site and in the surrounding area are discussed and assessed together.

TABLE 42: ASSESSMENT OF SIGNIFICANT IMPACTS AND RISKS

Activity	Potential impact	Aspects affected	Phase	Significance (unmitigated)	Mitigation type	Significance (mitigated)	Extent to which the impact can be avoided or addressed through the implementation of management measures
Open pit mining Placement of infrastructure Mineralised waste Maintenance and aftercare	Loss and sterilisation of mineral resources	Geology	Construction Operation Decommissioning Closure	High	• Control through infrastructure design and placement to ore body	Low	Can be managed/mitigated to acceptable levels
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Support services Demolition Rehabilitation Maintenance and aftercare	Hazardous excavations, infrastructure and surface subsidence that can be harmful to people and animals	Topography	Construction Operation Decommissioning Closure	High	• Control through access control • Control through management and monitoring • Control through rehabilitation • Remedy through emergency response procedure (Section 30.2.2)	Low	Can be managed/mitigated to acceptable levels
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Loss of soil resources and land capability through contamination	Soil and land capability	Construction Operation Decommissioning Closure	Medium	• Manage through the implementation of soil conservation management plan and waste management plan • Control through rehabilitation • Remedy through emergency response procedure (Section 30.2.2)	Low	Can be managed/mitigated to acceptable levels
Site preparation Earthworks Open pit mining Processing plant	Loss of soil resources and land capability through		Construction Operation Decommissioning Closure	High	• Manage through the implementation of soil conservation management plan and waste management plan	Low	Can be managed/mitigated to acceptable levels

Activity	**Potential impact**	**Aspects affected**	**Phase**	**Significance (unmitigated)**	**Mitigation type**	**Significance (mitigated)**	**Extent to which the impact can be avoided or addressed through the implementation of management measures**
Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	physical disturbance				• Control through rehabilitation • Control through limiting project footprint		
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation Maintenance and aftercare	Physical destruction of biodiversity	Biodiversity	Construction Operation Decommissioning Closure	High	• Control through limiting the project footprint • Control through alien invasive species programme • Remedy through biodiversity action plan • Remedy through biodiversity offset (for protected tree species) • Control through comprehensive monitoring of protected trees • Remedy through rehabilitation close to pre-mining conditions as practically possible.	Medium	Can be managed/mitigated to acceptable levels
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation Maintenance and aftercare	General disturbance of biodiversity		Construction Operation Decommissioning Closure	High	• Control through dust control (visual aspects, water management, traffic etc) • Control through training of employees • Control through waste management procedures.	Low	Can be managed/mitigated to acceptable levels

Activity	**Potential impact**	**Aspects affected**	**Phase**	**Significance (unmitigated)**	**Mitigation type**	**Significance (mitigated)**	**Extent to which the impact can be avoided or addressed through the implementation of management measures**
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Contamination of surface water resources	Surface water	Construction Operation Decommissioning Closure	Medium	• Prevent through design of pollution control infrastructure • Control through stormwater management and design • Remedy through emergency response procedure (Section 30.2.2)	Low	Can be managed/mitigated to acceptable levels
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Alteration of natural drainage patters		Construction Operation Decommissioning Closure	Medium	• Prevent through locating infrastructure outside of floodlines • Control through appropriate design • Control through the separation of dirty and clean water	Low	Can be managed/mitigated to acceptable levels
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management	Contamination of groundwater resources	Groundwater	Construction Operation Decommissioning Closure	Medium	• Control through appropriate design • Control through monitoring • Remedy through emergency response procedure (Section 30.2.2)	Low	Can be managed/mitigated to acceptable levels

Activity	**Potential impact**	**Aspects affected**	**Phase**	**Significance (unmitigated)**	**Mitigation type**	**Significance (mitigated)**	**Extent to which the impact can be avoided or addressed through the implementation of management measures**
Demolition Rehabilitation Maintenance and aftercare							
Water supply and use Open pit mining	Reduction of groundwater levels and availability		Construction Operation Decommissioning	Low	• Control through monitoring	Low	Can be managed/mitigated to acceptable levels
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition General site management Rehabilitation Maintenance and aftercare	Air pollution	Air	Construction Operation Decommissioning Closure	High	• Manage through a dust/PM management plan • Control through monitoring	Medium (Low for dust fallout)	Can be managed/mitigated to acceptable levels (dust fallout),
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition General site management Rehabilitation Maintenance and aftercare	Noise pollution	Noise	Construction Operation Decommissioning	Medium	• Control through noise control measures and monitoring (if required)	Low	Can be managed/mitigated to acceptable levels
Open pit mining	Blasting impacts (fly	Blasting	Operation	High	• Control through access control • Manage through appropriate	Medium	Can be managed/mitigated to

Activity	Potential impact	Aspects affected	Phase	Significance (unmitigated)	Mitigation type	Significance (mitigated)	Extent to which the impact can be avoided or addressed through the implementation of management measures
	rock, air blasts and ground vibrations)				blast design • Remedy through emergency response procedure (Section 30.2.2)		acceptable levels
Transport system	Road disturbance and traffic safety	Traffic	Construction Operation Decommissioning	High	• Control through appropriate design • Management through the implementation of traffic safety programme • Remedy through emergency response procedure (Section 30.2.2)	Medium	Can be managed/mitigated to acceptable levels
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Negative visual views	Visual	Construction Operation Decommissioning Closure	Medium	• Control through visual controls and con-current rehabilitation	Medium (Low at closure)	Can be managed/mitigated to acceptable levels
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services	Loss of heritage, cultural and palaeontological resources	Heritage/ cultural and palaeontological resources	Construction Operation Decommissioning Closure	High	• Control through avoidance of heritage resources • Remedy through emergency response procedure (Section 30.2.2)	Medium	Can be avoided

Activity	**Potential impact**	**Aspects affected**	**Phase**	**Significance (unmitigated)**	**Mitigation type**	**Significance (mitigated)**	**Extent to which the impact can be avoided or addressed through the implementation of management measures**
General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas							
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Economic impact	Socio-economic	Construction Operation Decommissioning Closure	High positive	• Control through procurement programme and bursary and skills development programme • Control through implementation of mitigation measures for environmental and social aspects	High positive	Can be managed/mitigated to acceptable levels
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Inward migration		Construction Operation Decommissioning Closure	High	• Minimise through effective communication of procurement and recruitment policies • Control through health policy, monitoring the development of informal settlements • Remedy through emergency response procedure (Section 30.2.2)	Medium	Can be managed/mitigated to acceptable levels
Site preparation Earthworks	Land use impact	Land use	Construction Operation	High	• Minimise by purchasing/ leasing land required for mining activities	Medium (Low at closure)	Can be managed/mitigated to

Activity	**Potential impact**	**Aspects affected**	**Phase**	**Significance (unmitigated)**	**Mitigation type**	**Significance (mitigated)**	**Extent to which the impact can be avoided or addressed through the implementation of management measures**
Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas			Decommissioning Closure		• Control through closure planning		acceptable levels

10 SUMMARY OF SPECIALIST REPORT FINDINGS

The relevant specialist studies that were undertaken as part of the proposed project including the recommendations made by the specialist are summarised in Table 41 below. The relevant specialist reports have been attached in the appendices to this EIA and EMP report.

TABLE 43: SUMMARY OF SPECIALIST REPORTS

Studies undertaken	Recommendations of specialists	Specialist recommendations that have been included in the EIA report (mark with an x)	Reference to applicable section in this report
Groundwater	• Coza should implement a groundwater monitoring programme with the following features: ○ The objective of the programme is to characterise groundwater quality and groundwater levels in the mining rights area on a regular basis. ○ As preliminary guidance, Groundwater Complete suggests that a network of seven boreholes (already drilled) be monitored as part of Coza's groundwater monitoring regime ○ It should be noted that this monitoring schedule will be re-assessed by a qualified geohydrologist at a later stage in terms of stability of water levels and quality. Should the sampling program be changed, it should be done in consultation with the Department of Water and Sanitation (DWS). ○ If there is a reduction in quality or quantity of water in 3rd party boreholes then Coza should provide an alternative water supply of equal or better quality and quantity. ○ Records should be kept of actual groundwater volumes abstracted and on-site daily rainfall data throughout the life of mine. ○ Monitoring boreholes will be capped and locked at all times. ○ Borehole depths will be measured quarterly and the boreholes will be blown out with compressed air, if required and ○ Vegetation around the boreholes will be removed on a regular basis and the borehole casings painted, when necessary, to prevent excessive rust and degradation. ○ Reporting on groundwater quality conditions will be included in the annual report. ○ The quarterly report should be an update of the database with time-series graphs and statistical analysis (average, maximum, minimum, 5 -, 50 – and 95 percentile values as well as linear performance). Data will also be presented in a map format to present a clear picture of the water quality situation. • Coza should spills or accidental releases of contaminants (such as oils, fuels, explosives, etc.) in all areas of the site • Coza should maintain and inspect vehicles to reduce the occurrence of contaminant leaks. • An appropriate liner is recommended for all water retaining infrastructure. • Coza should prevent contact between clean and dirty areas. • Coza should recycle and reuse contaminated water as far as possible, • All contaminated water should be contained for re-use and/or evaporation, • Coza should minimize the extent of disturbance of the aquifer and limit degeneration of groundwater quality.	X	Section 27 and Section 29
Biodiversity	• Floral impact mitigation should include: ○ Any disturbance of sensitive floral habitat and species of conservation concern must be avoided as far as possible; ○ If any mining activities are to be authorised, it is strongly recommended that the surface footprint of the proposed	X	Section 27 and Section 29

Studies undertaken	Recommendations of specialists	Specialist recommendations that have been included in the EIA report (mark with an x)	Reference to applicable section in this report
	mine be reduced to the minimum; ○ The footprint and daily operation of surface infrastructure must be strictly monitored to ensure that edge effects from the operational facilities do not affect the surrounding sensitive floral habitat. The significance of the impact on the ecology of the area will be largely linked to the degree to which this can be implemented; ○ Sensitive floral habitat and associated buffer zones beyond the immovable footprint areas must be designated as No-Go areas and no mining vehicles, personnel, or any other mining related activities are to encroach upon these areas; ○ An effective dust management plan bust be designed and implemented in order to mitigate the impact of dust on flora throughout all mining phases; ○ Adequate stormwater management must be incorporated into the design of the proposed development throughout all phases in order to prevent erosion of topsoil and the loss of floral habitat. Special mention is made of: - Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed; - Runoff from paved surfaces should be slowed down by the strategic placement of berms; and - All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff of the facilities. ○ An alien floral control plan must be designed and implemented in order to monitor and control alien floral recruitment in disturbed areas. The alien floral control plan must be implemented for a period of 5 years after decommissioning and closure; ○ No collection of firewood, SCC/Protected or medicinal floral species must be allowed by mining personnel; ○ No illicit fires must be allowed during any phases of the proposed mining development; ○ Concurrent/progressive rehabilitation must be implemented at all times and disturbed areas must be rehabilitated as soon as possible. This will not only reduce the total disturbance footprint, but will also reduce the overall rehabilitation effort and cost; ○ Rehabilitation trials must be continuously undertaken from the commencement of construction in order to determine the efficiency of rehabilitation methods ○ The rehabilitation plan must be continuously updated in accordance with the trial results in order to ensure that optimal rehabilitation measures are employed; ○ Rehabilitation efforts must be implemented for a period of at least 5 years after decommissioning and closure; ○ A floral SCC relocation, monitoring and management plan must be designed and implemented by a suitably qualified specialist and should address all species which can be successfully rescued and relocated; ○ During the surveying and site-pegging phase of surface infrastructure, all SCC/protected species which will be affected by surface infrastructure must be marked and where possible, relocated to suitable habitat surrounding the disturbance footprint. If relocation is impossible or any of the protected species are destroyed, 2 plants for every protected plant destroyed must be propagated. The relevant permits must be applied for as indicated in the baseline floral assessment.		

Studies undertaken	Recommendations of specialists	Specialist recommendations that have been included in the EIA report (mark with an x)	Reference to applicable section in this report
	• A floral monitoring plan must be designed and implemented throughout all phases of the mining development, should it be approved. The following points aim to guide the design of the monitoring plan, and it must be noted that the monitoring plan must be continually updated and refined for site-specific requirements: ○ Permanent monitoring plots must be established in areas surrounding the surface infrastructure and rehabilitated areas. These plots must be designed to accurately monitor the following parameters on an annual basis: - Measurements of crown and basal cover; - Species diversity; - Species abundance; - Impact of dust on flora; - Recruitment of indigenous species; - Alien vs. Indigenous plant ratio; - Recruitment of alien and invasive species; - Erosion levels and the efficacy of erosion control measures; - Vegetation community structure including species composition and diversity which should be compared to pre-development conditions; ○ Monitoring of rehabilitation trials in light of the above parameters must also take place throughout all phases of the proposed mining development and for a period of 5 years after decommissioning and closure; ○ The rehabilitation plan must be continuously updated in accordance with the monitoring results in order to ensure that optimal rehabilitation measures are employed; ○ Results of the monitoring activities must be taken into account during all phases of the proposed mining development and action must be taken to mitigate impacts as soon as negative effects from mining related activities become apparent. ○ The method of monitoring must be designed to be subjective and repeatable in order to ensure consistent results. • Faunal impact mitigation should include: ○ No areas falling outside of the footprint area may be cleared for construction or mining purposes; ○ As far as possible avoid placing any infrastructure within sensitive areas; ○ The footprint of the proposed mine should be kept to the minimum; ○ The footprint and daily operation of surface infrastructure must be strictly monitored to ensure that edge effects from the operational facilities do not affect the surrounding habitat units. The significance of the impact on the ecology of the area will be largely linked to the degree to which this can be implemented; ○ No trapping, collecting or hunting of faunal species must be allowed during any phases of the proposed mining development; ○ Sensitive faunal habitat and associated buffer zones adjacent to footprint areas must be designated as No-Go		

Studies undertaken	Recommendations of specialists	Specialist recommendations that have been included in the EIA report (mark with an x)	Reference to applicable section in this report
	areas and no mining vehicles, personnel, or any other mining related activities are to encroach upon these areas; ○ All voids, or open pits must be fenced off in order to prevent faunal species falling into such features; ○ As far as possible the existing road network is to be used, limiting further impact as a result of the construction of new roads; ○ Restrict vehicles to designated roadways to limit the ecological footprint of the construction and operational activities as well as to reduce the possibility of collisions with faunal species; ○ Prohibit uncontrolled fires within the study area; ○ Site clearing should occur within phases, enabling faunal species to naturally move to surrounding natural areas. During this time of clearing it is recommended that fences are removed in the affected sections so as to enable easy movement of faunal species out of the areas being cleared; ○ Where possible the removal of large established trees must be avoided, as these provide breeding and roosting sites for raptor species occurring within the region • A faunal monitoring plan must be designed and implemented throughout all phases of the mining development, should it be approved It is recommended that monitoring activities be conducted on an annual basis. The following points aim to guide the design of the monitoring plan, and it must be noted that the monitoring plan must be continually updated and refined for site-specific requirements: ○ It is recommended that monitoring points must be established in areas surrounding the mining area. These points must be designed to accurately monitor the following parameters: - Species diversity (mammal, invertebrate, amphibian, reptile and avifaunal); - Species abundance; and - Faunal community structure including species composition and diversity which should be compared to pre-development conditions. ○ The following methods aim to guide the monitoring plan, although more detailed, site specific methods must be employed during the development and implementation of the monitoring plan: - Monitoring activities must take place on an annual basis as a minimum; - Pitfall traps can be installed to monitor invertebrate diversity; - Sherman traps can be installed to monitor small mammal diversity; - Fixed and random points for bird counts to determine species composition and diversity trends; ○ Results of the monitoring activities must be taken into account during all phases of the proposed mining development and action must be taken to mitigate impacts as soon as negative effects from mining related activities become apparent. ○ The method of monitoring must be designed to be subjective and repeatable in order to ensure consistent results.		

Studies undertaken	Recommendations of specialists	Specialist recommendations that have been included in the EIA report (mark with an x)	Reference to applicable section in this report
	• Based on the findings of the wetland ecological assessment, several recommendations are made to minimise the impact on the wetland ecology of the area, should the proposed mining project proceed: ○ Measures to contain and reuse as much water as possible within the mine process water system and water from dewatering of operational areas should be sought; ○ All storm water and pollution control dams should be lined; ○ Very strict control of water consumption must take place and detailed monitoring must take place and where all water usage must continuously be optimised; ○ Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of clean water runoff areas which recharge the receiving wetland environment; ○ All mining infrastructure should remain out of the wetland zones and associated buffer zones in line with the requirements of Regulation GN704 of the National water Act; ○ No dirty water runoff must be permitted to reach the wetland resources during the entire life of mine, and clean and dirty water management systems must be put in place to prevent the contaminated runoff (suspended solids and salts and water with low pH) from entering the receiving aquatic environment. Clean and dirty water runoff systems should be constructed before construction of any other infrastructure takes place; ○ Strict control of sewage water treatment must take place and the sewage system should form part of the mine's closed process water system; ○ All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs; ○ Any dirty water runoff containment facilities must remain outside of the defined wetland areas and their buffers as a measure to minimise the impact on the receiving environment; ○ Adequate storm water management must be incorporated into the design of the proposed mine development in order to prevent erosion and the associated sedimentation of the wetland areas. In this regard special mention is made of: - Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed; - Runoff from paved surfaces should be slowed down by the strategic placement of berms; and - All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff of the facilities. ○ During any construction phase or exploration drilling activities no vehicles should be allowed to indiscriminately drive through the wetland systems and vehicles must remain on designated roadways; ○ During the construction and operational phases of the proposed mining development erosion berms should be installed on roadways to prevent gully formation and siltation of the wetland resources. The following points should serve to guide the placement of erosion berms: - Where the track has slope of less than 2%, berms every 50m should be installed; - Where the track slopes between 2% and 10%, berms every 25m should be installed; - Where the track slopes between 10%-15%, berms every 20m should be installed;		

Studies undertaken	Recommendations of specialists	Specialist recommendations that have been included in the EIA report (mark with an x)	Reference to applicable section in this report
	- Where the track has slope greater than 15%, berms every 10m should be installed; ○ No dumping of waste should take place within the riparian wetland. If any spills occur, they should be immediately cleaned up; ○ All areas affected by stockpiling during the operational phase of the mine should be rehabilitated and stabilised using cladding or a suitable grass mix to prevent sedimentation of the wetland resources in the area; ○ Throughout the life of mine measures to control alien vegetation must be implemented. • Wetland Monitoring ○ Close monitoring of surface water quality must take place. Monitoring of water quality should take place at a minimum frequency of once a month during which time major salts and basic metals, are monitored along with basic parameters such as pH, TSS and TDS, dissolved oxygen and EC; ○ Toxicity testing of the mine process water facilities should take place concurrently with the biomonitoring program in order to monitor the toxicological risk of the process water system to the receiving environment. Tests should include the following test organisms as a minimum: - Vibrio fischeri; - Poecilia reticulata - Daphnia pulex; and - Algal Growth Potential. ○ The mine must be managed as a zero discharge facility, however definitive toxicological testing according to the DEEEP protocol should take place should it become evident that process water discharge or decant of groundwater will occur for safety reasons in order to define safe discharge volumes and ensure sufficient dilution. • In order to ensure that impact mitigation takes place to an adequate level should mining proceed it is deemed essential that a Biodiversity Action Plan (BAP) be developed which contains details on all actions that need to be undertaken to manage impacts on the ecology of the region. In addition the BAP and its implementation should be overseen by an environmental panel which should include representatives from the mine and any relevant local stakeholders like farmers. The BAP should also be seen as a living document and must be continuously updated based on the findings of management and the ecological monitoring program. The actions required from the BAP should be implemented into a fully automated Environmental Management System (EMS).		
Surface water	• Careful management of mining infrastructure around wetland pan locations is recommended so that potential impacts of the mine are minimised • As per principal one of the DWA Best Practice Guideline - A1 and requirements stipulated in the GN 704, clean stormwater runoff must be kept clean and be routed to a natural watercourse by a system separate from the dirty water system, while preventing or minimising the risk of mixing clean and dirty stormwater runoff. • As per principle two of the Best Practice Guideline - A1 and requirements stipulated in the GN 704, dirty water must be collected and contained in a system separate from the clean water system and the risk of spillage or seepage into the clean water systems must be minimised	X	Section 27 and Section 29

Studies undertaken	**Recommendations of specialists**	**Specialist recommendations that have been included in the EIA report (mark with an x)**	**Reference to applicable section in this report**
Air quality	• For the control of vehicle entrained dust it is recommended that water be applied in combination with dust palliative to stabilise the surface and prevent dust. Literature reports an emissions reduction efficiency of up to 80%. In addition, vehicle speeds should be controlled. • Crushers and screens should be fitted with dust suppression systems and if practically possible should be enclosed • In minimizing windblown dust from stockpile areas, water sprays can be used to keep surface material moist and wind breaks installed to reduce wind speeds over the area. • In the transportation of ore and products, trucks, where possible should be well covered in order to avoid spillages. This will reduce the release of PM emissions • To ensure lower diesel exhaust emissions, equipment suppliers or contractors should be required to ensure compliance with appropriate emission standards for mining fleets. • It is recommended that, as a minimum, continuous dustfall, PM10 and PM2.5 sampling be conducted as part of the project's air quality management plan	X	Section 27 and Section 29
Noise	• For general activities the following good engineering practice should be applied: o All diesel powered equipment and plant vehicles should be kept at a high level of maintenance. This should particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment should serve as trigger for withdrawing it for maintenance. o To minimise noise generation, vendors should be required to guarantee optimised equipment design noise levels. o A mechanism to monitor noise levels, record and respond to complaints and mitigate impacts should be developed. o Blasting at the surface will be audible over long distances and may cause a startling reaction at receptors in close proximity. This can be mitigated by adhering to blast schedules that have been communicated to the affected parties. • In general, road traffic noise is the combination of noise from individual vehicles in a traffic stream and is considered as a line source if the density of the traffic is high enough to distinguish it from a point source. The following general factors are considered the most significant with respect to road traffic noise generation: o Traffic volumes i.e. average daily traffic. o Average speed of traffic. o Traffic composition i.e. percentage heavy vehicles. o Road gradient. o Road surface type and condition. o Individual vehicle noise including engine noise, transmission noise, contact noise (the interaction of tyres and the road surface, body, tray and load vibration and aerodynamic noise	X	Section 27 and Section 29

Studies undertaken	Recommendations of specialists	Specialist recommendations that have been included in the EIA report (mark with an x)	Reference to applicable section in this report
	• In managing transport noise specifically related to trucks, efforts should be directed at: o Minimizing individual vehicle engine, transmission and body noise/vibration. This is achieved through the implementation of an equipment maintenance program. o Minimize slopes by managing and planning road gradients to avoid the need for excessive acceleration/deceleration. o Maintain road surface regularly to avoid corrugations, potholes etc. o Avoid unnecessary idling times. o Minimizing the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. Alternatives to the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that it is 5 to 10 dB above the noise level in the vicinity of the moving equipment. The promotional material for some smart alarms does state that the ability to adjust the level of the alarm is of advantage to those sites 'with low ambient noise level. • In the event that Coza receives noise related complaints during either construction or operation, then Coza should consider conducting short term (24-hour) ambient noise measurements as part of investigating the complaints. The results of the measurements should be used to inform any follow up interventions. The following procedure should be adopted for all noise surveys: o Any surveys should be designed and conducted by a trained specialist. o Sampling should be carried out using a Type 1 sound level meter (SLM) that meets all appropriate International Electrotechnical Commission (IEC) standards and is subject to annual calibration by an accredited laboratory. o The acoustic sensitivity of the SLM should be tested with a portable acoustic calibrator before and after each sampling session. o Samples of at least 24 hours in duration and sufficient for statistical analysis should be taken with the use of portable SLM's capable of logging data continuously over the time period. Samples representative of the day- and night-time acoustic climate should be taken. o The following acoustic indices should be recorded and reported: - LAeq (T) - Statistical noise level LA90, - LAmin and LAmax - Octave band or 3rd octave band frequency spectra. o The SLM should be located approximately 1.5 m above the ground and no closer than 3 m to any reflecting surface. o Efforts should be made to ensure that measurements are not affected by the residual noise and extraneous influences, e.g. wind, electrical interference and any other non-acoustic interference, and that the instrument is operated under the conditions specified by the manufacturer. It is good practice to avoid conducting measurements when the wind speed is more than 5 m/s, while it is raining or when the ground is wet.		

Studies undertaken	**Recommendations of specialists**	**Specialist recommendations that have been included in the EIA report (mark with an x)**	**Reference to applicable section in this report**
	○ A detailed log and record should be kept. Records should include site details, weather conditions during sampling and observations made regarding the acoustic climate of each site.		
Traffic impact assessment	• It would be advisable to surface at least the bell-mouth area of the gravel roads leading into the intersection. It is also proposed that a right-turn refuge lane with a by-pass lane be provided on the provincial R325 road to improve safety. The right-turn lane should be provided according to the Northern Cape provincial road standards.	X	Section 27
Heritage/cultural and palaeontological	• Palaeontology: The EAP as well as the ECO for this project must be made aware of the fact that sediments of the Gamagara and Ongeluk Formations, Olifanthoek Group, contain significant fossil remains, albeit mostly stromatolite structures and micro-fossils. The calcrete deposits can contain significant remains of Tertiary aged animals. ○ A High Palaeontological sensitivity is allocated to surface limestones and a Moderate Sensitivity to the rest of the area. If any fossils, most notably stromoatolite structures, are recorded during investigations of the ore bodies the ECO must be notified and a qualified palaeontologist must be appointed to report these finds to SAHRA by conducting of a Phase 1 PIA investigation. • Heritage: Mitigation would be required for all the sites as follows: ○ JNK 1 - A collection of the lithics should be made as the locality was clearly a focus point on the landscape and was frequented by hunting and gathering groups. - In addition, an investigation using Shovel Test Pits (STP's) in the red sands will establish whether subsurface deposits are indeed present. - The proposed infrastructural developments include the construction of offices on the ridge above the site. It is proposed that the lithic collection may be housed at the office to serve as a small exhibition on the prehistory of the local region. - A permit would be required from the South African Heritage Agency (SAHRA) for the mitigation measures as well as the small exhibition of collected material. - The mitigation proposed here may only be undertaken under the auspices of a suitably qualified and experienced Stone Age specialist. ○ JNK 2 - The farmhouse and farmstead in its entirety must be recorded using photographs and a surveyed site layout plan. - The farmhouse and structures in its immediate surroundings (including the outside toilet and small rectangular structure with annex) must be recorded with measured drawings and photographs. Such measures drawings must include facades and plans. - A report must be compiled containing the results of the recording activity. - An application must be lodged with the relevant heritage authority to obtain a permit allowing for the disturbance to the old farmhouse and adjacent structures.	X	Section 27

Studies undertaken	Recommendations of specialists	Specialist recommendations that have been included in the EIA report (mark with an x)	Reference to applicable section in this report
	○ JNK 3 - In view of the future development it is recommended that the pan site should be mitigated through sampling of lithics from areas of higher densities. - A Phase 2 Archaeological Mitigation report must be compiled. - The abovementioned report and destruction permit application must be lodged with the South African Heritage Resources Agency (SAHRA). - The mitigation proposed here may only be undertaken under the auspices of a suitably qualified and experienced Stone Age specialist. ○ JNK 4 (An attempt must be made to preserve the possible grave in situ. To achieve this, the following would be required): - Demarcate a 5m buffer around the possible grave. - Erect a fence (preferably a palisade one) with lockable gate around the possible grave. - In the event that the possible grave cannot be excluded from the development footprint, a grave relocation process, as outlined below, needs to be implemented. Wherever a grave relocation is required it must include the following process: - A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin so as to obtain their consent for the relocation of the grave. This social consultation would also assist in obtaining information on the possible grave to see if it is indeed a grave or not. - Bilingual site notices indicating the intent of the excavation / relocation - Bilingual newspaper notices indicating the intent of the excavation / relocation - Permits from the relevant authorities. - An archaeological excavation of the possible grave to assess whether a grave is located here. - Should a grave be found, an exhumation process must be implemented that keeps the dignity of the remains and family intact and will safeguard the legal rights of the families as well as that of the development company. - The process must be done by a reputable company well versed in grave mitigation ○ JNK 5 - A collection of the lithics should be made as the locality was clearly a focus point on the landscape that was frequented over time. - In addition, an investigation through Shovel Test Pits (STP's) would establish whether subsurface deposits are present. - A Phase 2 Archaeological Mitigation report must be compiled. - The abovementioned report and destruction permit application must be lodged with the South African Heritage Resources Agency (SAHRA).		

Studies undertaken	**Recommendations of specialists**	**Specialist recommendations that have been included in the EIA report (mark with an x)**	**Reference to applicable section in this report**
	The mitigation proposed here may only be undertaken under the auspices of a suitably qualified and experienced Stone Age specialist. ○ JNK 6 - A 100m buffer area surrounding the rock shelter must be kept free of any - development. - The site must be recorded using accepted practice and techniques. - An archaeological monitoring program must be implemented to monitor the rock art site during the Construction and Mining Phases of the proposed development. Any impacts on the site identified during these monitoring visits must be addressed swiftly, including the recommendation and implementation of additional mitigation measures. Such measures may include the expansion of the buffer area and increased monitoring frequency. - The frequency of monitoring visits can start off at one visit every two weeks during the Construction and Mining Phases. Each of these monitoring visits must be preceded by a monitoring report containing the observations and photographs of the particular monitoring visit. Recommendations must also be made. - All monitoring must be undertaken by a suitable qualified and experienced archaeologist. ○ JNK 7 - The site must be recorded with photographs and a layout plan. - A permit application must be lodged with the South African Heritage Resources Agency (SAHRA) to allow for the subsequent mitigation measures to be implemented. - Once the permit is received, a metal detector must be used to investigate the site. This must be augmented by a Shovel Test Pits (STP's) investigation. Both techniques will be used to further assess and interpret the site. - A Phase 2 Archaeological Mitigation report must be compiled. - The abovementioned report and destruction permit application must be lodged with the South African Heritage Resources Agency (SAHRA). - The mitigation proposed here may only be undertaken under the auspices of a suitably qualified and experienced archaeologist.		
Economic and sustainability land use analysis	• ensure adequate management and financial resources are made available to fully implement the mitigation measures as outlined in EIA and EMP; • ideally develop specific socio-economic mitigation measures and corporate social investment strategies in consultation with the relevant authorities to ensure progress towards achieving the national, provincial and local government priorities.	Not applicable	Section 27
Closure cost assessment	Not applicable	Not applicable	Section 27

11 ENVIRONMENAL IMPACT STATEMENT

11.1.1 SUMMARY OF KEY FINDINGS OF THE EIA

This section provides a summary of the findings of identified and assessed potential impacts on the receiving environment in both the unmitigated and mitigated scenarios, including cumulative impacts. A summary of the potential impacts (as per Section 9), associated with the chosen alternatives (as per Section 7), in the unmitigated and mitigated scenarios for all project phases is included in Table 44 below.

TABLE 44: SUMMARY OF POTENTIAL IMPACTS

Section	Potential impact	Significance of the impact (the ratings are negative unless otherwise specified)	
		Unmitigated	Mitigated
Geology	Loss and sterilization of mineral resources	H	L
Topography	Hazardous excavations and infrastructure	H	L
Soils and land capability	Loss of soil resources and land capability through contamination	M	L
	Loss of soil resources and land capability through physical disturbance	H	L
Biodiversity	Physical destruction of biodiversity	H	M
	General disturbance of biodiversity	H	L
Surface water	Contamination of surface water resources	M	L
	Alteration of natural drainage patterns	M	L
Groundwater	Contamination of groundwater resources	M	L
	Reduction of groundwater levels and availability	L	L
Air quality	Air pollution	High	M (L for dust fallout)
Noise	Noise pollution	M	L
Blasting	Blasting impacts	H	M
Traffic	Road disturbance and traffic safety	H	M
Visual	Visual impacts	M	M (L at closure)
Heritage, palaeontological and cultural resources	Loss of heritage, palaeontological and cultural resources	H	M
Socio-economic	Economic impact	H^+	H^+
	Inward migration	H	M
Land use	Land use impact	H	M (L at closure)

The assessment of the proposed project presents the potential for significant negative impacts to occur (in the unmitigated scenario in particular) on the bio-physical, cultural and socio-economic environments both on the project sites and in the surrounding area. With mitigation these potential impacts can be prevented or reduced to acceptable levels.

It follows that provided the EMP is effectively implemented there is no environmental, social or economic reason why the project should not proceed.

11.1.2 FINAL SITE MAP

The final preferred site layout plan is included in Appendix G.

11.1.3 SUMMARY OF THE POSITIVE AND NEGATIVE IMPLICATIONS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES

A detailed discussion of the positive and negative implications and risks of the proposed activity and identified alternatives is provided in Section 7.7. The environmental implications and risks for soil, groundwater, visual, air, noise, land use, economic impact and inward migration are the same for both site layout Options 1 and 2. Option 1 will however require the disturbance of high biodiversity sensitive areas and the destruction of heritage resources whereas Option 2 will allow for sensitive biodiversity areas and heritage resources to be avoided to a larger extent.

With reference to Section 7.7, Option 1 presents an infrastructure layout which is deemed to be the most economically preferable layout and Option 2 allows for infrastructure placement to have been optimised and strategically arranged in order to limit impacts to sensitive biodiversity areas (Figure 8).

It follows that Option 2 is the preferred alternative as indicated in Section 7.7.

11.2 PROPOSED MANAGEMENT OBJECTIVES AND OUTCOMES FOR ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

Specific environmental objectives to control, remedy or stop potential impacts emanating from the proposed project is provided in Table 45 below.

TABLE 45: ENVIRONMENTAL OBJECTIVES AND OUTCOMES

Aspect	Environmental objective	Outcome
Geology	To prevent unacceptable mineral sterilisation	Avoid mineral sterilisation
Topography	To prevent physical harm to third parties and animals from potentially hazardous excavations and infrastructure	To ensure the safety of people and animals
Soil and land capability	To prevent soil pollution and to minimise the loss of soil resources and related land capability through physical disturbance, erosion and compaction	To handle, manage and conserve soil resources to be used as part of rehabilitation and re-establishment of the pre-mining land capability
Biodiversity	To prevent the unacceptable disturbance	To limit the area of disturbance as far as

Aspect	Environmental objective	Outcome
	and loss of biodiversity and related ecosystem functionality through physical destruction and disturbance	practically possible
Surface water	To prevent pollution of surface water resources and related harm to surface water users (if any) and to prevent unacceptable alteration of drainage patterns and related reduction of downstream surface water flow	To ensure that the reduction of the volume of run-off into the downstream catchment is limited to what is necessary and that natural drainage patterns are re-established as part of rehabilitation.
Groundwater	To prevent pollution of groundwater resources and related harm to water users and to prevent losses to third party water users.	To ensure groundwater quality remains within acceptable limits for both domestic and agricultural purposes. To ensure that groundwater continues to be available to current users.
Air	To prevent air pollution health impacts	To ensure that any pollutants emitted as a result of the proposed project remains with acceptable limits at the nearest sensitive receptor sites
Noise	To prevent unacceptable noise impacts	To ensure that any noise generated as a result of the proposed project remain within acceptable limits
Visual	To limit negative visual impacts	To ensure visual views that complement the surrounding environment as far as is practically possible
Traffic	To reduce the potential for safety and vehicle related impacts on road users	To ensure the mine's use of public roads is done in a responsible manner
Blasting	To minimise the potential for third party damage and/or loss	To protect third party property from proposed project-related activities, where possible Where damage is unavoidable, to work together with the third parties to achieve a favourable outcome To ensure public safety
Heritage, cultural and palaeontological	To prevent unacceptable loss of heritage resources and related information	To protect resources where possible. If disturbance is unavoidable, then mitigate impact in consultation with a specialist and the SAHRA and in line with regulatory requirements
Socio-Economic	To enhance the positive economic impacts and limit the negative economic impacts	To work together with existing structures and organisations
Inward migration	To limit the impacts associated with inward migration	To establish and maintain a good working relationship with surrounding communities, local authorities and land owners
Land uses	To prevent unacceptable impacts on surrounding land uses and their economic activity	To co-exist with existing land uses To negatively impact existing land uses as little as possible

11.2.1 IMPACTS THAT REQUIRE MONITORING PROGRAMMES

Outcomes of the environmental objectives are the implementation of monitoring programmes. Impacts that require monitoring include:

- Hazardous excavations and structures

- Physical destruction and general disturbance of biodiversity
- Pollution of surface water resources (when possible)
- Contamination of groundwater
- Depletion of groundwater resources
- Increase in air pollution
- Increase in noise levels
- Blasting damage
- Traffic increase and road use

11.2.2 ACTIVITIES AND INFRASTRUCTURE

The source activities of potential impacts which require management are detailed in Section 4.1 and listed below.

- Site preparation
- Earthworks
- Civil works
- Open pit mining
- Processing plant
- Transportation
- Mineralised waste
- Non-mineralised waste
- Water supply, use and management
- Power supply and use
- Supporting services
- General site management
- Demolition
- Rehabilitation
- Maintenance and aftercare

11.2.3 MANAGEMENT ACTIONS

Management actions which will be conducted to control the project activities or processes which have the potential to pollute or result in environmental degradation are detailed in Section 27.

11.2.4 ROLES AND RESPONSIBILITIES

The key personnel to ensure compliance to this EMP report will be the operations executive, the environmental department manager and the stakeholder engagement manager. As a minimum, these roles as they relate to the implementation of monitoring programmes and management activities will include:

- Senior Operational Manager and Environmental Department Manager
  - Ensure that the monitoring programmes and audits are scoped and included in the annual mine budget
  - Identify and appoint appropriately qualified specialists/engineers to undertake the programmes
  - Appoint specialists in a timeously manner to ensure work can be carried out to acceptable standards

- Stakeholder engagement department:
  - Liaise with the relevant structures in terms of the commitments in the SLP
  - Ensure that commitments in the SLP are developed and implemented timeously
  - Establish and maintain good working relations with surrounding communities and landowners
  - Facilitate stakeholder communication, information sharing and grievance mechanism

12 FINAL PROPOSED ALTERNATIVES

The preferred alternatives for the proposed project include the following:

- Site layout option 2 which includes the optimisation of infrastructure layout to limit the disturbance to environmentally sensitive areas.
- The use of water from on-site boreholes.
- The construction of rail infrastructure at the mine that will link to Transnet Freight Rail's domestic route.
- Sourcing of power from the BKM substation.

For the details pertaining to how these alternatives were selected refer to sections 7.1 and 7.7. The environmental impact assessment provided in Section 9 is based on these alternatives. It follows that the impact management objectives and measures were identified to manage and mitigate impacts associated with the above listed alternatives.

13 ASPECTS FOR INCLUSION AS CONDITIONS OF THE AUTHORISATION

Management measures including monitoring requirements as outlined in Sections 27 and 29 need to form part of the conditions of the environmental authorisation. With reference to Section 26 of GN.982 of NEMA, additional conditions that need to form part of the environmental authorisation that are not specifically included in the EIA and EMP report include the following:

- Coza should appoint an Environmental Control Officer (ECO) for the duration of the construction phase afterwhcih an Environmental Manager should be appointed to manage the next phases of the operation.
- Coza must comply with all applicable environmental legislation whether specifically mentioned in this document or not and which may be amended from time to time.

14 ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

Assumptions, uncertainties and limitations associated with the proposed project are included below.

14.1 ENVIRONMENTAL ASSESSMENT LIMIT

The EIA and EMP focused on third parties only and did not assess health and safety impacts on workers because the assumption was made that these aspects are separately regulated by health and safety legislation, policies and standards, and that Coza will adhere to these.

14.2 PREDICTIVE MODELS IN GENERAL

All predictive models are only as accurate as the input data provided to the modellers. If any of the input data is found to be inaccurate or is not applicable because of project design changes that occur over time, then the model predictions will be less accurate.

14.3 SOILS AND LAND CAPABILITY

The assumptions and limitations made as part of the soils and agricultural potential study include the following (ARC, January 2016):

- The soil information provided is at 1:250 000 scale, and has not been ground-truthed. However, the existing reconnaissance information, supported by the climatic characteristics of the area, indicate that this is a low potential area for agriculture. A previous study in the nearby vicinity (Paterson & Oosthuizen, 2013) did involve a ground-truthing phase, where the field study confirmed that the soils were generally very limiting for agriculture. It can be expected that the same situation will exist in the area covered by this report.

14.4 BIODIVERSITY

The assumptions and limitation made as part of the biodiversity impact assessment include the following (SAS, February 2016):

- The terrestrial and wetland assessment was confined to the study area and therefore does not include the neighbouring and adjacent properties. These were, however, considered as part of the desktop assessment;
- The time of the assessment took place over a period where rainfall was low. Thus, not all species would have been noted that would normally occur within a higher rainfall period;
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the study area may therefore have been missed during the assessment;
- Due to the nature and habits of most faunal taxa it is unlikely that all species would have been observed during a site assessment of limited duration. Therefore, site observations are compared with literature studies where necessary;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked;
- Due to the majority of wetland features being highly ephemeral within the region where the study area is located, very few areas were encountered that displayed more than one wetland characteristic as defined by the DWA (2005) method. As a result, the identification of the outer boundary of temporary zones proved difficult in some areas and in particular in the areas where wetland conditions are marginal.
  - The wetland delineation as presented in this report is regarded as a best estimate of the wetland boundary based on the site conditions present at the time of assessment within the pans and drainage line features; and
  - The outer boundary of the temporary wetland zones of the pans was not mapped since the wetland area in most pans was extremely small and isolated to a small area in the deepest part of the pan. Instead, the entire pan was delineated as either a Wetland pan or a Terrestrial pan.
- Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required the wetland will need to be surveyed and pegged according to surveying principles;
- Wetlands and terrestrial areas form transitional areas where an ecotone is formed as vegetation species change from terrestrial species to facultative wetland species. Within this transition zone some variation of opinion on the wetland boundary may occur, however, if the DWA (2005) method is followed, all assessors should get largely similar results; and
- The level of detail undertaken in the study is considered sufficient to ensure that the results of this assessment accurately define the Ecological Importance and Sensitivity (EIS) and the Present Ecological State (PES) of the study area and to provide the relevant planners and decision makers

with sufficient information to formulate an opinion on the viability of the proposed development from an ecological conservation viewpoint.

14.5 SURFACE WATER

The limitation associated with the flow peak determination methods is that the recommended flows determined take into account a comprehensive review of available data. It should however be noted that with any ungauged catchment, there remains significant uncertainties associated with flood estimation.

The water balance assumes the following (Jeffares & Green, January 2016):

Variable	Value	Comment
Climate		
Mean Annual Rainfall (mm)	322	Obtained from WR2012 for Quaternary Catchment D73A
Mean Annual Evaporation (mm)	2 450	Obtained from WR2012 for Evaporation Zone 7A
Mine Layout		
Pollution Control Dam Area (m^2)	2 500	Based on Stormwater Management Plan Recommendations
Raw / Process Water Dam Area (m^2)	64	Information Provided (Diameter of 20 m)
Potable Water Dam Area (m^2)	24	Information Provided (Diameter of 8 m)
Jenkins Pit Area (m^2)	350 460	Measured from layout plan provided
Crushing, Screening & Stockpile Area (m^2)	1 325 000	Measured from layout plan provided.
Workshop Area (m^2)	18 000	Measured from layout plan provided
Pollution Control Dam Volume (m^3)	5 000	Combined capacity of both Pollution Control Dams
Jenkins pit surrounding catchment area	-	Assumed diversion berms will be placed around the open pit
Water Requirements		
Dust Suppression (m^3/month)	915	Provided by the Client
Wash Bay (m^3/month)	61	Assumed individual area uses, however, the figure of 75 m^3/day or 2 350 m^3/month for process water demands (i.e. water used at the washbay, working faces and drill rigs) was provided by the client.
Working Faces/shovel (m^3/month)	1 067.5	
Drill Rigs (m^3/month)	152.5	
Potable Water (m^3/month)	1 510	As provided by the client. 180 staff using 50 ℓ per person per day and 270 staff using 150 ℓ per day
Groundwater Ingress – Jenkins Pit		
Average Ground Water Ingress Years 1 to 6 (m^3/day)	0	Provided by the client.
Average Ground Water Ingress Year 7 (m^3/day)	215	
Average Ground Water Ingress Year 8 (m^3/day)	190	
Average Ground Water Ingress Year 9 (m^3/day)	180	
Average Ground Water Ingress Year 10 (m^3/day)	375	

14.6 GROUNDWATER

The assumptions and limitations that were made as part of the groundwater assessment (Groundwater Complete, January 2016) are discussed below.

- Numerous sources indicate a large number of geological structures (mainly dykes) exist in the project area. Time and budget restrictions made it virtually impossible to determine the hydraulic properties of each and every structure. Nonetheless, all dykes were simulated in the numerical flow and mass transport models.
- Aquifer delineation is conducted to show which part of the aquifer was used or considered during simulation exercises. Because the main aquifer is a fractured rock type and fractures could assume any geometry and orientation, the physical boundary or 'end' of the aquifer is very difficult to specify or quantify. No-flow boundaries were used in areas where geological information indicated dykes to occur, while general head boundaries were used to delineate the remaining model perimeter where structural information was lacking.
- Aquifer thickness in a fractured rock aquifer is virtually impossible to determine as the actual 'aquifer' consists of transmissive fractures, fissures or cracks of any orientation, extent or aperture in any of the rock types underlying the site. Therefore, an approximation can at best be made on the thickness of the aquifer.
- The groundwater level distribution throughout the project area is considered to be good. However, some areas are devoid of such information and the commonly used Bayesian interpolation method was used to estimate water levels in these areas.
- Constant rate pump tests were performed on three exploration boreholes and two user boreholes in the project area for the purpose of calculating representative aquifer parameters. Fractured rock aquifers are known for being highly heterogeneous, causing significant variations in aquifer transmissivity/storativity within relatively short distances. It is therefore difficult to determine representative values over large areas. The calculated aquifer parameters were used as indicative values only and model calibration aided in obtaining representative values.
- A secondary fractured rock aquifer (such as the one underlying the Jenkins Project area) is a highly complex system and is by no means homogeneous. Coupled with numerous model restrictions, over or under estimations of the predicted groundwater impacts should be expected (quality and quantity). The model results should therefore only be regarded as being qualitative rather than quantitative for use in planning of management and mitigation measures. The model results/predictions also need to be verified and updated regularly by means of a comprehensive groundwater monitoring program.

14.7 GEOCHEMISTRY

The following assumptions were made as part of the qualitative geochemistry (waste assessment) comments made by SLR.

- The qualitative/theoretical results of the waste assessment are based on SLR's experience in similar waste assessments for overburden/waste rock in the Northern Cape region and in this regard no site specific or proxy samples were available.

- It is recommended that for the purposes of the WULA, a waste assessment on representative samples of waste rock material be undertaken.

14.8 AIR QUALITY

The assumptions and limitations that were made as part of the air quality impact assessment include the following (Airshed, February 2016):

- The focus of this assessment is on mining activities at Jenkins. Although other existing sources of emission within the area were identified, such sources were not quantified.
- All project information required to calculate emissions for proposed operations were provided by SLR.
- Routine emissions from mining operations were estimated and simulated.
- In the absence of on-site meteorological data, use was made of data recorded near Postmasburg.
- A minimum of 1 year, and typically 3 to 5 years of meteorological data are generally recommended for use in atmospheric dispersion modelling for air quality impact assessment purposes. Approximately 3 years of meteorological data were available for use in atmospheric dispersion modelling simulations.
- The impact assessment was limited to airborne particulates (including TSP, PM10 and PM2.5) and gaseous pollutants from vehicle exhausts, including CO, DE, NOx, VOCs and SO2.
- Nitrogen monoxide (NO) emissions are rapidly converted in the atmosphere into the much more poisonous nitrogen dioxide (NO2). NO2 impacts where calculated by AERMOD using the ozone limiting method assuming constant monthly average background ozone concentrations of ranging between 51 and 78 µg/m3 (as obtained from the Postmasburg monitoring station data set) and a NO2/NOx emission ratio of 0.2 (Howard, 1988).
- The 2014 assessment of Doornpan indicated that CO, SO2 and VOC concentrations as a result of diesel vehicle exhaust emissions are generally very low and only a fraction of associated air quality criteria (von Reiche, 2014). The same trend is expected at Jenkins. Although emissions were quantified, dispersion simulations were not conducted for these pollutants.
- Construction and decommissioning phase impacts were not quantified. Impacts associated with this phase are highly variable and less significant than operational phase impacts as shown in the assessment for Doornpan (von Reiche, 2014). Mitigation and management measures recommended for the operational phase are however also applicable to the construction and closure phases.
- The estimation of greenhouse gas (GHG) emissions was not included in the scope of work but reference made to draft GHG emission reporting regulations.

14.9 NOISE

The assumptions and limitations that were made as part of the noise impact assessment include the following (Airshed, February 2016):

- The study excluded the assessment of the impact of blasting. The 'noise' aspect of blasting is referred to as the air blast overpressure. Predicting the noise caused by the air overpressure generated during a blasting event is a highly complex process. The air overpressure consists of air transmitted sound pressure waves that move outwards from an exploding charge.
- All mining activities were conservatively assumed to be at the surface of pit area. The mitigating effect of pit walls and the waste rock dump were not accounted for.
- Although the focus of this assessment is on mining activities at Jenkins, the COZA Iron Ore Project includes mining on the farms Doornpan and Driehoekspan. The distance between Jenkins and the Doornpan/Driehoekspan portions is such that cumulative noise impacts are unlikely.
- The quantification of sources of noise was restricted to proposed operations at Jenkins. Although other existing sources of emission within the area were identified, such sources were not quantified but are taken account of in ambient baseline noise level measurements.
- All project information required to calculate noise impacts was provided by SLR.
- Routine noise impacts from mining operations were estimated and modelled.
- In the absence of on-site meteorological data, use was made of data recorded near Postmasburg.

14.10 HERITAGE/ CULTURAL AND PALAEONTOLOGICAL RESOURCES

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

- Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.
- The findings of the specialist report is based on an intensive walkthrough of all the proposed development footprint areas located within the Remainder and Portion 1 of the farm Jenkins 562. As such, no fieldwork was undertaken outside these footprint areas and outside these farm portions. Should any footprints be identified which falls outside of the ones assessed as part of this study, such additional footprints will have to be assessed by a heritage specialist to ensure that no detrimental impact takes place to the heritage fabric of the area.

14.11 ECONOMIC LAND USE AND SUSTAINABILITY

The following assumptions and limitations apply to the economic impact and sustainability analysis assessment:

- Entire portion Jenkins farm, which constitutes a lease area of 824ha was assumed to impacted upon and as a result no environmental buffer zone was applied in any of the calculations;
- The information supplied in relation to employment opportunities, income generation, life of mine, etc. by the client is an accurate reflection of the activities during construction, operational and closure phases of the proposed project;
- A discount factor of 12% as advised by the client was used to calculate the net present value calculations;
- Operational life was taken as 10 years;
- information which were used in some of the agricultural calculations were sourced from third parties. Errors with this information could possible effect the results of the calculations and therefore the assessment;
- It was assumed that 70% of capital investment will be spent nationally and 30% will be spent locally and regionally;
- 100% of the employment value was assign to local and regional;
- Land values are based on average land values in the region, however the true value of the land is determined by a range of factors and will therefore most likely be higher or lower than the value used in this report.

In addition, the following information was not available at the time that the specialist study was undertaken:

- Capital Expenditure
- Amount of Jobs to be created during the construction phase
- Planned amount to be spend on wages construction and operational phase

14.12 TRAFFIC IMPACT ASSESSMENT

Assumptions relevant to the traffic impact assessment include (TTT Africa, February 2016):

- Due to the closure of some of the local mines, traffic on the local road network has reduced. However, a more conservative traffic growth rate has been applied to the 2013 traffic counts. A growth rate of five percent per annum was applied to these counts to allow for the background traffic growth along the R325.

14.13 CLOSURE COST ESTIMATE

The closure cost estimate for the proposed project was based on the following assumptions (SLR, March 2016):

- No allowance for salvage and recycled/scrap material has been considered; and
- All infrastructure will be demolished and no handover of any facilities (for post closure use) has been allowed for.
- It is assumed that concurrent rehabilitation of the open pit will take place and therefore the costs for backfilling of the open pit are assumed to be catered for by the mine as part of its operational costs.

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

15.1.1 REASONS WHY THE ACTIVITY SHOULD BE AUTHORIZED OR NOT

The assessment of the proposed project presents the potential for significant negative impacts to occur (in the unmitigated scenario in particular) on the bio-physical, cultural and socio-economic environments both on the project site and in the surrounding area. With mitigation these potential impacts can be prevented or reduced to acceptable levels. It follows that provided the EMP is effectively implemented there is no environmental, social or economic reason why the project should not proceed.

15.1.2 CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORISATION

15.1.2.1 Specific conditions for inclusion in the EMPR

Refer to Section 13.

15.1.2.2 Rehabilitation Requirements

Refer to Section 28.1.1.

16 PERIOD FOR WHICH AUTHORISATION IS REQUIRED

The life of mine is expected to be approximately 7 to 10 years.

17 UNDERTAKING

I, Caitlin Hird, the Environmental Assessment Practitioner responsible for compiling this report, undertake that:

- the information provided herein is correct;
- the comments and inputs from stakeholders and I&APs has been included;
- inputs and recommendations from the specialist reports have been included where relevant.
- 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

Signature of EAP

Date

Signature of commissioner of oath

Date

18 FINANCIAL PROVISION

18.1.1 METHOD TO DERIVE THE AMOUNT TO MANAGE AND REHABILITATE THE ENVIRONMENT

TABLE 46: ESTIMATED COSTS FOR IMPLEMENTING TECHNICAL AND MANAGEMENT OPTIONS

Potential impact	Technical and management options	Estimated costs
Resources	• All options need to be implemented with input from a dedicated environmental management resource at the mine.	• R700 000.00
Auditing and annual review	• Biannual EMP performance assessment (external) • Annual review of closure cost estimate	• R60 000.00 (EMP performance assessment) • R300 000.00 (Closure cost update)
Hazardous structures	• Establish and maintain site security measures • Control site and facility access • Appropriate design of stockpiles with the potential to fail (and by qualified person) • Establish and maintain infrastructure security measures • Undertake third party awareness training	• Approximately 2 million to cover all aspects
Loss of soil resources	• Implement a site-specific soil management plan • Implement a non-mineralised waste management procedure (provide skips for waste sorting and waste removal contractor) • Rehabilitation of contaminated soils (as soon as possible)	• Approximately 1 million to cover all aspects
Biodiversity	• Apply for permit to disturb protected trees • Compile a biodiversity offset plan and implementation thereof • Implement a monitoring programme to remove alien and invasive species	• R30 000.00 (Tree removal permit as and when required) • R100 000 to 150 000 (Offset – once off) • R30 000 (Alien invasive species programme)
Alternation of drainage patterns	• Construction of stormwater controls (and by qualified person) •	• R2 700 000.00 (stormwater controls – once off) •
Surface water pollution	• Maintain stormwater controls and inspections • Update water balance on an annual basis	• R30 000.00 (water balance) • R60 000.00 (maintain stormwater controls and inspections)
Groundwater quality and quantity	• Implement a monitoring programme (quality and quantity). Where surface water resources are present, include these in the programme. • Installation of liners in relevant dams	• R400 000.00 (monitoring) • R 2 500 000.00 (liners – once off)
Air pollution	• Install dust monitoring buckets and implement monitoring programme • Implement a PM10/PM2.5 sampler and monitoring	• R150 000 (Dust bucket installation and monitoring) • R400 000 (PM10 and PM2.5 sampler and monitoring).
Disturbing noise	• Short term noise monitoring if required • Maintenance of equipment	• R80 000.00 (Noise sampling) • R280 000.00 (maintenance)

Potential impact	Technical and management options	Estimated costs
Landscape and visual	• Retain natural vegetation as screens • Paint buildings and structures in colours that reflect landscape • Careful use of night lights • Prevent litter	• Approximately R500 000.00
Blast hazards	• Design and implement blast to meet threshold criteria • Monitor blasts and installation of seismographs	• R200 000.00 (blast design and monitoring)
Traffic	• On-going training of staff • Maintenance of vehicles and of roads	• R150 000.00 (training) • R280 000 (maintenance)
Heritage	• Not applicable unless there are chance finds.	• R300 000 (mitigation)
Socio-economic	• Quarterly meetings	• R20 000.00

The estimated amount to manage and rehabilitate the environment is as presented above. It is however important to note that some of these costs are once-off and will only be required during the construction phase as part of implementing facilities.

18.1.2 CONFIRM THAT THE AMOUNT CAN BE PROVIDED FOR FROM OPERATING EXPENDITURE

The amount required in order to manage and rehabilitate the environmental is provided for in the operating costs.

19 DEVIATIONS FROM SCOPING REPORT AND APPROVED PLAN OF STUDY

19.1.1 DEVIATION FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

No deviations in terms of the methodology used to determine the significance of potential environmental impacts and risks were made as per the approved plan of study in the scoping report.

19.1.2 MOTIVATIONS FOR DEVIATION

Not applicable.

20 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

20.1.1 IMPACT ON THE SOCIO-ECONOMIC CONDITIONS OF ANY DIRECTLY AFFECTED PERSON

The impacts associated with socio-economic conditions are discussed in Appendix F. Management and mitigation measures identified to address any socio-economic impacts are included in Section 27. It is assumed that Coza will purchase the land owned by SIOC prior to any project related activities taking place. Provided that impacts are managed as presented in the EMP, it is expected that impacts on third parties will be limited.

20.1.2 IMPACT ON ANY NATIONAL ESTATE REFERRED TO IN SECTION 3(2) OF THE NATIONAL HERITAGE RESOURCES ACT

Not applicable as no national estate will be affected as part of the proposed project.

21 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT

No other matters are required in terms of Section 24(4)(A) and (B) of the act.

PART B – ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

22 DETAILS OF THE EAP

It is hereby confirmed that the details of the EAP who undertook the EIA and prepared this EMP are provided in Part A, Section 1 of the EIA report.

23 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

It is hereby confirmed that the activities covered by this EMP are fully described in Part A, Section 4 of the EIA report.

24 COMPOSITE MAP

A map indicated all surface infrastructure superimposed on the environmental sensitive areas of the preferred site is included in Appendix G.

25 DESCRIPTION OF THE IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

25.1 DETERMINATION OF CLOSURE OBJECTIVES

The closure objectives for the proposed project were determined taking into account the exiting type of environment as described in Section 7.4.1, in order to ensure that the closure objectives strive to achieve a condition approximating its natural state as far as possible. Further information pertaining to the closure objectives identified for the proposed project, refer to Section 28.1.1.

25.2 THE PROCESS FOR MANAGING ENVIRONMENTAL DAMAGE AS A RESULT OF UNDERTAKING THE ACTIVITY

The management measures outlined in Section 27 have been identified in order to manage and reduce impacts associated with the proposed project in order to prevent unnecessary damage to the environment as a result of the proposed project. In the event that incidents occur that may result in environmental damages the emergency response procedure as outlined in Section 30.2 will be implemented to avoid pollution or degradation.

25.3 POTENTIAL RISK OF ACID MINE DRAINAGE

As part of the proposed project a geochemistry analysis was undertaken. The results of the analysis indicate that there is no risk of acid mine drainage. Further information is provided in Section 7.4.1.1.

25.4 STEPS TAKEN TO INVESTIGATE, ASSESS AND EVALUATE THE IMPACT OF ACID MINE DRAINAGE

This section is not applicable as acid mine drainage is not associated with the proposed project.

25.5 ENGINEERING OR MINE DESIGN SOLUTIONS TO AVOID OR REMEDY ACID MINE DRAINAGE

This section is not applicable as acid mine drainage is not associated with the proposed project.

25.6 MEASURES IN PLACE TO REMEDY RESIDUAL OR CUMULATIVE IMPACT FROM ACID MINE DRAINAGE

This section is not applicable as acid mine drainage is not associated with the proposed project.

25.7 VOLUMES AND RATE OF WATER USE FOR MINING

The volumes of water required as part of the proposed project include the following:

- Potable water (50m^3/day or 1 509 m^3/month) (based on a staff compliment of 180 people using 50 litres per day and a further 270 people using approximately 150 litres per day)
- Process water (2190 m^3/month) (provided to Jeffares and Green by Coza),, this is comprised of:
  - Mining operations (42 m^3/day) and
  - Dust suppression (30m^3l/day)

25.8 HAS A WATER USE LICENCE BEEN APPLIED FOR

A water use license application is required for the proposed project. The water use license application will be submitted to the DWS following the submission of the EIA and EMP report and when more project information becomes available. The DWS has been notified that a water use license application will be submitted as part of the proposed project. In this regard a copy of the notice of intent letter submitted to the DWS in included in Appendix E.

25.9 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

The section below focuses on mitigation measures that are specific to listed activities based on actions outlined in Section 27.

TABLE 47: MEASURES TO REHABILITATE THE ENVIRONMENT AFFECTED BY THE LISTED ACTIVITIES

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	**Description**					
GNR. 983 -9	The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where - (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve; or (b) where such development will occur within an urban area.	Construction Operation Decommissioning Closure	Approximately 10 ha (All stormwater facilities combined)	• In all phases mine infrastructure will be constructed, operated and maintained so as to comply with the provisions of the National Water Act (36 of 1998) and Regulation 704 (4 June 1999) of any future amendments thereto. These include: ○ Clean water systems are separated from dirty water systems ○ The size of dirty water areas are minimized and clean run-off and rainfall water is diverted around dirty areas and back into the normal flow in the environment ○ The site wide water balance is refined on an on-going basis with the input of actual flow volumes and used as a decision making tool for water management and impact mitigation (Section 29). ○ The location of all activities and infrastructure should be outside of the specified zones and/or flood lines of watercourses. If this is unavoidable the necessary exemptions/approvals will be obtained.	National Water Act (36 of 1998) and Regulation 704 (4 June 1999)	On-going
GNR. 985 - 14	The development of - (i) canals exceeding 10 square metres in size ; (ii) channels exceeding 10 square metres in size; CO bridges exceeding 10 square metres in size; (iv) dams, where the dam , including infrastructure and water surface area exceeds 10 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres in size; (vi) bulk storm water outlet structures exceeding 10 square metres in size; (vii) marinas exceeding 10 square metres in size; (viii) jetties exceeding 10 square metres in size;	Construction Operation Decommissioning Closure				

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	Description					
	(ix) slipways exceeding 10 square metres in size; (x) buildings exceeding 10 square metres in size; (xi) boardwalks exceeding 10 square metres in size; or (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs - (a) within a watercourse ; (b) in front of a development setback ; or (c) if no development setback has been adoped, within 32 metres of a watercourse , measured from the edge of a watercourse ; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. In an estuary ; ii. Outside urban areas , in: (aa) A protected area identified in terms of NEMPAA , excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (ee) Sites or areas identified in terms of an International Convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a					

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	Description					
	biosphere reserve; (ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or iii. In urban areas : (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adoped by the competent authority , zoned for a conservation purpose; or (cc) Areas seawards of the development setback line.					
GNR. 983 - 13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.	Construction Operation Decommissioning Closure				
GNR. 985 -2	The development of reservoirs for bulk water supply with a capacity of more than 250 cubic metres. In an estuary ; ii. In a protected area identified in terms of NEMPAA , excluding conservancies; iii. Outside urban areas , in: (aa) National Protected Area Expansion Strategy Focus areas; (bb) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (cc) Sites or areas identified in terms of an International Convention; (dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ee) Core areas in biosphere reserves; (ff) Areas within 10 kilometres from national	Construction Operation Decommissioning Closure				

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	Description					
	parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or (gg) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or iv. In urban areas : (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority , or zoned for a conservation purpose; or (cc) Areas seawards of the development setback line or within urban protected areas.					
GNR. 983 - 12	The development of- (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; - excluding- (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; or (ee) where such development occurs within	Construction Operation Decommissioning Closure	Approximately 2 ha			

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	Description					
	existing roads or road reserves.					
GNR. 983 19	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse; (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater but excluding where such infilling, depositing, dredging, excavation, removal or moving- (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.	Construction Operation Decommissioning Closure	-	• Mitigation measures related to design and construction of road crossings will be put in place to ensure that the flow of water is not impeded or disturbed.	Not applicable	As required
GNR. 984 -11	The development of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day, from and to or between any combination of the following - (i) water catchments; (ii) water treatment works; or (iii) impoundments; excluding treatment works where water is to be treated for drinking purposes.	Construction Operation Decommissioning Closure		• As part of construction and operation the following should be undertaken: ○ Limit the clearing of vegetation and limiting infrastructure, activities and related disturbance to those specifically identified and described in this report ○ Preconstruction surveys of the development footprints for species suitable for search and rescue operations. ○ Prevent the disturbance of sensitive areas so that the species composition and ecosystem functionality remain intact as far as practically possible ○ Collection of pods of *Vachellia erioloba* (Camel Thorn) and *Vachellia haematoxylon* (Grey Camel Thorn) should be collected in order to aid in the re-establishment of these species ○ Obtain a tree removal permit prior to removal of protected tree species from	The mitigation action to obtain a tree removal permit from DAFF is in accordance with the National Forests Act (No. 84 of 1998) that stipulates that no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell,	On-going
GNR. 984 -12	The development of railway lines, stations or shunting yards excluding - (i) railway lines, shunting yards and railway stations in industrial complexes or zones; (ii) underground railway lines in a mining area ; or (iii) additional railway lines within the railway line reserve.	Construction Operation Decommissioning Closure				
GNR. 983 -27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of	Construction Operation Decommissioning	Approximately 100 ha			

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	**Description**					
	indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Closure		DAFF. ○ A comprehensive monitoring programme of the protected trees within the area must be undertaken. This monitoring should be conducted on an individual tree basis as well as monitoring on a community level. ○ Implementation of an alien invasive species programme ○ Implementation of a biodiversity action plan to ensure that the undeveloped/mined areas within the property are properly conserved and maintained ○ Implementation of a biodiversity offset for approval by DAFF prior to the removal of any protected trees. ○ All employees (permanent and temporary) should be aware of which areas are identified for infrastructure/activities. In this regard, no activities or infrastructure should be placed on the western section of the proposed project area. ○ Where soils have to be disturbed the soils will be stripping, storage and maintenance and replaced in accordance with the specifications of the soil management principles included in Table 51 and the detailed Coza soils management procedure. • As part of con-current rehabilitation during the operational and decommissioning phases, all cleared areas should be re-seeded once the topsoil has been replaced with a seed mixture reflecting the current natural vegetation. • Closure objective should aim to ensure effective rehabilitation to as close to pre-mining conditions as practically possible. In addition to this closure planning needs to take into consideration the requirements for the establishment of long term species diversity, ecosystem functionality, aftercare and	donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license. Compliance with the National Heritage Resource Act No. 25 of 1999 in the event of any chance finds of heritage resources.	On-going As required As required
GNR. 983 - 28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	Construction Operation Decommissioning Closure				
GNR. 984 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Construction Operation Decommissioning Closure				
GNR. 985 - 12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA 'or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;	Construction Operation Decommissioning Closure				

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	**Description**					
	ii. Within critical biodiversity areas identified in bioregional plans; iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on even in urban areas; or iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.			confirmatory monitoring • During closure final rehabilitated areas will be managed through a care and maintenance programme to limit and/or enhance the long term post closure visual impacts		
GNR. 983 - 21	Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act , 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act , 2002 (Act No. 28 of 2002).	Construction Operation Decommissioning Closure				
GNR. 983 - 30	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act , 2004 (Act No. 10 of 2004).	Construction Operation Decommissioning Closure				
GNR.984 -17	Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	Construction Operation Decommissioning Closure				
GNR. 984	Any activity including the operation of that	Construction	1ha			

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	**Description**					
- 21	activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.	Operation Decommissioning Closure	(processing plant)			
GNR. 983 - 10	The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve; or (b) where such development will occur within an urban area.	Construction Operation Decommissioning Closure	-			
GNR 985 - 18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. In an estuary ; ii. Outside urban areas , in: (aa) A protected area identified in terms of NEMPAA , excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the	Construction Operation Decommissioning Closure	-			

Activities (Listed) Number	Description	Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
	competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (hh) Areas seawards of the development .setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; or iii. Inside urban areas : (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.					
GNR. 983 24	The development of - (v) a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; (vi) a road with a reserve wider than 13.5 metres, or where no reserve exists where the road is wider than 8 metres but excluding – (b) roads which are identified and included in activity 27 of Listing Notice 27 in Notice 2 of 2014; or roads where the entire road falls within an urban area	Construction Operation Decommissioning Closure	10 ha (All road infrastructure combined)	• Coza will implement a transport safety programme to achieve the mitigation objectives during the construction, operational and decommissioning phases. Key components of the programme include: ○ Education and awareness training ○ Maintenance of the transport system ○ Use of dedicated loading and off-loading areas on site • Coza needs to ensure that proper road markings, reflective road studs, road signs, overhead lighting and proper pedestrian crossings should be provided and maintained at the entrance to the mine, if required • A road maintenance plan needs to be developed for the proposed project • In case of a person or animal being injured by transport activities the emergency response	Not applicable	On-going As required
GNR. 983 -56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 km –	Construction Operation Decommissioning				

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	Description					
	(vii) where the existing reserve is wider than 13.5 metres; or (viii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.	Closure		procedure in Section 30.2.2 will be followed.		
GNR. 985 - 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. In an estuary ; ii. Outside urban areas , in: (aa) A protected area identified in terms of NEMPAA , excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas; or (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or iii. In urban areas : (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a					

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	**Description**					
	conservation purpose; or (cc) Seawards of the development setback line or within urban protected areas.					
GNR. 984 -16	The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.	Construction Operation Decommissioning Closure	-	• All mineralised waste facilities and water dams will be designed, constructed, operated and closed in a manner to ensure stability and related safety risks to third parties and animals are addressed. It will furthermore be monitored according to a schedule that is deemed relevant to the type of facility by a professional engineer. As part of closure, Coza should ensure that provision is made to address long term and safety risks in the decommissioning and rehabilitation planning. • Coza will survey its mining area and update its mine plan map on a routine basis to ensure that the position and extent of all potential hazardous excavations, hazardous infrastructure and subsidence is known as part of construction, operation and decommissioning. It will further more ensure that appropriate management measures are taken to address the related safety risks to third parties and animals • As part of construction and operation, the safety risks associated with identified hazardous excavations, subsidence and infrastructure will be addressed through one or more of the following: o Fencing, berms, barriers and/or security personnel to prevent unauthorized access o Warning signs in the appropriate languages (s) Warning pictures can be used as an alternative • During decommissioning planning of any part of the mine, provision will be made to address long term safety risks in the decommissioning and rehabilitation phases. • At closure of any part of the mine, the hazardous infrastructure will either have been removed or decommissioned and rehabilitated		

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	**Description**					
				in a manner that it does not present a long term safety and/or stability risk. • At closure the hazardous excavations and subsidence will have been dealt with as follows: ○ The pit will have been backfilled and rehabilitated ○ The potential for surface subsidence will have been addressed by providing a bulking factor for the backfilled pit ○ Monitoring and maintenance will take place to observe whether the relevant long term safety objective have been achieved and to identify the need for additional intervention where the objectives have not been met. • In case of injury or death due to hazardous excavations, the emergency response procedure in Section 30.2.2 will be followed.		
GNR. 984 -4	The development of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	Construction Operation Decommissioning Closure	-	• Coza will comply with both the National Water Act (36 of 1998) and Regulation 704 (4 June 1999) • All hazardous chemicals (new and used), mineralised wastes and non-mineralised waste are handled in a manner that they do not pollute groundwater. This will be implemented by covering the following: ○ Pollution prevention through basic infrastructure design ○ Pollution prevention through maintenance of equipment ○ pollution prevention through education and training of workers (permanent and temporary); ○ Pollution prevention through appropriate management of hazardous chemicals, materials and non-mineralised waste ○ Required steps to enable containment and remediation of pollution incidents ○ Specification for post rehabilitation audit criteria to ascertain whether the remediation has been successful and if not,	Water use licence in terms of Section 21g of the NWA. Regulations regarding the planning and management of residue stockpiles and deposits from a prospecting, mining, exploration or production operation in terms of NEM:WA, Regulation 632.	On-going On-going
GNR. 985 -10	The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. In an estuary ; ii. Outside urban areas , in: (aa) A protected area identified in terms of NEMPAA , excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (dd) Sites or areas identified in terms of an International Convention;	Construction Operation Decommissioning Closure				

Activities (Listed)		**Phase**	**Size and scale of disturbance**	**Mitigation measures**	**Compliance with standards**	**Time period for implementation**
Number	**Description**					
	(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; or (jj) Within 500 metres of an estuary ; or iii. In urban areas : (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or (cc) Within 500 metres of an estuary .			to recommend and implement further measures • Infrastructure that has the potential to pollute groundwater resources will be designed and implemented in a manner that pollution is addressed in all mine phases. In this regard design of overburden stockpiles need to comply with Section 7 of GN. 632 of NEM:WA where relevant. • Planned infrastructure that has the potential to pollute groundwater (overburden stockpiles) will be identified and included into the groundwater pollution management plan which will be implemented and needs to comply with Section 7 of GN. 632. The plan includes: o Identify potential pollution sources o Determine the extent of the pollution plume o Design and implement intervention measures to prevent, eliminate and/or control the pollution plume. o Limit unauthorized access to overburden stockpile o Monitoring all potential impact zones to track pollution and mitigation impacts o Where monitoring results indicates that third party water supply has been polluted by Coza, Coza will ensure that an alternative equivalent water supply will be provided. o At closure no overburden will remain on surface as all overburden will be backfilled into the open pit as part of rehabilitation • Coza will implement the groundwater monitoring programme as outlined in Section 29. • In case of a major discharge incident that may result in the pollution of groundwater resources the emergency response procedure in Section 30.2.2 will be followed.		On-going On-going On-going As required
GNR. 984 - 6	The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste	Construction Operation Decommissioning Closure	-			

Activities (Listed)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	**Description**					
	Act, 2008 applies; or (iii) the development of facilities or infrastructure for the treatment of effluent, wastewater or sewage where such facilities have a daily throughput capacity of 2000 cubic metres or less.					
GNR. 921- Category B 4(7)	The disposal of any quantities of hazardous waste to land	Construction Operation Decommissioning Closure	18.3ha (overburden stockpiles) Backfilling pit with overburden			
GNR. 921- Category B 4(10)	The construction of a facility for a waste management activity listed in Category B of this schedule					
GNR. 921- Category B 4(11)	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)	Construction Operation Decommissioning Closure				
GNR. 921 – Category C 5(1)	The storage of general waste at a facility that has the capacity to store in excess of $100m^3$ of general waste at any one time, excluding the storage of waste in lagoons or temporary storage of such waste .	Construction Operation Decommissioning Closure	To be determined			
GNR. 921 – Category C 5(2)	The storage of hazardous waste at a facility that has the capacity to store in excess of 80m3 of hazardous waste at any one time, excluding the storage of hazardous waste in lagoons or temporary storage of such waste .	Construction Operation Decommissioning Closure				
GNR. 921 – Category C 5(3)	The storage of waste tyres in a storage area exceeding $500m^2$.	Construction Operation Decommissioning Closure				

26 IMPACT MANAGEMENT OUTCOMES

The section below provides a description of the outcomes and objective of mitigation actions in order to manage, remedy, control or modify potential impacts. The mitigation actions identified to achieve these outcomes and objectives are described in Section 27.

TABLE 48: DESCRIPTION OF IMPACT MANAGEMENT OUTCOMES

Activity	Potential impact	Affected aspect	Phase	Mitigation type	Standard to be achieved (Impact management outcome/objectives)
Open pit mining Placement of infrastructure Mineralised waste Maintenance and aftercare	Loss and sterilisation of mineral resources	Geology	Construction Operation Decommissioning Closure	• Control through infrastructure design and placement to ore body	Avoid sterilisation of mineral resources to prevent unacceptable mineral sterilisation.
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Support services Demolition Rehabilitation Maintenance and aftercare	Hazardous excavations infrastructure and surface subsidence	Topography	Construction Operation Decommissioning Closure	• Control through access control • Control through management and monitoring • Control through rehabilitation • Remedy through emergency response procedure (Section 30.2.2)	To ensure the safety of people and animals in order to prevent physical harm from potentially hazardous excavations and infrastructure
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition	Loss of soil resources and land capability through contamination	Soils and land capability	Construction Operation Decommissioning Closure	• Manage through the implementation of soil conservation management plan and waste management plan • Control through rehabilitation • Remedy through emergency response procedure (Section 30.2.2)	To ensure that soil resources are handled and managed properly in order to conserve these resources for use as part of rehabilitation which will assist with the restoration of pre-mining land capability as far as possible.

Activity	Potential impact	Affected aspect	Phase	Mitigation type	Standard to be achieved (Impact management outcome/objectives)
Rehabilitation Maintenance and aftercare of rehabilitated areas					
Site preparation Earthworks Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Loss of soil resources and land capability through physical disturbance		Construction Operation Decommissioning Closure	• Manage through the implementation of soil conservation management plan and waste management plan • Control through rehabilitation • Control through limiting project footprint	To ensure that soil resources are handled and managed properly in order to conserve these resources for use as part of rehabilitation which will assist with the restoration of pre-mining land capability as far as possible.
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation Maintenance and aftercare	Physical destruction of biodiversity	Biodiversity	Construction Operation Decommissioning Closure	• Control through limiting the project footprint • Control through alien invasive species programme • Remedy through biodiversity action plan • Remedy through biodiversity offset • Control through comprehensive monitoring of protected trees • Remedy through rehabilitation close to pre-mining conditions as practically possible.	To prevent the unacceptable disturbance and loss of biodiversity and related ecosystem functionality through physical destruction and to limit the area of disturbance as far as possible.
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste	General disturbance of biodiversity	Biodiversity	Construction Operation Decommissioning Closure	• Control through dust control • Control through training of employees • Control through waste management procedures.	To prevent the unacceptable disturbance and loss of biodiversity and related ecosystem functionality through physical disturbance.

Activity	Potential impact	Affected aspect	Phase	Mitigation type	Standard to be achieved (Impact management outcome/objectives)
Non-mineralised waste Support services General site management Rehabilitation Maintenance and aftercare					
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Contamination of surface water resources	Surface water	Construction Operation Decommissioning Closure	• Control through stormwater management and design • Remedy through emergency response procedure (Section 30.2.2)	To ensure surface water quality remains within acceptable limits for both domestic and agricultural purposes to prevent pollution of surface water resources and related harm to surface water users.
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Alteration of natural drainage patterns		Construction Operation Decommissioning Closure	• Control through appropriate design • Control through the separation of dirty and clean water	To ensure that the reduction of the volume of run-off into the downstream catchment is limited to what is necessary and that natural drainage patterns are re-established as part of rehabilitation in order to prevent unacceptable alteration of drainage patterns and related reduction of downstream surface water flow.
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste	Contamination of groundwater resources	Groundwater	Construction Operation Decommissioning Closure	• Control through monitoring • Remedy through emergency response procedure (Section 30.2.2)	To ensure groundwater quality remains within acceptable limits for both domestic and agricultural purposes to prevent harm to water users.

Activity	Potential impact	Affected aspect	Phase	Mitigation type	Standard to be achieved (Impact management outcome/objectives)
Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare					
Water supply and use Open pit mining	Reduction of groundwater levels and availability		Construction Operation Decommissioning	• Control through monitoring	To avoid loss of groundwater for third party use.
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition General site management Rehabilitation Maintenance and aftercare	Air pollution	Air	Construction Operation Decommissioning Closure	• Control through monitoring	To ensure that any pollutants emitted as a result of the proposed project remain with acceptable limits so as to prevent health related impacts.
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition General site management Rehabilitation Maintenance and aftercare	Noise pollution	Noise	Construction Operation Decommissioning	• Control through noise control measures and monitoring (if required)	To ensure that any noise generated as a result of the proposed project remains within acceptable limits to avoid the disturbance of third parties.
Open pit mining	Blasting impacts (fly rock, air blasts and	Blasting	Operation	• Control through access control	To protect third party property from

Activity	Potential impact	Affected aspect	Phase	Mitigation type	Standard to be achieved (Impact management outcome/objectives)
	ground vibrations)			• Manage through appropriate blast design • Remedy through emergency response procedure (Section 30.2.2)	proposed project-related activities, where possible. Where damage is unavoidable, to work together with the third parties to achieve a favourable outcome and to ensure public safety
Transport system	Road disturbance and traffic safety	Traffic	Construction Operation Decommissioning	• Control through appropriate design • Management through the implementation of traffic safety programme • Remedy through emergency response procedure (Section 30.2.2)	To ensure the mine's use of public roads is done in a responsible manner to reduce the potential for safety and vehicle related impacts on road users.
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Negative visual views	Visual	Construction Operation Decommissioning Closure	• Control through visual controls and con-current rehabilitation	To ensure visual views that complement the surrounding environment to limit negative visual views.
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste	Loss of heritage, cultural and palaeontological resources	Heritage/ cultural and palaeontological resources	Construction Operation Decommissioning Closure	• Control through avoidance of heritage resources • Remedy through emergency response procedure (Section 30.2.2)	To avoid the disturbance of significant heritage resources

Activity	Potential impact	Affected aspect	Phase	Mitigation type	Standard to be achieved (Impact management outcome/objectives)
Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas					
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Economic impact	Socio-economic	Construction Operation Decommissioning Closure	• Control through procurement programme and bursary and skills development programme	To enhance the positive economic impacts by working together with existing structures and organisations.
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Inward migration		Construction Operation Decommissioning Closure	• Control through health policy, monitoring the development of informal settlements • Remedy through emergency response procedure (Section 30.2.2)	To establish and maintain a good working relationship with surrounding communities, local authorities and land owners in order to limit the impacts associated with inward migration.
Site preparation Earthworks Civil works	Land use impact	Land use	Construction Operation Decommissioning	• Control through closure planning	To co-exist with existing land uses and to negatively impact on land uses as little as possible in order to prevent

Activity	Potential impact	Affected aspect	Phase	Mitigation type	Standard to be achieved (Impact management outcome/objectives)
Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas			Closure		unacceptable impacts on surrounding land uses and their economic activity.

27 IMPACT MANAGEMENT ACTIONS

The mitigation actions for all phases (construction, operation, decommissioning and closure) to achieve the objectives and outcomes set out in Section 27 are listed in tabular format below. The action plans include the timeframes for implementing the mitigation actions together with a description of how mitigation actions comply with relevant standards. Mitigation actions and recommendations identified by specialists have been summarised and are included into Table 49 below.

TABLE 49: DESCRIPTION OF IMPACT MANAGEMENT ACTIONS

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
Open pit mining Mineralised waste Placement of infrastructure Maintenance and aftercare	Loss and sterilisation of mineral resources	• During all mine phases Coza will ensure the following: o Incorporation of cross discipline planning structures for all mining and infrastructure to avoid mineral sterilization. A key component of the cross cutting function is the Mine resource manager o Mine workings including rehabilitation will be developed and designed so as not to limit the potential to exploit deeper minerals	Design phase On-going	Not applicable
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and useMineralised waste Support services Demolition Rehabilitation Maintenance and aftercare	Hazardous excavations, infrastructure and surface subsidence	• All mineralised waste facilities and water dams will be designed, constructed, operated and closed in a manner to ensure stability and related safety risks to third parties and animals are addressed. It will furthermore be monitored according to a schedule that is deemed relevant to the type of facility by a professional engineer. As part of closure, Coza should ensure that provision is made to address long term and safety risks in the decommissioning and rehabilitation planning. • Coza will survey its mining area and update its mine plan map on a routine basis to ensure that the position and extent of all potential hazardous excavations, hazardous infrastructure and subsidence is known as part of construction, operation and decommissioning. It will further more ensure that appropriate management measures are taken to address the related safety risks to third parties and animals • As part of construction and operation, the safety risks associated with identified hazardous excavations, subsidence and infrastructure will be addressed through one or more of the following: o Fencing, berms, barriers and/or security personnel to prevent unauthorized access	On-going On-going On-going	Not applicable

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
		○ Warning signs in the appropriate languages (s) Warning pictures can be used as an alternative • During decommissioning planning of any part of the mine, provision will be made to address long term safety risks in the decommissioning and rehabilitation phases. • At closure of any part of the mine, the hazardous infrastructure will either have been removed or decommissioned and rehabilitated in a manner that it does not present a long term safety and/or stability risk. • At closure the hazardous excavations and subsidence will have been dealt with as follows: ○ The pit will have been backfilled and rehabilitated ○ The potential for surface subsidence will have been addressed by providing a bulking factor for the backfilled pit ○ Monitoring and maintenance will take place to observe whether the relevant long term safety objective have been achieved and to identify the need for additional intervention where the objectives have not been met. • In case of injury or death due to hazardous excavations, the emergency response procedure in Section 30.2.2 will be followed.	As required As required As required As required	
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Loss of soil resources and land capability through contamination	• During the construction, operational and decommissioning phases, Coza will ensure that all hazardous chemicals (new and used), dirty water, mineralized wastes and non-mineralised wastes are transported, handled and stored in a manner that they do not pollute soils. This will be implemented through a procedure(s) covering the following: Pollution prevention through basic infrastructure design ○ Pollution prevention through maintenance of equipment ○ Maintenance of equipment should be done either on impermeable surfaces or drip trays should be used. ○ Pollution prevention through education and training of workers (temporary and permanent) ○ Pollution prevention through appropriate management of hazardous materials and waste as outlined in Table 50. ○ The required steps to enable fast reaction to contain and remediate pollution incidents. In this regard the remediation options include containment and in situ treatment or disposal of contaminated soils as hazardous waste. In situ treatment is generally considered to be the preferred option because with successful in situ remediation the soil resourced will be retained in the correct place. The in situ options include bioremediation	On-going	Not applicable

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
		at the point of pollution, or removal of soils for washing and/or bio remediation at a designated area after which the soils are returned ○ Specifications for post rehabilitation audit to ascertain whether the remediation of any polluted soils and re-establishment of soil functionality has been successful and if not, to recommend and implement further measures • In case of major spillage incidents the emergency response procedure in Section 30.2.2 will be followed.	If required	
Site preparation Earthworks Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Loss of soil resources and land capability through physical disturbance	• Limit the disturbance of soils to what is absolutely necessary for earthworks on-going activities, infrastructure footprints and use of vehicles during all phases. • All employees (permanent and temporary) should be aware of which areas are identified for infrastructure/activities. In this regard, no activities or infrastructure should be placed on the western section of the proposed project area. • Where soils have to be disturbed the soils will be stripped, storage and maintenance and replaced in accordance with the specifications of the soil management principles included in Table 51 and the detailed Coza soils management procedure.	On-going On-going On-going	Not applicable
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation Maintenance and aftercare	Physical destruction of biodiversity	• As part of construction and operation the following should be undertaken: ○ Limiting infrastructure, activities and related disturbance to those specifically identified and described in this report ○ Preconstruction surveys of the development footprints for species suitable for search and rescue operations. ○ Prevent the disturbance of sensitive areas so that the species composition and ecosystem functionality remain intact as far as practically possible ○ Collection of pods of *Vachellia erioloba* (Camel Thorn) and *Vachellia haematoxylon* (Grey Camel Thorn) should be collected in order to aid in the re-establishment of these species ○ Obtain a tree removal permit prior to removal of protected tree species from DAFF. ○ A comprehensive monitoring programme of the protected trees within the area must be undertaken. This monitoring should be conducted on an individual tree basis as well as monitoring on	On-going	The mitigation action to obtain a tree removal permit from DAFF is in accordance with the National Forests Act (No. 84 of 1998) that stipulates that no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license.

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
		a community level. ○ As part of the construction and operational phases, Coza should strive to investigate alternative means of removing dust from protected trees where practical ○ Implementation of an alien invasive species programme ○ Implementation of a biodiversity action plan to ensure that the undeveloped/mined areas within the property are properly conserved and maintained ○ Implementation of a biodiversity offset for approval by DAFF prior to the removal of any protected trees, as required. • As part of con-current rehabilitation during the operational and decommissioning phases, all cleared areas should be re-seeded once the topsoil has been replaced with a seed mixture reflecting the current natural vegetation. This may be used in conjunction with commercially available mix as this will ensure good vegetation coverage and soil stability. • Closure objective should aim to ensure effective rehabilitation to as close to pre-mining conditions as practically possible. In addition to this closure planning needs to take into consideration the requirements for the establishment of long term species diversity, ecosystem functionality, aftercare and confirmatory monitoring	On-going As required	
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation Maintenance and aftercare	General disturbance of biodiversity	• During construction, operation, decommissioning and closure the following needs to be adhered to: ○ The use of light is kept to a minimum, and where it is required, yellow lighting is used where possible ○ Vertebrates should be kept away from the proposed project area with appropriate fencing ○ There is training for workers on the value of biodiversity and the need to conserve the species and systems that occur within the surface use area ○ There is zero tolerance of the killing or collecting of any biodiversity by anybody working for or on behalf of Coza ○ Strict speed control measures are used for any vehicles driving within the surface use area ○ Noisy and/or vibrating equipment will be well maintained to control noise and vibration emission levels ○ Dust control measures will be implemented ○ Pollution and litter prevention measures will be implemented ○ Prevention and combatting veld fires though establishment and maintaining of fire breaks and through the education of employees	On-going	The mitigation actions regarding veld fires are in accordance with the National Veld and Forest Fire Act No. 101 of 1998. The purpose of this Act is to prevent and combat veld, fires and places the responsibility on landowners to develop and maintain firebreaks as well as be sufficiently prepared to combat veld fires in terms of equipment as well as suitably trained personnel.

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
		○ Coza will form part of existing forums within the area and work together with local farmers to combat, manage and control veld fires • As part of closure planning, the designs of any permanent and potentially polluting structures (mineralised waste facilities) will take consideration of the requirements for long term pollution prevention and confirmatory monitoring. • In case of a major incident the emergency response procedure in Section 30.2.2 will be followed.	 As required As required	
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Contamination of surface water resources	• Mine infrastructure, will be constructed and operated so as to comply with the National Water Act (36 of 1998) and Regulation 704 (4 June 1999): ○ Clean water systems are separated from dirty water systems ○ Clean run-off and rainfall water is diverted around dirty areas and back into its normal flow in the environment ○ The size of dirty water areas are minimized and dirty water is contained in systems that allow the reuse and/or recycling of this dirty water ○ Discharges of dirty water may only occur in accordance with authorisations that are issued in terms of the relevant legislation specifications and they must not result in negative health impacts for downstream surface water users. The relevant legislation specifications comprise any applicable authorisation/exemption, the National Water Act (36 of 1998) and Regulation 704. • All hazardous chemicals (new and used), mineralized waste and non-mineralised waste must be handled in a manner that they do not pollute surface water. This will be implemented by means of the following: ○ Pollution prevention through basic infrastructure design ○ Pollution prevention through maintenance of equipment ○ Pollution prevention through education and training of workers (permanent and temporary) ○ Pollution prevention through appropriate management of hazardous, materials and ○ The required steps to enable containment and remediation of pollution incidents ○ Specifications for post rehabilitation audit criteria to ascertain whether the remediation has been successful and if not, to recommend and implement further measures. • The designs of potentially polluting structures will take account of	On-going On-going On-going	As outlined in mitigation type.

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
		the requirements for long term surface water pollution prevention. • Coza will monitor the water quality of the non perennial drainage lines on site when in flow as per the monitoring programme outlined in Section 29. • In case of a discharge incident that may result in the pollution of surface water resources, the emergency response procedure in Section 30.2.2 will be followed.	On-going As required	
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Alteration of natural drainage patterns	• In all phases mine infrastructure will be constructed, operated and maintained so as to comply with the provisions of the National Water Act (36 of 1998) and Regulation 704 (4 June 1999) of any future amendments thereto. These include: ○ Clean water systems are separated from dirty water systems ○ The size of dirty water areas are minimized and clean run-off and rainfall water is diverted around dirty areas and back into the normal flow in the environment ○ The site wide water balance is refined on an on-going basis with the input of actual flow volumes and used as a decision making tool for water management and impact mitigation (Section 29). ○ The location of all activities and infrastructure should be outside of the specified zones and/or flood lines of watercourses. If this is unavoidable the necessary exemptions/approvals will be obtained.	On-going As required	As outlined in mitigation type.
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Contamination of groundwater resources	• Coza will comply with both the National Water Act (36 of 1998) and Regulation 704 (4 June 1999) • All hazardous chemicals (new and used), mineralized wastes and non-mineralised waste are handled in a manner that they do not pollute groundwater. This will be implemented by covering the following: ○ Pollution prevention through basic infrastructure design ○ Pollution prevention through maintenance of equipment ○ Pollution prevention through education and training of workers (permanent and temporary) ○ Pollution prevention through appropriate management of hazardous chemicals, materials and non-mineralised waste ○ Required steps to enable containment and remediation of pollution incidents ○ Specification for post rehabilitation audit criteria to ascertain whether the remediation has been successful and if not, to recommend and implement further measures	On-going On-going	As outlined in mitigation type.

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
		• Infrastructure that has the potential to pollute groundwater resources will be designed and implemented in a manner that pollution is addressed in all mine phases. In this regard design of overburden stockpiles need to comply with Section 7 of GN. 632 of NEM:WA where relevant. • Planned infrastructure that has the potential to pollute groundwater (overburden stockpiles) will be identified and included into the groundwater pollution management plan which will be implemented and needs to comply with Section 7 of GN. 632. The plan includes: ○ Identify potential pollution sources ○ Determine the extent of the pollution plume ○ Design and implement intervention measures to prevent, eliminate and/or control the pollution plume. ○ Limit unauthorized access to overburden stockpile ○ Monitoring all potential impact zones to track pollution and mitigation impacts ○ Where monitoring results indicates that third party water supply has been polluted by Coza, Coza will ensure that an alternative equivalent water supply will be provided. ○ At closure no overburden will remain on surface as all overburden will be backfilled into the open pit as part of rehabilitation • Coza will implement the groundwater monitoring programme as outlined in Section 29. • In case of a major discharge incident that may result in the pollution of groundwater resources the emergency response procedure in Section 30.2.2 will be followed.	On-going On-going On-going As required	
Water supply and use Open pit mining	Reduction of groundwater levels and availability	• During the construction and operational and decommissioning phases, Coza will implement the following: ○ All potentially affected third party boreholes will be included in the Coza groundwater monitoring program to ensure that changes in water depths can be identified, where possible. ○ Where Coza's dewatering causes a loss of water supply to third parties an alternative equivalent water supply will be provided by Coza until such time as the dewatering impacts cease. ○ Coza will monitor groundwater quantity as per the monitoring programme included in Section 29.	On-going	Not applicable
Site preparation Earthworks Civil works Open pit mining	Air pollution	• During the construction, operation and decommissioning phases, Coza will implement a dynamic air quality management plan that covers: ○ The identification of sources and emissions inventory	On-going	National Atmospheric Emission Reporting Regulations in terms of the National Environmental Management: Air Quality Act 39 of

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition General site management Rehabilitation Maintenance and aftercare		○ The implementation of source based controls ○ The use of source and receptor based performance indicators and monitoring strategies ○ The use of source and receptor based mitigation measures ○ The use of internal and external auditing ○ Review and plan adjustment as required. • During the construction, operation and decommissioning phases, the following specific mitigation measures will be implemented for the main emission sources: roads, crushing and screening, materials handling (tipping points), vehicles and wind erosion. The recommended methods include: ○ Limit the disturbance of land to what is absolutely necessary and in accordance with the mine infrastructure layout ○ For the control of vehicle entrained dust it is recommended that water (at an application rate >2 litre/m2-hour), be applied in combination with dust palliative consisting of a cationic bitumen emulsion to stabilize the surface and prevent dust. Literature reports an emissions reduction efficiency of up to 90%. ○ Dust controls at the crushing and screening operation by water sprays ○ In minimizing windblown dust from stockpile areas (product stockpile), water sprays should be used to keep surface material moist and wind breaks installed to reduce wind speeds over the area. ○ In the transportation of ore and products, trucks should be well covered in order to avoid spillages. This will reduce the release of PM emissions. ○ To ensure lower diesel exhaust emissions, equipment suppliers or contractors should be required to ensure compliance with appropriate emission standards for mining fleets. ○ Rehabilitation and re-vegetation of all decommissioned areas ○ Maintenance of all vehicles to achieve optimal exhaust emissions. • Coza will implement a dust fallout monitoring programme as included in Section 29. • Coza will register as a data provider on the National Atmospheric Emissions Inventory System, if required. • Implementation of an air complaints procedure during all phases. • Undertake a carbon footprint assessment when during the operational phase of the project.	On-going On-going On-going As required	2004 requires that holders of mining rights register on the National Atmospheric Emissions Inventory System (NAEIS) and to ensure that annual monitoring reports are uploaded onto the NAEIS.

Activity	**Potential impact**	**Mitigation type**	**Time period for implementation**	**Compliance with standards**
			On-going As required	
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition General site management Rehabilitation Maintenance and aftercare	Noise pollution	• During the construction, operation and decommissioning phases the following good engineering practice should be applied: o All diesel powered equipment and plant vehicles should be kept at a high level of maintenance. This should particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. o Optimised equipment design noise levels. o A noise complaints register should be kept on site • During the construction, operation and decommissioning phases measures to manage transport related noise, specifically from trucks, include o Minimizing individual vehicle engine, transmission and body noise/vibration. This is achieved through the implementation of an equipment maintenance program. o Minimize slopes by managing and planning road gradients to avoid the need for excessive acceleration/deceleration. o Maintain road surface regularly to avoid corrugations, potholes etc. o Avoid unnecessary idling times. o Minimizing the need for trucks/equipment to reverse. This will reduce the frequency at which disturbing but necessary reverse warnings will occur. Alternatives to the traditional reverse ‘beeper’ alarm such as a ‘self-adjusting’ or ‘smart’ alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that it is 5 to 10 dB above the noise level in the vicinity of the moving equipment. The promotional material for some smart alarms does state that the ability to adjust the level	On-going On-going	Not applicable

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
		of the alarm is of advantage to those sites ‘with low ambient noise level. • In the event that Coza receives noise related complaints during either construction or operation, monitoring measures outlined in Section 29 should be implemented.	 As required	
Open pit mining	Blasting impacts (fly rock, air blasts and ground vibrations)	• Implementation of a blast management programme during the operational phase which has the following principles: ○ Pre mining structure and crack survey of structures within the potential impact zone ○ Design of blasts to prevent injury to people and livestock and to prevent damage to structures. As a minimum the blast design will achieve: ○ A fly rock zone limit of less than 500 m ○ A peak velocity limit of less than 12 mm/s at third party structures that are built according to building industry standards and that is further reduced at third party structures that are not built according to building industry standards ○ An air blast limit of less than 130 dB at third party structures ○ Communication of the planned blast programme to interested and affected parties including mine personnel ○ Pre-blast warning and evacuation to clear people, traffic, moveable property and livestock from the potential impact zone ○ Blast monitoring to verify the effectiveness of the blast design and blast execution ○ Audit and review to adjust the blast design where necessary to achieve the stated objectives ○ Formal documented investigation and response for all third party blast related complaints ○ Remediation of all impacts caused by blasting • Blasting within 500 m of any third party structures will be limited where possible. Where Coza would like to blast in areas within this 500 m distance, a project specific risk assessment will be completed and project specific mitigation measures will be implemented, subject to approval by the relevant authority(ies) • Blasting activities is limited to day time hours • In case of a person or animal being injured by blasting activities the emergency response procedure in Section 30.2.2 will be followed.	On-going On-going On-going As required	Not applicable
Transport system	Road disturbance and traffic safety	• Coza will implement a transport safety programme to achieve the mitigation objectives during the construction, operational and decommissioning phases. Key components of the programme include:	On-going	Not applicable

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
		○ Education and awareness training ○ Maintenance of the transport system ○ Use of dedicated loading and off-loading areas on site • Coza should investigate, together with the roads department and neighbouring mines, the possibility of maintaining the road infrastructure by providing the following during the construction, operational and decommissioning phases: ○ Reflective road studs to ensure visibility at night time ○ Road surface maintenance ○ Road markings (Highway paint recommended) ○ Road traffic signs ○ Fencing along public roads to control animal movement ○ Road safety training to workers and local communities. ○ Regular inspections of these intersections should take place as part of a risk and safety management process • Coza needs to ensure that proper road markings, reflective road studs, road signs, overhead lighting and proper pedestrian crossings should be provided and maintained at the entrance to the mine • A road maintenance plan needs to be developed for the proposed project • In case of a person or animal being injured by transport activities the emergency response procedure in Section 30.2.2 will be followed.	On-going As required On-going	
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Negative visual impact	• During construction and operation phases, Coza will ensure the following: ○ Limit the clearing of vegetation ○ Limit the emission of visual air emission plumes (dust emissions) ○ Use of lighting will be limited to project requirements and measures will be implemented to limit light pollution impacts on surrounding areas ○ On-going vegetation establishment on rehabilitated areas ○ Painting infrastructure with colours that blend in with the surrounding environment where possible • During the decommissioning phase, Coza will implement a closure plan which involves the removal of infrastructure, and the rehabilitation and re-vegetation of disturbed areas. The pit will be backfilled and all stockpiles will have been removed. • During closure final rehabilitated areas will be managed through a care and maintenance programme to limit and/or enhance the long term post closure visual impacts	On-going As required As required	Not applicable
Site preparation	Loss of heritage,	• Coza will ensure that adequate buffer zones around relevant	On-going	Compliance with the National

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	cultural and palaeontological resources	heritage sites is maintained, where possible. • If there are any chance finds of heritage and/or cultural sites, Coza will follow the emergency response procedure (Section 30.2.2).	As required	Heritage Resource Act No. 25 of 1999 in the event of any chance finds.
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Economic impact	• During all mine phases, Coza will ensure the following: ○ Coza (and its contractors) will hire local people from the closest communities where possible ○ Coza will extend its formal bursary and skills development programmes to the closest communities to increase the number of local skilled people and thereby increase the potential local employee base ○ Coza will ensure it procures local goods and services from the closest communities where possible ○ Coza will implement a procurement mentorship programme which provides support to local businesses from the enquiry to project delivery stages ○ Coza will ensure that it incorporates economic considerations into its closure planning from the outset ○ Closure planning considerations cover the skilling of employees for the downscaling, early closure and long term closure scenarios ○ Coza will identify and develop sustainable business opportunities and skills, independent from mining for members of the local communities to ensure continued economic prosperity beyond the life of mine.	On-going	Not applicable
Site preparation Earthworks Civil works Open pit mining Processing plant	Inward migration	• In terms of recruitment, procurement and training during all mine phases Coza will ensure the following: ○ Good communication with all job and procurement opportunity seekers will be maintained throughout the recruitment process. The process must be seen and understood to be fair and	On-going	Not applicable

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas		impartial by all involved. The personnel in charge of resolving recruitment and procurement concerns must be clearly identified and accessible to potential applicants ○ The precise number of new job opportunities (permanent and temporary) and procurement opportunities will be made public together with the required skills and qualifications. The duration of temporary work will be clearly indicated and the relevant employees/contractors provided with regular reminders and revisions throughout the temporary period ○ Recruitment and procurement, by Coza and its contractors, will be preferentially provided to people in the communities where possible, that are closest to Coza. In order to be in a position to achieve this a skills register of people within the closest communities will be maintained. Coza will also preferentially provide bursaries and training to people that reside in these closest communities ○ There will be no recruitment or procurement at the gates of the mine. All recruitment will take place off at designated locations. All procurement will be through existing, established procurement and tendering processes that will include mechanisms for empowering service providers from the closest communities		
		• During all mine phases, Coza will ensure the following: ○ No mine employees will be housed on-site ○ Coza will work with neighbouring mines, local authorities and law enforcement officials to monitor and prevent the development of informal settlements near the mine and to assist where possible with crime prevention within the proposed project area ○ Coza will implement a health policy on HIV/AIDS and tuberculosis. This policy will promote education, awareness and disease management both in the workplace and in the home so that the initiatives of the workplace have a positive impact on the communities from which employees are recruited. Partnerships will be formed with local and provincial authorities to maximize the off-site benefits of the policy. ○ Coza will work closely with the local and regional authorities and other mine/industries in the areas to be part of the problem solving process that needs to address social service constraints. ○ Coza will implement a stakeholder communication, information	On-going	

Activity	Potential impact	Mitigation type	Time period for implementation	Compliance with standards
		sharing and grievance mechanism to enable all stakeholders to engage with Coza on both socio-economic and environmental issues		
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare of rehabilitated areas	Land use impact	• Prior to construction, Coza will apply to the local municipality to change the land zoning from agriculture to mining. • During construction, operation and decommissioning Coza will implement the EMP commitments with a view not only to prevent and/or mitigate the various environmental and social impacts, but also to prevent negative impacts on surrounding land uses. • During closure planning Coza will incorporate measures to achieve the future land use plans for the land within the proposed project area • Quarterly meetings will be held with surrounding landowners for the purpose of information sharing and problem solving. • Coza will ensure that it forms part of existing forums and initiatives within the area in order to aid in the management of environmental matters.	As required As required As required As required On-going	Re-zoning applications need to be submitted in terms of the Northern Cape Planning and Development Act No. 7 of 1998 or the Spatial Planning and Land Use Management Act No. 16 of 2013, whichever is applicable at the time of the submission of the re-zoning application.

The waste management and soil conservation procedures applicable to the proposed project are included in Table 50 and Table 51 below.

TABLE 50: WASTE MANAGEMENT PROCEDURES FOR GENERAL AND HAZARDOUS WASTE

Items to be considered		**Intentions**
General	**Specific**	
Classification and record keeping	General	The waste management procedure for the mine will cover the storage, handling and transportation of waste to and from the mine. The mine will ensure that the contractor's responsible are made aware of these procedures.
	Waste opportunity analysis	In line with DWEA's strategy to eliminate waste streams in the longer term, Coza will assess each waste type to see whether there are alternative uses for the material. This will be done as a priority before the disposal option.
	Classification	Wastes (except those listed in Annexure 1 of the new Waste Regulations) will be classified in accordance with SANS 10234 within one hundred and eighty (180) days of generation. Waste will be re-classified every five (5) years, or within 30 days of modification to the process or activity that generated the waste, changes in raw materials or other inputs, or any other variation of relevant factors.
	Safety data sheets	The mine will maintain, where required in terms of the Regulations, the safety data sheets for hazardous waste (prepared in accordance with SANS 10234).
	Inventory of wastes produced	The mine will keep an accurate and up to date record of the management of the waste they generate, which records must reflect: • The classification of the wastes • The quantity of each waste generated, expressed in tons or cubic metres per month • The quantities of each waste that has either been re-used, recycled, recovered, treated or disposed of • By whom the waste was managed.
	Labelling and inventory of waste produced	Any container or storage impoundment holding waste must be labelled, or where labelling is not possible, records must be kept, reflecting: • The date on which waste was first placed in the container • The date on which waste was placed in the container for the last time when the container was filled, closed, sealed or covered • The dates when, and quantities of, waste added and waste removed from containers or storage impoundments, if relevant • The specific category or categories of waste in the container or storage impoundment as identified in terms of the National Waste Information Regulations, 2012 • The classification of the waste in terms of Regulation 4 once it has been completed (if required).
	Disposal record	Written evidence of safe disposal of waste will be kept.
	Record keeping	Records will be retained for a period of at least 5 years and will be made available to the Department on request.
Waste management	Collection points	Designated waste collection points will be established on site. Care will be taken to ensure that there will be sufficient collection points with adequate capacity and that these are serviced frequently.
	Laydown/ salvage areas	During decommissioning and closure, lay down areas for re-usable non-hazardous materials will be established.
	General waste	Will be stored in designated skips and removed by an approved contractor for disposal at a licensed facility.
	Scrap metal and building rubble	Care will be taken to ensure that scrap metal and building rubble does not become polluted or mixed with any other waste. The scrap metal will be collected in a designated area for scrap metal. It will be sold to scrap dealers.

Items to be considered		Intentions
General	**Specific**	
	Hazardous wastes	Medical waste will be temporarily stored in sealed containers in a bunded store before removal by an approved waste contractor and disposal in a licenced facility.
	Oil and grease	Oil and grease will be collected in suitable containers at designated collection points. The collection points will be bunded and underlain by impervious materials to ensure that any spills are contained. Notices will be erected at each waste oil point giving instructions on the procedure for waste oil discharge and collection. An approved subcontractor will remove oil from site.
	Diesel tanks	Bunds should be established around the diesel tanks
	Any soil polluted by a spill	If remediation of the soil *in situ* is not possible, the soils will be classified as a waste in terms of the Waste Regulations and will be disposed of at an appropriate permitted waste facility.
	Mixing of wastes	Waste will not be mixed or treated where this would reduce the potential for re-use, recycling or recovery; or result in treatment that is not controlled and not permanent.
Disposal	Off site waste disposal facilities	Waste will be disposed of at appropriate permitted waste disposal facilities.
		Unless collected by the municipality, the mine must ensure that their waste is assessed in accordance with the Norms and Standards for Assessment of Waste for Landfill Disposal set in terms of section 7(1) of the Waste Act prior to the disposal of the waste to landfill.
		Unless collected by the municipality, the mine must ensure that the disposal of their waste to landfill is done in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7(1) of the Waste Act.
Waste transport	Contractor	A qualified waste management subcontractor will undertake the waste transport. The contractor will provide an inventory of each load collected and of proof of disposal at a licensed facility.
Banned practices	Long-term stockpiling of waste	Stockpiling of waste is a temporary measure. Waste stockpiling sites must have an impervious floor, be bunded and have a drainage system for collection and containment of water on the site.
	Burying of waste	No wastes will be buried on site.
	Burning of waste	Waste may only be burned in legally approved incinerators.

TABLE 51: SOIL MANAGEMENT PRINCIPLES

Steps	Factors to consider	Detail
Delineation of areas to be stripped		Stripping will only occur where soils are to be disturbed by activities and infrastructure that are described in the EIA and EMP report, and where a clearly defined end rehabilitation use for the stripped soil has been identified. Soil stripping should be conducted a suitable period ahead of mining.
Stripping	Topsoil	A minimum of 400 mm topsoil will be stripped unless a soils expert advises otherwise.
Delineation of stockpiling areas	Location	Stockpiling areas will be identified in close proximity to the source of the soil to limit handling and to promote reuse of soils in the correct areas.
	Designation of the areas	Soil stockpiles will be clearly identifiable in terms of soil type and the intended areas of rehabilitation. All topsoil will be stockpiled in areas clearly demarcated on the infrastructure layout and should be defined as no-go areas.
Stockpile management	Vegetation establishment and erosion control	Rapid growth of vegetation on the topsoil stockpiles will be promoted (e.g. by means of watering or fertilisation). The purpose of this exercise will be to encourage vegetation growth on soil stockpiles and to combat erosion by water and wind.
	Storm water controls	Stockpiles will be established with storm water diversion berms to prevent run off erosion.

Steps	Factors to consider	Detail
	Height and slope	Soil stockpile height will be controlled to avoid compaction and damage to the underlying soils. In this regard, topsoil stockpiles should be limited to a maximum height of 5m. The stockpile side slopes should be flat enough to promote vegetation growth and reduce run-off related erosion. In addition to this, the topsoil stockpiles need to be established on a gradual slope if possible.
	Waste	No waste material will be placed on the soil stockpiles.
	Vehicles	Equipment movement on top of the soil stockpiles will be limited to avoid topsoil compaction and subsequent damage to the soils and seedbank.
Rehabilitation of disturbed land: restoration of land capability	Placement of soil	Once the site has been cleared on infrastructure, the area to be rehabilitated should be ripped in order to reduce soil compaction. A minimum layer of 400 mm of topsoil will be replaced unless a soils expert advises otherwise. Once the land has been prepared, seeding and re-vegetation will contribute to establishing a vegetative cover on disturbed soil as a means to restore disturbed areas to beneficial uses as quickly as possible.
	Fertilisation	Samples of stripped soils will be analysed to determine the nutrient status of the soil before rehabilitation commences. As a minimum, the following elements will be tested for cation exchange capacity, pH and phosphate. These elements provide the basis for determining the fertility of soil. Based on the analysis, fertilisers will be applied if necessary.
	Erosion control	Erosion control measures will be implemented to ensure that the topsoil is not washed away and that erosion gulley's do not develop prior to vegetation establishment. If erosion is evident on the topsoil stockpiles, the side slopes can be stabilised through re-vegetation with indigenous species.
	Restore land function and capability	Apply landscape function analysis and restoration interventions to areas where soil has been replaced as part of rehabilitation, but the land function and capability has not been effectively restored.

28 FINANCIAL PROVISION

28.1 DETERMINATION OF THE AMOUNT OF THE FINANCIAL PROVISION

28.1.1 DESCRIPTION OF THE CLOSURE OBJECTIVES AND THE ALIGNMENT WITH THE BASELINE ENVIRONMENT

The closure objective for the proposed project including how objective will align with the current baseline environment includes the following:

- To maintain a relatively flat topography or a topography that emulates the existing ground lines.
- To maintain a functioning ecosystem
- Good groundwater quality (with elevated nitrates)
- Stable water table providing groundwater as a water supply source for domestic and livestock watering
- Quiet rural/urban environment
- Environmental damage is minimised to the extent that they are acceptable to all parties involved
- The land is rehabilitated to achieve a condition approximating its natural state, or so that the envisaged end use grazing, woodland or wildlife (ACR, January 2016) is achieved.
- Backfilling of the open pit will take place on a concurrent basis.
- All surface infrastructure, will be removed from site after rehabilitation and the open pit will be completely backfilled.
- Mine closure is achieved efficiently, cost effectively and in compliance with the law.
- The social impacts resulting from mine closure are managed in such a way that negative socio-economic impacts are minimised.

28.1.2 CONFIRMATION THAT THE CLOSURE OBJECTIVES HAVE BEEN CONSULTED WITH LANDOWNERS AND IAPS

The closure objectives were outlined in the scoping report which was made available to IAPs, including landowners for review and comment (Section 7.2.7). Further to this, IAPs including landowners will be given a further opportunity to review the closure objectives associated with the proposed project as part of the review of the EIA and EMP report (Section 7.2.8).

To date no comments regarding the closure objectives associated with the proposed project have been received from IAPs including landowners.

28.1.3 REHABILITATION PLAN

The plan showing the location and aerial extent of the entire operation at the time of closure is illustrated in Figure 3.

28.1.4 COMPATIBILITY OF THE REHABILITATION PLAN WITH THE CLOSURE OBJECTIVES

It can be confirmed that the rehabilitation plan is compatible with the closure objectives given that the closure objectives were taken into account during the determination of the financial provision.

28.1.5 CALCULATE AND STATE THE QUANTUM OF THE FINANCIAL PROVISION

The information in this section was sourced from the closure cost calculation study completed by SLR (SLR, March 2016) and is included in Appendix R. The closure cost assessment was undertaken in accordance with the DMR Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine. The financial closure liability associated with Jenkins (as at life of mine, LOM, or approximately December 2026) is R 62,393,784 (including VAT). All amounts calculated are at Current Value (CV) as at March 2016.

The financial closure liabilities for Jenkins over the life of mine (at CV) are summarised in the table below. There is no decrease or increase in the financial closure liability over the life of mine since there is no additional infrastructure constructed during the life of mine, and the open pit area remains unchanged after the end of the first year (i.e. pit only gets deeper).

TABLE 52: FINANCIAL LIABILITY FOR YEARS 1, 2, 4, 6, 8 AND LOM

Time-frame	Date	Financial Liability Calculations based on the following activities	Financial Liability incurred during the year (incl. VAT)	Progressive Financial Liability (incl. VAT)	Progressive Liability as a % of LOM liability
Middle of Phase 1 (Year 1)	Dec 2017	Pre-stripping at open pit complete and mine production started	R 62,393,784	R 62,393,784	100 %
End of Phase 1 (Year 2)	Dec 2018	Ongoing mine production and open pit development	R 0	R 62,393,784	100 %
End of Phase 2 (Year 4)	Dec 2020	Ongoing mine production and open pit development	R 0	R 62,393,784	100 %
End of Phase 3	Dec 2022	Ongoing mine production and open	R 0	R 62,393,784	100 %

(Year 6)		pit development			
End of Phase 4 (Year 8)	Dec 2024	Ongoing mine production and open pit development	R 0	R 62,393,784	100 %
End of Phase 5 (Year 10 and LOM)	Dec 2026	LOM, end of mine operations	R 0	R 62,393,784	100 %

28.1.6 CONFIRMATION THAT THE FINANCIAL PROVISION WILL BE PROVIDED

The financial provision will be provided in the form of a bank guarantee or alternatively a trust. This will be agreed between Coza and the DMR.

29 MECHANISMS FOR MONITORING COMPLIANCE AND PERFORMANCE AGAINST THE EMP

Environmental impacts requiring monitoring are listed in Table 53 below.

TABLE 53: MONITORING OF COMPLIANCE AND PERFORMANCE IN TERMS OF EMPR

Activity	Impacts requiring monitoring	Functional requirements for monitoring	Roles and responsibilities	Monitoring and reporting frequency and time period for management actions
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Support services Demolition Rehabilitation Maintenance and aftercare	Hazardous infrastructure	All mineralised waste facilities and water dams will be monitored to ensure stability, safety and prevention of environmental impacts. The findings will be documented for record-keeping and auditing purposes and addressed where relevant to achieve the stated objectives.	Qualified engineer	The frequency of the monitoring and the qualification of the monitoring personnel will be determined on an infrastructure specific basis. Monitoring will be undertaken for the duration of the mine.
Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Mineralised waste Non-mineralised waste Support services Rehabilitation Demolition Maintenance and aftercare	Alteration of natural drainage patterns	An operational water balance for the mine needs to be developed from recorded flow measurements and production figures. This is done by an appropriately qualified person. The water balance is used to check on an on-going basis that the capacity of the dirty water holding facilities is adequate.	Environmental Department	Updated on a monthly basis for the duration of the mine.
Earthworks Civil works Open pit mining Processing plant	Contamination of surface water resources	Monitoring of surface water quality should be undertaken in the event that surface water flow is present in the non-perennial drainage channels. Water quality analyses results should be classified in terms of the DWAF Guidelines Domestic Water Supply (1999), the DWAF guidelines for livestock watering,	Environmental Department	Monitoring reports need to be submitted to the DWS as per the conditions of the WULA.

<table>
<tr><th>Activity</th><th>Impacts requiring monitoring</th><th>Functional requirements for monitoring</th><th>Roles and responsibilities</th><th>Monitoring and reporting frequency and time period for management actions</th></tr>
<tr><td>Transportation
Power supply and use
Mineralised waste
Non-mineralised waste
Support services
Rehabilitation
Demolition
Maintenance and aftercare</td><td></td><td>IFC mining Effluent Limits, WHO guidelines and SANS guideline limits. The parameters that need to be tested as part of the monitoring programme are those outlined in the groundwater monitoring programme. The monitoring results should be assessed by a suitably-qualified professional registered with the South African Council for Natural Scientific Professional (SACNASP). All of the above may be amended to comply with the WUL conditions.</td><td></td><td>Monitoring will be undertaken when the two non-perennial drainage channels are in flow.</td></tr>
<tr><td>Earthworks
Civil works
Open pit mining
Processing plant
Transportation
Power supply and use
Mineralised waste
Non-mineralised waste
Support services
Rehabilitation
Demolition
Maintenance and aftercare</td><td>Contamination of groundwater resources or reduction in groundwater levels</td><td>As part of the proposed project, Coza will implement a groundwater monitoring programme. The proposed location of the groundwater monitoring boreholes are illustrated in Figure 25.The exact location and number of monitoring boreholes should be refined in consultation with qualified specialists. Where requested and where it makes sense to the operations, landowner boreholes can be included in the programme. Water quality analyses results should be classified in terms of the DWAF Guidelines Domestic Water Supply (1999), the DWAF guidelines for livestock watering, IFC mining Effluent Limits, WHO guidelines and SANS guideline limits. The parameters that should be monitored are tabulated below.
<table>
<tr><td>pH</td><td>Potassium</td></tr>
<tr><td>Electrical conductivity</td><td>Magnesium</td></tr>
<tr><td>Total hardness</td><td>Manganese</td></tr>
<tr><td>Fluoride as F</td><td>Sodium</td></tr>
<tr><td>Total alkalinity</td><td>Total dissolved solids</td></tr>
<tr><td>Chloride as Cl</td><td>Potassium</td></tr>
<tr><td>Sulphate as SO_4</td><td>Iron</td></tr>
<tr><td>Nitrate as N</td><td>Calcium</td></tr>
<tr><td>Aluminium</td><td>Turbidity</td></tr>
</table></td><td>Environmental Department</td><td>Groundwater quality should be monitored monthly for the duration of the mine and for at least ten years after closure.

Groundwater quantity should be monitored on a quarterly basis for the duration of the mine and for at least ten years after closure.

The monitoring programme should be implemented at least one year prior to mining.

Groundwater monitoring reports need to be submitted to the DWS as per the conditions of the WUL.</td></tr>
<tr><td>Site preparation
Earthworks
Civil works
Open pit mining
Processing plant</td><td>Air pollution</td><td>Coza will ensure the implementation of an air quality monitoring (dust fallout, PM2.5 and PM10) programme for the proposed project. The location of the monitoring points are illustrated in Figure 24.</td><td>Environmental Department</td><td>Dust fallout monitoring must be undertaken on a monthly basis. Monitoring will be undertaken for the duration of the mine.</td></tr>
</table>

Activity	Impacts requiring monitoring	Functional requirements for monitoring	Roles and responsibilities	Monitoring and reporting frequency and time period for management actions
Transportation Power supply and use Mineralised waste Non-mineralised waste Support services Rehabilitation Demolition Maintenance and aftercare				PM10 and PM2.5 monitoring should take place on a monthly basis.
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Mineralised waste Non-mineralised waste Support services Rehabilitation Demolition	Noise pollution	In the event that Coza receives noise related complaints during either construction or operation, Coza should consider conducting short term (24-hour) ambient noise measurements as part of investigating the complaints. The results of the measurements should be used to inform any follow up interventions. The following procedure should be adopted for all noise surveys if required: • Any surveys should be designed and conducted by a trained specialist. • Sampling should be carried out using a Type 1 sound level meter (SLM) that meets all appropriate International Electrotechnical Commission (IEC) standards and is subject to annual calibration by an accredited laboratory. • The acoustic sensitivity of the SLM should be tested with a portable acoustic calibrator before and after each sampling session. • Samples of at least 24 hours in duration and sufficient for statistical analysis should be taken with the use of portable SLM's capable of logging data continuously over the time period. Samples representative of the day- and night-time acoustic climate should be taken. • The following acoustic indices should be recoded and reported: o LAeq (T) o Statistical noise level LA90 o LAmin and LAmax o Octave band or 3rd octave band frequency spectra. • The SLM should be located approximately 1.5 m above the ground and no closer than 3 m to any reflecting surface. • Efforts should be made to ensure that measurements are not affected by the residual noise and extraneous influences, e.g. wind, electrical interference and any other non-acoustic interference, and that the instrument is operated under the conditions specified by the manufacturer. It is good practice to avoid conducting measurements when the wind speed is more than 5 m/s, while it is raining or when the	Environmental Department	Noise monitoring should be done for a month in the event of a noise related complaint.

Activity	Impacts requiring monitoring	Functional requirements for monitoring	Roles and responsibilities	Monitoring and reporting frequency and time period for management actions
		ground is wet. • A detailed log and record should be kept. Records should include site details, weather conditions during sampling and observations made regarding the acoustic climate of each site.		
Site preparation Earthworks Civil works Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation Demolition Maintenance and aftercare	Physical destruction and general disturbance of biodiversity	Coza will implement an alien/invasive /weed management programme to control the spread of these plants onto and form disturbed areas. This will be achieved by active eradication and the establishment of natural species and through on-going monitoring and assessment. The use of herbicides will be limited and focussed and will only be used under strict controls. Herbicides will be selected to ensure least residual harm. Herbicides will be administered by suitably qualified people. Continued monitoring will be undertaken to ensure that the alien invasive species have been eradicated and are controlled for both controlled sites as well as rehabilitated areas. For each area requiring rehabilitation specific landscape functionality objectives will be set with expert input and the associated targets and monitoring program will follow accordingly.	Environmental Department	The alien/invasive/weed management programme should be undertaken on an annual basis for the duration of the mine. After closure, repeat surveys should be carried out annually for at least the first three years post-rehabilitation.
Open pit mining	Blasting impacts (fly rock, air blasts and ground vibrations)	Monitoring of each blast will be taken as part of the proposed project. Points for off-site vibration and airblast monitoring will be identified in consultation with surrounding landowners and a blast monitoring specialist. The monitoring results will be documented and maintained for record-keeping and auditing purposes.	Qualified blasting specialist	Blast monitoring will take place for the duration of blasting activities.

29.1 FREQUENCY OF PERFORMANCE ASSESSMENT REPORT

- The environmental department manager will conduct internal management audits against the commitments in the EMP. These audits will be conducted on an on-going basis until final closure. The audit findings will be documented for both record keeping purposes and for informing continual improvement. In addition, and in accordance with mining regulation R527, an independent professional will conduct an EMP performance assessment every 2 years. The site's compliance with the provisions of the EMP and the adequacy of the EMP report relative to the on-site activities will be assessed in the performance assessment. In addition, in accordance to Section 34 of GNR. 982 of NEMA, the holder of a mining right needs to submit an environmental audit report, prepared by an independent person, to the DMR at intervals indicated in the environmental authorisation. The purpose of the environmental audit report is to ensure compliance with the conditions of the environmental authorisation and the EMP.

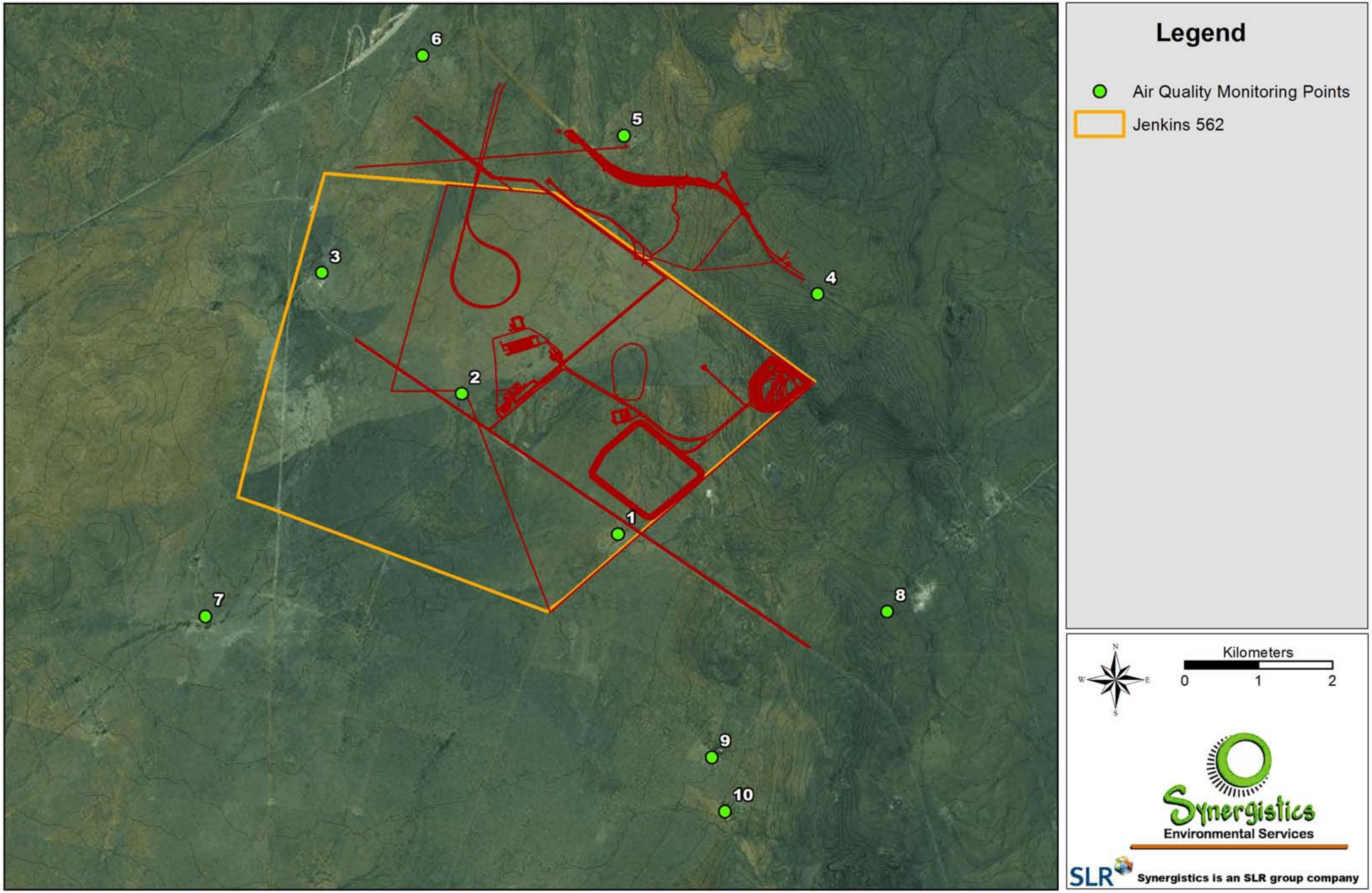


Figure 24: Monitoring Plan (Air Quality)	755.03048.00001	Coordinate System DMS	
		Spheroid WGS84	Central Meridian LO

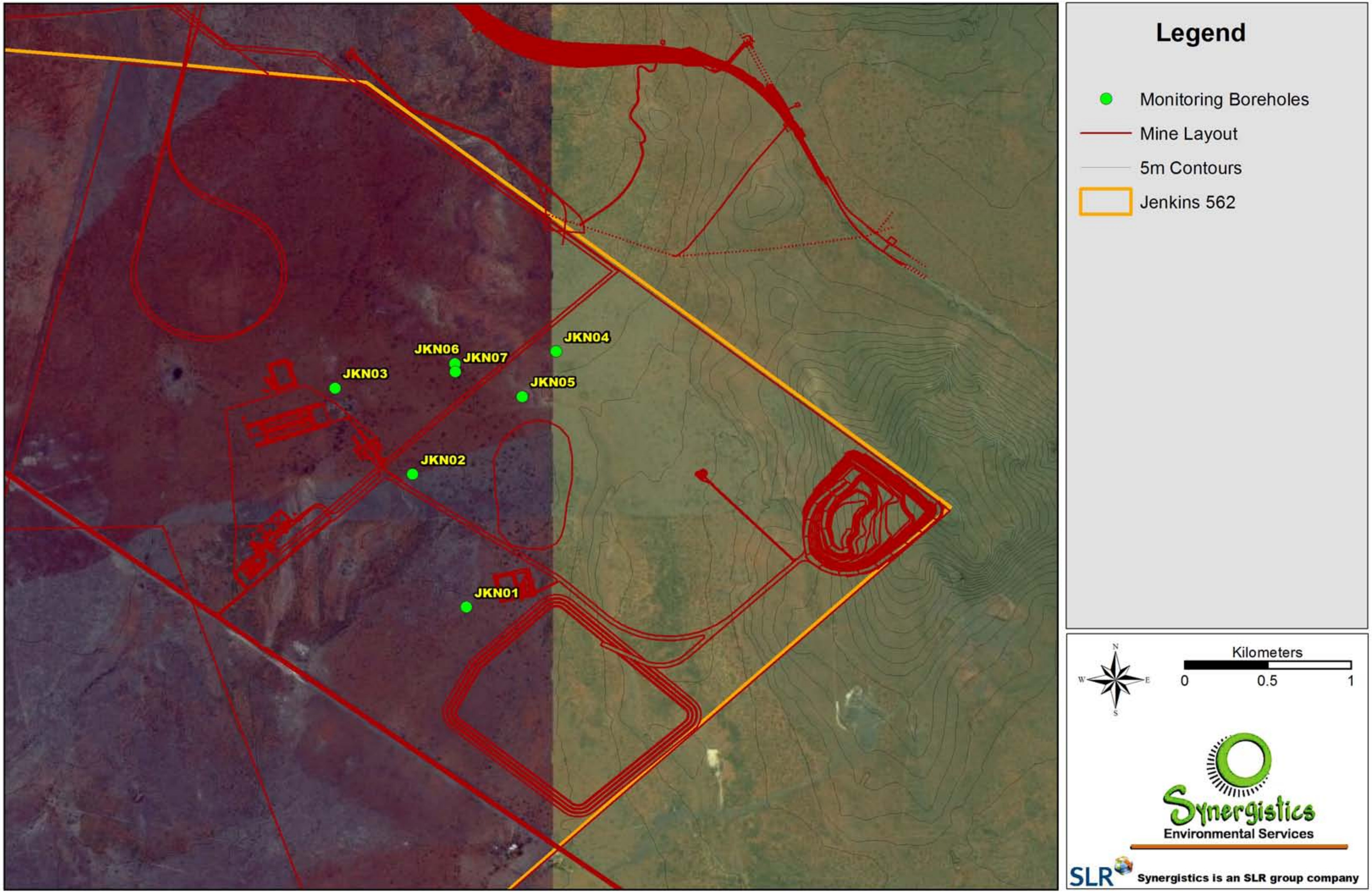


Figure 25: Monitoring Plan (Groundwater)

755.03048.00001

Coordinate System DMS

Spheroid WGS84

Central Meridian LO

30 ENVIRONMENTAL AWARENESS PLAN

30.1 MANNER IN WHICH APPLICANT INTENDS TO INFORM EMPLOYEES OF THE ENVIRONMENTAL RISKS

This section includes an environmental awareness plan for the proposed mine. The plan describes how employees will be informed of environmental risks which may result from their work, the manner in which the risk must be dealt with in order to avoid pollution or degradation of the environment and the training required for general environmental awareness and the dealing of emergency situations and remediation measures for such emergencies.

All contractors that conduct work on behalf of Coza are bound by the content of the EMPr and a contractual condition to this effect will be included in all such contracts entered into by the mine. If contractors are used, the responsibility for ensuring compliance with the EMPr will remain with Coza.

The purpose of the environmental awareness plan is to ensure that all personnel and management understand the general environmental requirements of the site. In addition, greater environmental awareness must be communicated to personnel involved in specific activities which can have a significant impact on the environment and ensure that they are competent to carry out their tasks on the basis of appropriate education, training and/or experience. The environmental awareness plan should enable Coza to achieve the objectives of the environmental policy.

ENVIRONMENTAL POLICY

Coza will display the environmental policy. To achieve world class environmental performance in a sustainable manner Coza is currently committed to:

- Integrating environmental management into all aspects of our business, including the entire product life cycle;
- Complying with all applicable legislation and other requirement to which Coza subscribes;
- Practising responsible stewardship by adopting world class standards;
- Proactively identifying and managing significant environmental aspects in order to:
    - Minimise emissions to atmosphere
    - Minimise the release of effluent
    - Optimise resource consumption
    - Mitigate our impacts on climate change
    - Minimise waste
    - Rehabilitate disturbed land and protect environmental biodiversity

  - Protect cultural heritage resources.
- Ensuring environmental awareness and appropriate competency among employees and promoting environmental awareness in the community
- Engaging with all IAPs towards the shared goal of improving the environment;
- Setting objectives and, where possible, quantitative targets, to determine continual improvement in environmental performance and the prevention of pollution

30.1.1 STEPS TO ACHIEVE THE ENVIRONMENTAL POLICY OBJECTIVES

Coza's environmental policy will be realised by setting specific and measurable objectives. It is proposed that new objectives are set throughout the life of mine, but initial objectives are as follows:

- Management of environmental responsibilities:
  - Coza will establish and appoint Managers at senior mine management level at each site, who will be provided with all necessary resources to carry out the management of all environmental aspects of the site irrespective of other responsibilities, for example:
    - Compliance with environmental legislation and EMP commitments
    - Implementing and maintaining an environmental management system with the assistance of the appointed EMS Area Coordinator and the Area Waste Coordinator
    - Developing environmental emergency response procedures and coordinating personnel during incidents
    - Manage routine environmental monitoring and data interpretation
    - Environmental trouble shooting and implementation of remediation strategies
    - Closure planning.
- Communication of environmental issues and information:
  - Meetings, consultations and progress reviews will be carried out, and specifically Coza will:
    - Set the discussion of environmental issues and feedback on environmental projects as an agenda item at all company board meetings
    - Provide progress reports on the achievement of policy objectives and level of compliance with the approved EMP to the Department of Minerals Resources
    - Ensure environmental issues are raised at monthly mine management executive committee meetings and all relevant mine wide meetings at all levels
    - Ensure environmental issues are discussed at all general liaison meetings with local communities and other interested and affected parties.
- Environmental awareness training:
  - Coza will provide environmental awareness training to individuals at a level of detail specific to the requirements of their job, but will generally comprise:

  - Basic awareness training for all prior to granting access to site (e.g. short video presentation requiring registration once completed). Employees and contractors who have not attended the training will not be allowed on site.
  - General environmental awareness training will be given to all employees and contractors as part of the Safety, Health and Environment induction programme. All non-Coza personnel who will be on site for more than three days must undergo the SHE induction training.
  - Specific environmental awareness training will be provided to personnel whose work activities can have a significant impact on the environment (e.g. workshops, waste handling and disposal, sanitation, etc.).
- Review and update the environmental topics already identified in the EMPr which currently includes the following purpose:
  - Topography (hazardous excavations)
  - Soil and land capability management (loss of soil resource)
  - Management of biodiversity
  - Surface water management (alteration of surface drainage and pollution of surface water)
  - Groundwater management (reduction in groundwater levels/availability and groundwater contamination)
  - Management of air quality (dust generation)
  - Noise (specifically management of disturbing noise)
  - Visual aspects (reduction of negative visual impacts)
  - Surrounding land use (traffic management, blast management, land use loss)
  - Heritage resources (management of sites)
  - Socio-economic impacts (management of positive and negative impacts)
- The mine will be designed to minimise impact on the environment and to accomplish closure/rehabilitation objectives.
- Coza will maintain records of all environmental training, monitoring, incidents, corrective actions and reports.

30.1.2 TRAINING OBJECTIVES OF THE ENVIRONMENTAL AWARENESS PLAN

The environmental awareness plan ensures that training needs are identified and that appropriate training is provided. The environmental awareness plan should communicate:

- The importance of conformance with the environmental policy, procedures and other requirements of good environmental management
- The significant environmental impacts and risks of individuals work activities and explain the environmental benefits of improved performance
- Individuals roles and responsibilities in achieving the aims and objectives of the environmental policy

- The potential consequences of not complying with environmental procedures.

30.1.2.1 General Contents of the Environmental Awareness Plan

To achieve the objectives of the environmental awareness plan the general contents of the training plans are as follows:

- Module 1 – Basic training plan applicable to all personnel entering the site:
  - Short (15 min) presentation to indicate the site layout and activities at specific business units together with their environmental aspects and potential impacts.
  - Individuals to sign off with site security on completion in order to gain access to the site.
- Module 2 – General training plan applicable to all personnel at the site for longer than 3 days:
  - General understanding of the environmental setting of the mine (e.g. local communities and industries and proximity to natural resources such as rivers);
  - Understanding the environmental impact of individuals activities on site (e.g. excessive production of waste, poor housekeeping, energy consumption, water use, noise, etc.);
  - Indicate potential site specific environmental aspects and their impacts;
  - Coza's environmental management strategy;
  - Identifying poor environmental management and stopping work which presents significant risks;
  - Reporting incidents;
  - Examples of poor environmental management and environmental incidents; and
  - Procedures for emergency response and cleaning up minor leaks and spills.
- Module 3 – Specific training plan:
  - Environmental setting of the workplace (e.g. proximity of watercourses, vulnerability of groundwater, proximity of local communities and industries, etc.);
  - Specific environmental aspects such as:
    - Spillage of hydrocarbons at workshops
    - Spillage of explosive liquids in the open pits
    - Poor waste management such as mixing hazardous and general wastes, inappropriate storage and stockpiling large amounts of waste
    - Poor housekeeping practices
    - Poor working practices (e.g. not carrying out oil changes in designated bunded areas)
    - Excessive noise generation and unnecessary use of hooters
    - Protection of heritage resources (including palaeontological resources).
  - Impact of environmental aspects, for example:
    - Hydrocarbon contamination resulting in loss of resource (soil, water) to downstream users;
    - Groundwater contamination also resulting in loss of resource due to potential adverse aesthetic, taste and health effects; and
    - Dust impacts on local communities (nuisance and health implications).

- Coza's duty of care (specifically with respect to waste management); and
- Purpose and function of Coza's environmental management system.

Individuals required to complete Module 3 (Specific training module) will need to complete Modules 1 and 2 first. On completion of the Module 3, individuals will be subject to a short test (written or verbal) to ensure the level of competence has been achieved. Individuals who fail the test will be allowed to re-sit the test after further training by the training department.

The actual contents of the training modules will be developed based on a training needs analysis.

Key personnel will be required to undergo formal, external environmental management training (e.g. how to operate the environmental management system, waste management and legal compliance).
In addition to the above Coza will:

- Conduct refresher training/presentations on environmental issues for mine employees (permanent and contractors) at regular intervals.
- Promote environmental awareness using relevant environmental topic posters displayed at strategic locations on the mine. These topics will be changed monthly, and will be reviewed annually by the Environmental Department Manager to ensure relevance.
- Participate and organise events which promote environmental awareness, some of which will be tied to national initiatives e.g. National Arbour Week, World Environment Day and National Water Week.

30.2 Manner in which risks will be dealt with to avoid pollution or degradation

30.2.1 On-going monitoring and management measures

The monitoring programme as described in Section 29 will be undertaken to provide early warning systems necessary to avoid environmental emergencies.

30.2.2 Procedures in case of environmental emergencies

Emergency procedures apply to incidents that are unexpected and that may be sudden, and which lead to serious danger to the public and/or potentially serious pollution of, or detriment to the environment (immediate and delayed). Procedures to be followed in case of environmental emergencies are described in the table below (Table 54).

30.2.2.1 General emergency procedure

The general procedure that should be followed in the event of all emergency situations is as follows.

- Applicable incident controller defined in emergency plans must be notified of an incident upon discovery
- Area to be cordoned off to prevent unauthorised access and tampering with evidence
- Undertake actions defined in emergency plant to limit/contain the impact of the emergency
- If residue facilities/dams, stormwater diversions, etc., are partially or totally failing and this cannot be prevented, the emergency siren is to be sounded (nearest one available). After hours the Operations Engineer on shift must be notified
- Take photographs and samples as necessary to assist in investigation
- Report the incident immediately to the environmental department for emergencies involving environmental impacts or to the safely department in the case of injury
- The Environment department must comply with Section 30 of the National Environmental Management Act (107 of 1998) such that:
  - The Environment department must immediately notify the Director-General (DWS and DMR and Inspectorate of Mines as appropriate), the South African Police Services, the relevant fire prevention service, the provincial head of DMR, the head of the local municipality, the head of the regional DWS office and any persons whose health may be affected of:
    - The nature of the incident
    - Any risks posed to public health, safety and property
    - The toxicity of the substances or by-products released by the incident
    - Any steps taken to avoid or minimise the effects of the incident on public health and the environment.
- The Environment department must as soon as is practical after the incident:
    - Take all reasonable measures to contain and minimise the effects of the incident including its effects on the environment and any risks posed by the incident to the health, safety and property of persons;
    - Undertake clean up procedures;
    - Remedy the effects of the incident; and
    - Assess the immediate and long term effects of the incident (environment and public health);
  - Within 14 days the Environment department must report to the Director-General DWS and DEA, the provincial head of DMR, the regional manager of the DMR, the head of the local and district municipality, the head of the regional DWS office such information as is available to enable an initial evaluation of the incident, including:
    - The nature of the incident
    - The substances involved and an estimation of the quantity released
    - The possible acute effects of the substances on the persons and the environment (including the data needed to assess these effects)
    - Initial measures taken to minimise the impacts

- Causes of the incident, whether direct or indirect, including equipment, technology, system or management failure
- Measures taken to avoid a recurrence of the incident.

30.2.2.2 Identification of Emergency Situations

The site wide emergency situations that have been identified together with specific emergency response procedures are outlined in Table 54.

30.2.3 TECHNICAL, MANAGEMENT AND FINANCIAL OPTIONS

Technical, management and financial options that will be put into place to deal with the remediation of impacts in cases of environmental emergencies are described below.

- The applicant will appoint a competent management team with the appropriate skills to develop and manage a mine of this scale and nature.
- To prevent the occurrence of emergency situations, the mine will implement as a minimum the mine plan and mitigation measures as included in this EMPr report.
- The mine has an environmental management system in place where all operation identify, report, investigate, address and close out environmental incidents.
- As part of its annual budget, the mine will allow a contingency for handling of any risks identified and/or emergency situations.
- Where required, the mine will seek input from appropriately qualified people.

TABLE 54: EMERGENCY RESPONSE PROCEDURES

Item	Emergency situation	Response in addition to general procedures
1	Spillage of chemicals, engineering substances and waste	Where there is a risk that contamination will contaminate the land (leading to a loss of resource), surface water and/or groundwater, Coza will: • Notify residents/users downstream of the pollution incident. • Identify and provide alternative resources should contamination impact adversely on the existing environment. • Cut off the source if the spill is originating from a pump, pipeline or valve (e.g. refuelling bays) and the infrastructure 'made safe'. • Contain the spill (e.g. construct temporary earth bund around source such as road tanker). • Pump excess hazardous liquids on the surface to temporary containers (e.g. 210 litre drums, mobile tanker, etc.) for appropriate disposal. • Remove hazardous substances from damaged infrastructure to an appropriate storage area before it is removed/repaired.
2	Discharge of dirty water to the environment	Apply the principles listed for Item 1 above. To stop spillage from the dirty water system the mine will: • Redirect excess water to other dirty water facilities where possible • Pump dirty water to available containment in the clean water system, where there is no capacity in the dirty water system • Carry out an emergency discharge of clean water and redirect the spillage to the emptied facility. • Apply for emergency discharge as a last resort.
3	Pollution of surface water (where relevant)	Personnel discovering the incident must inform the Environment department of the location and contaminant source. Apply the principles listed for Item 1 above. Absorbent booms will be used to absorb surface plumes of hydrocarbon contaminants. Contamination entering the surface water drainage system should be redirected into the dirty water system. The Environment department will collect in-stream water samples downstream of the incident to assess the immediate risk posed by contamination.
4	Groundwater contamination	Use the groundwater monitoring boreholes as scavenger wells to pump out the polluted groundwater for re-use in the process water circuit (hence containing the contamination and preventing further migration). Investigate the source of contamination and implement control/mitigation measures.
5	Burst water pipes (loss of resource and erosion)	Notify authority responsible for the pipeline (if not mine responsibility). Shut off the water flowing through the damaged area and repair the damage. Apply the principles listed for Item 1 above if spill is from the dirty/process water circuit.
6	Flooding from failure of surface water control	Evacuate the area downstream of the failure. Using the emergency response team, rescue/recover and medically treat any injured personnel.

Item	Emergency situation	Response in addition to general procedures
	infrastructure	Temporarily reinstate/repair stormwater diversions during the storm event (e.g. emergency supply of sandbags). Close the roads affected by localised flooding or where a stormwater surge has destroyed crossings/bridges.
7	Risk of drowning from falling into water dams	Attempt rescue of individuals from land by throwing lifeline/lifesaving ring. Get assistance of emergency response team whilst attempting rescue or to carry out rescue of animals and or people as relevant. Ensure medical assistance is available to recovered individual.
8	Veld fire	Evacuate mine employees from areas at risk. Notify downwind residents and industries of the danger. Assist those in imminent danger/less able individuals to evacuate until danger has passed. Provide emergency fire fighting assistance with available trained mine personnel and equipment.
9	Falling into hazardous excavations	Personnel discovering the fallen individual or animal must mobilise the emergency response team to the location of the incident and provide a general appraisal of the situation (e.g. human or animal, conscious or unconscious, etc.). The injured party should be recovered by trained professionals such as the mine emergency response team. A doctor (or appropriate medical practitioner)/ambulance should be present at the scene to provide first aid and transport individual to hospital.
10	Road traffic accidents (on site)	The individual discovering the accident (be it bystander or able casualty) must raise the alarm giving the location of the incident. Able personnel at the scene should shut down vehicles where it is safe to do so. Access to the area should be restricted and access roads cleared for the emergency response team. Vehicles must be made safe first by trained professionals (e.g. crushed or overturned vehicles). Casualties will be moved to safety by trained professionals and provided with medical assistance. Medical centres in the vicinity with appropriate medical capabilities will be notified if multiple seriously injured casualties are expected. A nearby vet should be consulted in the case of animal injury
11	Development of informal settlements	The mine will inform the local authorities (municipality and police) that people are illegally occupying the land and ensure that action is taken within 24hrs.
12	Injury from fly rock	The person discovering the incident will contact the mine emergency response personnel to recover the injured person or animal and provide medical assistance. Whilst awaiting arrival of the emergency response personnel, first aid should be administered to the injured person by a qualified first aider if it is safe to do so.
13	Uncovering of graves and sites	Personnel discovering the grave or site must inform the Environment department immediately. Prior to damaging or destroying any of the identified graves, permission for the exhumation and relocation of graves must be obtained from the relevant descendants (if known), the National Department of Health, the Provincial Department of Health, the

Item	Emergency situation	Response in addition to general procedures
		Premier of the Province and the local Police. The exhumation process must comply with the requirements of the relevant Ordinance on Exhumations, and the Human Tissues Act, 65 of 1983.
14	Uncovering of fossils	Personnel discovering the fossil or potential site must inform the Environment department immediately. Should any fossils be uncovered during the development of the site, a palaeontologist will be consulted to identify the possibility for research.

31 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

The following documents will be submitted to the DMR from the start of construction until mine closure:

- In accordance to Section 34 of GNR. 982 of NEMA, the holder of a mining right needs to submit an environmental audit report, prepared by an independent person, to the DMR at intervals indicated in the environmental authorisation. The purpose of the environmental audit report is to ensure compliance with the conditions of the environmental authorisation and the EMP.
- The financial provision will be updated on an annual basis and submitted to the DMR

32 UNDERTAKING

I, Caitlin Hird, the Environmental Assessment Practitioner responsible for compiling this EMPR hereby confirm:

- The correctness of the information provided in the report;
- The inclusion of comments and inputs form stakeholders and IAPs;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- The acceptability of the project in relation to the finding of the assessment and the level of mitigation proposed.

__________________ Date: 12/04/2016.

Signature of the EAP

REFERENCES

Agricultural Research Council, Coza Mining Jenkins Iron Ore Project: Soils and Agricultural Potential, March 2016.

Airshed Planning Professionals (Pty) Ltd, Air Quality Specialist Report for the Proposed Coza Iron Ore Project on Farm Jenkins in the Northern Cape Province, February 2015.

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TTT Africa (Africa) (Pty) Ltd, Traffic Investigation of the Proposed Jenkins Iron Ore Mine, Traffic Impact Statement, January 2016.

APPENDIX A: PROOF OF EAP QUALIFICATIONS

APPENDIX B: CURRICULUM VITAE OF EAP

APPENDIX C: LOCAL AND REGIONAL SETTING

APPENDIX D: SITE LAYOUT

APPENDIX E: STAKEHOLDER ENGAGEMENT DOCUMENTS

- NEMA/NEMWA application form
- Mining Right Application form
- Database
- Notice of intent letter submitted to the DWS (8 June 2015)
- DMR acceptance letter of relevant applications
- SLR response to DMR acceptance letter (16 February 2016)
- Background Information Document (BID) in English and Afrikaans
- Proof of distribution of BID (via email and post)
- Site notices in English and Afrikaans and photos of the site notices
- Advertisements placed in the Volksblad and Kathu Gazette
- Correspondence from the land claims commissioner (DRDLR)
- Proof of distribution of the scoping report and summaries to IAPs and regulatory authorities for review and comment
- Comments received during the review of the scoping report by IAPs and regulatory authorities
- Letter of intent to lodge WULA (sent to DWS) (20 January 2016)

APPENDIX F: IMPACT RATING FOR EACH POTENTIAL IMPACT

Potential environmental and socio-economic impacts were identified by SLR, specialists and other stakeholders. The impacts are discussed under issue headings in this section. All identified impacts are considered in a cumulative manner such that the current baseline conditions on site and in the surrounding area are discussed and assessed together. The criteria used to rate each impact is outlined in Section 7.6 of the main report. The potential impacts are rated with the assumption that no mitigation measures are applied and then again with mitigation. An indication of the phases in which the impact will occur including the activity associated with each impact is provided below. A summary of the impact assessment is summarised in Section 9 of the main report.

Environmental impacts that will be assessed in this section include the following:

- Loss and sterilisation of a mineral resource
- Hazardous excavations, infrastructure and surface subsidence
- Loss of soil resources and land capability through contamination
- Loss of soil resources and land capability through physical disturbance
- Physical destruction of biodiversity
- General disturbance of biodiversity
- Contamination of surface water resources
- Alteration of natural drainage patterns
- Contamination of groundwater resources
- Reduction of groundwater levels and availability
- Air pollution
- Noise pollution
- Blasting impacts
- Road disturbance and traffic safety
- Visual impacts
- Loss of heritage, cultural and palaeontological resources
- Economic impact
- Inward migration impact
- Land use impact

GEOLOGY

ISSUE: LOSS AND STERILIZATION OF MINERAL RESOURCE

Information in this section was sourced from the project team.

Introduction

Mineral resources can be sterilised and/or lost through the placement of infrastructure and activities in close proximity to mineral resources, by preventing access to potential mining areas, and through the disposal of mineral resources onto mineralised waste facilities (waste rock dump (WRD)) or as backfill in the open pit.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Open pit mining Placement of infrastructure Mineralised waste	Open pit mining Placement of infrastructure Mineralised waste	Open pit mining Placement of infrastructure Mineralised waste	Maintenance and aftercare of rehabilitated areas

Rating of impact

<u>Severity / nature</u>

The severity of sterilising mineral resources is considered to be high because of the associated potential economic value that is lost when sterilisation occurs. In the unmitigated scenario, this may occur in the event that Coza develops or decommissions infrastructure in a manner that it prohibits the mining of feasible resources, or where it disposes of feasible mineral resources onto the WRD which will be backfilled into the open pit in a manner that makes it difficult or impossible to access the resources.

In the mitigated scenario, planning and co-ordination between the project team can help to prevent the unacceptable sterilisation of resources, without compromising safety requirements. The mitigated severity reduces to low.

<u>Duration</u>

If sterilisation of resources occurs it is likely that the related impact will extend beyond the life of mine. This is a long term duration in both the unmitigated and mitigated scenario.

<u>Spatial scale / extent</u>

The spatial extent of the physical impact is linked to the spatial extent of the proposed project area. This is a localised spatial extent. If one however considers the economic nature of the impact, it will extend beyond the site into the broader economy.

<u>Consequence</u>

The unmitigated consequence is high. The mitigated consequence is medium.

<u>Probability</u>

Without mitigation the probability is high. With the implementation of mitigation measures, planning structures will be in place to avoid infrastructure and development related sterilisation which reduces the probability to low.

<u>Significance</u>

The unmitigated significance is high. In the mitigated scenario the significance is low.

<u>Unmitigated – summary of the rated loss and sterilisation of mineral resources impact per phase of the project</u>

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Operation, decommissioning and closure						
Unmitigated	H	H	M	H	H	H

<u>Mitigated – summary of the rated loss and sterilisation of mineral resources impact per phase of the project</u>

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Operation, decommissioning and closure						
Mitigated	L	H	M	M	L	L

TOPOGRAPHY

ISSUE: HAZARDOUS EXCAVATIONS, INFRASTRUCTURE AND SURFACE SUBSIDENCE

Information in this section was sourced from the project team.

Introduction

Hazardous excavations and infrastructure include all structures into or off which third parties and animals can fall and be harmed. Included in this category is surface subsidence associated with mining areas. Hazardous excavations and infrastructure occur in all mine phases from construction through operation to decommissioning and closure. In the construction and decommissioning phases these hazardous excavations and infrastructure are usually temporary in nature, usually existing for a few weeks to a few months. The operational phase will present more long term hazardous excavations and infrastructure and the closure phase will present final land forms that are considered hazardous.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Support services Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Support services Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impact

Severity/ nature

In the unmitigated scenario, in all project phases, most of the identified hazardous excavations and infrastructure (including surface subsidence) present a potential risk of injury and/or death to both people and animals. This is a potential high severity.

In the mitigated scenario the severity reduces to low with the implementation of management measures focused on access control and the design of the open pit con-current rehabilitation components to prevent and/or mitigate impacts.

Duration

Death or permanent injury is considered a long term, permanent impact in both the mitigated and unmitigated scenarios.

Spatial scale/ extent

Direct impacts associated with hazardous infrastructure and excavations will be located within the site boundary in all project phases, with or without mitigation. The potential indirect impacts will however extend beyond the site boundary to the communities to which the injured people and/or animals belong.

Consequence

The consequence is high in both the unmitigated and mitigated scenarios.

Probability

In the unmitigated scenario, without design and management interventions the impact probably is expected to be high The mitigation measures will focus on infrastructure safety design and implementation as well as on limiting access to third parties and animals which reduces the probability of the impact occurring.

Significance

In the unmitigated scenario, the significance of this potential impact is high. In the mitigated scenario, the significance of this potential impact is low because there will be a reduction in probability that the impact occurs.

Unmitigated – summary of the rated hazardous excavations and infrastructure impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	H	H	M	H	H	H

Mitigated – summary of the rated hazardous excavations and infrastructure impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	L	H	M	M	L	L

SOIL AND LAND CAPABILITY

ISSUE: LOSS OF SOIL RESOURCES AND LAND CAPABILITY THROUGH CONTAMINATION

Information in this section was sourced from the soils and agricultural potential study for the proposed project (ARC, January 2016) included in Appendix I.

Introduction

Soil is a valuable resource that supports a variety of ecological functions. The proposed project has the potential to damage soil resources through physical disturbance and/or contamination. Contamination of soils also has the potential to impact both surface and groundwater resources. Surface and groundwater contamination impacts are discussed under their respective headings in this appendix. The loss of soil resources has a direct impact on the potential loss of the natural capability of the land. This section therefore focuses directly on the potential for disturbance and contamination of the soil resources and the effect this has on land capability.

There are a number of sources in all phases that have the potential to pollute soil resources. In the decommissioning phase these pollution sources are usually temporary in nature, usually existing for a few weeks to a few months. The operational phase will present more long term pollution sources. Although the sources are temporary in nature, the potential related pollution can have long term effects. Limited sources occur during the closure phase.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Support services General site management Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impacts

Severity/nature

In the unmitigated scenario, pollution of soils from numerous incidents can result in a loss of land capability as an ecological driver because it can create a toxic environment for vegetation and ecosystems that rely on the soil. It could also negatively impact on the chemistry of the soils such that current growth conditions are impaired. Incidents are expected to be limited to construction material, fuel/lubricant spills, dirty water spills, sewage spills and product spillages. This is a medium severity in the unmitigated scenario.

In the mitigated scenario the number of pollution events should be significantly less which reduces the potential severity to low.

Duration

In the unmitigated scenario, most pollution impacts and associated loss in land capability will remain long after closure. In the mitigated scenario most of these potential impacts should either be avoided or be remedied within the life of the project, which reduces the duration to low. This will be achieved by the effective reaction time of the clean-up team and the chosen remediation methods.

Spatial scale/extent

In both the unmitigated and mitigated scenarios for all phases, the potential loss of soil resources and associated land capability will be restricted to within the site boundary.

Consequence

In the unmitigated scenario the consequence is medium. In the mitigated scenario the consequence is reduced to low as the severity and duration of the impact is reduced.

Probability

Without any mitigation the probability of impacting on soils and land capability through pollution events is high. With mitigation, the probability will be significantly reduced to low because emphasis will be placed on preventing pollution events and on quick and effective remediation if pollution events do occur.

Significance

In the unmitigated scenario, the significance of this potential impact is medium. In the mitigated scenario, the significance reduces to low because with mitigation the severity, duration and probability associated with the potential the impact all reduce.

Unmitigated – summary of the rated loss of soil resources and land capability through contamination impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	M	H	L	M	H	M

Mitigated – summary of the rated loss of soil resources and land capability through soil contamination impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	L	L	L	L	L	L

ISSUE: LOSS OF SOIL RESOURCES AND LAND CAPABILITY THROUGH PHYSICAL DISTURBANCE

Information in this section was sourced from the soils and agricultural potential study for the proposed project (ARC, January 2016) included in Appendix I.

Introduction

Soil is the key to re-establishing post closure land capability. There are a number of activities/infrastructure in all phases that have the potential to disturb soils and related land capability through removal, compaction and/or erosion. Decommissioning related activities are temporary in nature, usually existing for a few weeks to a few months. The operational phase will present more long term activities. During the closure phase, even though activities that cause physical disturbance of soil and associated land capability will not occur during the closure phase, final rehabilitated areas may be susceptible to erosion.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Support services General site management Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impact

Severity/nature

In the unmitigated scenario, physical soil disturbance can result in a loss of soil functionality as an ecological driver. In the case of erosion, the soils will be lost to the area of disturbance, and in the case of compaction the soils functionality will firstly be compromised through a lack of rooting ability and aeration, and secondly the compacted soils are likely to erode because with less inherent functionality there will be little chance for the establishment of vegetation and other matter that naturally protects the soils from erosion. This amounts to a high severity.

In the mitigated scenario, the soils can be conserved and reused which reduces the high unmitigated severity to medium.

Duration

In the unmitigated scenario the loss of soil and related functionality is long term and will continue after the life of the mine. In the mitigated scenario, the soil is conserved, replaced and the functionality restored which reduces the duration of the impact to medium.

Spatial scale/extent

In both the unmitigated and mitigated scenarios for all phases of the project, the potential loss of soil and land capability through physical disturbance will be restricted to within the site boundary.

Consequence

In the unmitigated scenario the consequence is high. In the mitigated scenario the consequence is medium as the severity and duration of the impact is reduced.

Probability

Without any mitigation the probability of losing soil and related land capability is definite. With mitigation, the probability will be reduced because emphasis will be placed on soil conservation and re-establishment.

Significance

In the unmitigated scenario the impact is high. In the mitigated scenario the significance of this impact is reduced to low as the severity, duration and probability are reduced.

Unmitigated – summary of the rated loss of soil resources and land capability through physical disturbance impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	H	H	L	H	H	H

Mitigated – summary of the rated loss of soil resources and land capability through physical disturbance impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	M	M	L	M	L	L

BIODIVERSITY

ISSUE: PHYSICAL DESTRUCTION OF BIODIVERSITY

Information in this section was sourced from the biodiversity study undertaken by Scientific Aquatic Services (SAS, January 2016) included in Appendix J.

Introduction

There are a number of activities/infrastructure in all phases that have the potential to destroy biodiversity in the broadest sense. In this regard, the discussion relates to the physical destruction of specific biodiversity areas, of linkages between biodiversity areas and related species which are considered to be significant because of their status, and/or the role that they play in the ecosystem.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impact

Severity/nature

Areas of high ecological sensitivity are functioning biodiversity areas with species diversity and associated intrinsic value. In addition, some of these areas host protected species. The linking areas have value because of the role they play in allowing the migration or movement of flora and fauna between the areas which is a key function for the broader ecosystem. The transformation of land for any purpose, including mining and associated activities, increases the destruction of the site specific biodiversity, the fragmentation of habitats, reduces its intrinsic functionality and reduces the linkage role that undeveloped land fulfils between different areas of biodiversity importance.

When considering the surface infrastructure/activities proposed as part of the project, it should be noted that some infrastructure will be placed within areas of high sensitivity (for example the location of the proposed pit within the rocky ridge habitat located in the east of the project area) (see Figure 16) and the proposed project may also require the removal of protected species (*Vachellia erioloba* (Camel Thorn) and *Vachellia haematoxylon* (Grey Camel Thorn)). This is unavoidable due to the location of the ore body. It should however be noted that infrastructure has been positioned in such a way as to avoid wetland depressions identified on site (see Figure 16) and other rocky ridge areas (as far as possible) and therefore impacts on the remaining sensitive environments will be limited.

The potential risk of losing ecosystem functionality amounts to a high severity in the unmitigated scenario when taking the above into consideration. With the correct mitigation measures being put in place, the physical disturbance to biodiversity can be limited somewhat; however by the very nature of opencast mining, the proposed activities will still be invasive. If the correct mitigation measures are put in place, some of the destruction could be avoided entirely and where such destruction has occurred, rehabilitation could aim to establishing a functional ecosystem. This amounts to a mitigated severity of medium for the proposed project.

Duration

In the unmitigated scenario the loss of biodiversity and related functionality is long term and will continue after the life of the mine. With mitigation, biodiversity and related functionality may be partially restored during the operational, decommissioning and closure phases. The duration is therefore high in the unmitigated scenario, reducing to medium in the mitigated scenario.

Spatial scale / extent

Given that biodiversity processes are not confined to the proposed project area, the spatial scale of impacts will extend beyond this boundary in both the mitigated and unmitigated scenarios. Key related issues are the migration of species and the flow of nutrients. The spatial scale is therefore medium in both the unmitigated and mitigated scenarios.

Consequence

In the unmitigated the consequence is high and reduces to medium with mitigation.

Probability

Without mitigation the probability is definite. With mitigation, the probability may be reduced to medium with correct management measures and concurrent rehabilitation.

Significance

The significance of this impact is high without mitigation, reducing to medium with the correct mitigation measures.

Unmitigated – summary of the cumulatively rated loss of biodiversity through physical destruction impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	H	H	M	H	H	H

Mitigated – summary of the cumulatively rated loss of biodiversity through physical destruction impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	M	M	M	M	M	M

ISSUE: GENERAL DISTURBANCE OF BIODIVERSITY

Information in this section was sourced from the biodiversity study undertaken by Scientific Aquatic Services (SAS, January 2016) included in Appendix J.

Introduction

There are a number of activities/infrastructure that have the potential to directly disturb vegetation, vertebrates and invertebrates in all project phases, particularly in the unmitigated scenario. In the construction and decommissioning phases these activities are temporary in nature, usually existing for a few weeks to a few months. The operational phase will present more long term occurrences that may have pollution potential through long term seepage and/or run-off.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impact

<u>Severity / nature</u>

In the unmitigated scenario, biodiversity may be disturbed in the following ways:

- Lighting can attract large numbers of invertebrates which become easy prey for predators. This can upset the invertebrate population balances;
- People may kill various types of species for food, for sport, for fire wood etc.
- People may illegally collect and remove vegetation, vertebrate and invertebrate species
- Excessive dust fallout from various dust sources (the stockpiles (product and waste rock) and crushing and screening plant) may have adverse effects on the growth of some vegetation, and it may cause varying stress on the teeth of vertebrates that have to graze soiled vegetation
- Noise and vibration pollution (from the open pit activities, vehicle movement, materials handling etc.) may scare off vertebrates and invertebrates. In some instances the animals may be deterred from passing close to noisy activities which can effectively block some of their migration paths. In other instances, vertebrates and invertebrates that rely on vibration and noise senses to locate for, and hunt, prey may be forced to leave the vicinity of noisy, vibrating activities
- The increased presence of vehicles in the area can cause road kills especially if drivers speed

- The presence of mine water impoundments may lead to drowning of fauna
- An increase in pollution emissions and general litter may directly impact on the survival of individual plants, vertebrates and invertebrates.

Taken together, the disturbances will have a high severity in the unmitigated scenario. In the mitigated scenario, many of these disturbances can be prevented or mitigated to acceptable levels, which reduces the severity to low.

<u>Duration</u>

In the unmitigated scenario, the impact is long term because where biodiversity is compromised, killed or removed from the area this impact is likely to exist beyond the life of the project. With mitigation this reduces to medium.

<u>Spatial scale / extent</u>

Given that biodiversity processes are not confined to the proposed project area, the spatial scale of general disturbances will extend beyond the site boundary in the unmitigated and mitigated scenarios. Key related issues are the migration of species and linkages between biodiversity areas. This is a medium spatial scale.

<u>Consequence</u>

In the unmitigated scenario, the consequence of this potential impact is high. With mitigation, this reduces to low because the severity and duration reduce.

<u>Probability</u>

Without any mitigation, the probability of negatively impacting on biodiversity through multiple disturbance events is high. With mitigation, the probability can be reduced to low because most of the disturbances can be controlled through implementation and enforcement of practices, policies and procedures.

<u>Significance</u>

In the unmitigated scenario, the significance of this potential impact is high reducing to low with mitigation.

<u>Unmitigated – summary of the cumulatively rated general disturbance of biodiversity impact per phase of the project</u>

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	H	H	M	H	H	H

Mitigated – summary of the cumulatively rated general disturbance of biodiversity impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	L	M	M	L	L	L

SURFACE WATER

ISSUES: ALTERATION OF NATURAL DRAINAGE PATTERNS

Information in this section was sourced from the hydrology study (Jeffares and Green, January 2016) included in Appendix K.

Introduction

Pre-mining natural drainage across the proposed project area is via sheet flow and/or preferential flow paths (drainage lines). Rainfall and surface water run-off will be collected in all areas that have been designed with water containment infrastructure as required by legislation. The collected run-off will therefore be lost to the catchment and can result in the alteration of drainage patterns. Any development within floodlines could also influence the flow of surface water. During the construction, operational and decommissioning phase, these activities will continue until such time as project infrastructure can be removed and/or the project areas are rehabilitated. During the closure phase rehabilitation will allow for the restoration of drainage patterns.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impacts

Severity/nature

During the construction, operation, decommissioning, and to a lesser extent, the closure phases, rainfall and surface water run-off will be collected in all areas that have been designed with water containment infrastructure. The collected run-off will therefore be lost to the catchment and can result in the alteration of drainage patterns. Given the limited footprint of the proposed project, it is not expected that the project will result in a measurable reduction of Mean Annual Runoff (MAR) to the catchment. This is considered to be a low severity because the reduction is not expected to result in a substantial loss in the water reserve and downstream water uses. The overall low severity rating applies in both the unmitigated (all phases) and mitigated scenarios (prior to closure). After closure, in the mitigated scenario, the proposed project area will be rehabilitated to re-establish landscape functionality and surface water runoff will no longer be contained. In addition infrastructure has been planned so as to avoid the wetland depressions identified on site and be outside of the 1:100 year floodlines (except for a road crossing), thereby limiting the alteration of natural drainage patterns associated with the project. The associated severity reduces to low.

Duration

In the unmitigated scenario, the alteration of drainage patterns will extend beyond closure. In the mitigated scenario, the duration of the alterations will mostly be restricted to the phases before closure.

Spatial scale / extent

In the mitigated and unmitigated scenario the physical alteration of drainage patterns will extend beyond the site boundary as flow reduction impacts could extend further downstream.

Consequence

In the unmitigated scenario the consequence is medium. The mitigated consequence is low.

Probability

The probability of the alteration of drainage patterns is definite, but the magnitude of the reduced flows is unlikely to result in substantial deterioration and related flow impacts downstream therefore probability is medium. The probability can be reduced to low with mitigation measures.

Significance

The significance is medium in all phases without mitigation. With mitigation this reduces to low.

Unmitigated – summary of the rated alteration of natural drainage patterns impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	L	H	M	M	M	M

Mitigated – summary of the rated alteration of natural drainage patterns impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	L	M	L	L	L	L

ISSUE: CONTAMINATION OF SURFACE WATER RESOURCES

Information in this section was sourced from the hydrology study (Jeffares and Green, February 2016) included in Appendix K.

Introduction

There are a number of pollution sources in all project phases that have the potential to pollute surface water, particularly in the unmitigated scenario. In the construction, decommissioning and closure phases these potential pollution sources are temporary and diffuse in nature. Although these sources may be temporary, the potential pollution may be long term. The operational phase will present more long term potential sources.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impacts

Severity/nature

In the unmitigated scenario, surface water may collect contaminants (hydrocarbons, salts, and metals) from numerous sources. Potential construction and decommissioning phase pollution sources include:

- Sedimentation from erosion

- Spillage from portable toilets, spillage of fuel, lubricants, cement or leaks from vehicles and equipment
- Improper non-mineralised waste management.

Potential operational phase pollution sources include:
- Spills from sewage treatment plant, spillage of fuel, lubricants, cement or leaks from vehicles and equipment.
- Improper non-mineralised waste management.
- Contaminated discharges from the dirty water systems including: dirty water pipelines, pollution control dam(s)
- Contaminated runoff and seepage from the WRD
- Sedimentation from erosion.

At elevated concentrations certain contaminants can exceed the relevant surface water quality limits imposed by DWS and can be harmful to humans and livestock if ingested directly and possibly even indirectly through contaminated vegetation, vertebrates and invertebrates (Refer to the biodiversity section in this appendix for the potential biodiversity impacts. This impact will not be re-assessed in this section). Given the limited surface water resources in the project area the related unmitigated severity is medium.

In the mitigated scenario, clean water will be diverted away from the operational areas and contaminated run-off and process water will be contained and re-used in the normal course of operations. The severity can therefore be reduced to low.

<u>Duration</u>
In the unmitigated scenario, the contamination of surface water resources will occur for periods longer than the life of proposed project. With mitigation, pollution can be prevented and/or managed and as such the impacts can be reversed or mitigated within the life of proposed project.

<u>Spatial scale / extent</u>
In the unmitigated scenario the spatial scale is likely to be limited to the proposed project area. The reason for this is that surface water resources on site are ephemeral in nature (flow only after rainfall events) and not well defined. Even though contamination is mobile once it reaches drainage lines, the surface water flow is predicted to have low velocities (Jeffares and Green, 2016). With mitigation, the spatial scale of potential impacts can be further restricted.

Consequence

In the unmitigated scenario the consequence is medium and in the mitigated scenario it is low.

Probability

The probability of the impact occurring relies on a causal chain that comprises three main elements:

- Does contamination reach surface water resources?
- Will people and livestock utilise this contaminated water?
- Is the contamination level harmful?

The first element is that contamination reaches the surface water resources (wetland depressions and drainage lines) within the proposed project area. Due to the proposed open pit, WRD and other project infrastructure being located outside of the footprints of wetland depressions and floodlines but still within proximity to these resources, contaminants could reach surface water resources (even though it should be noted that these depressions are dry in the normal course).

The second element is that third parties and/or livestock use this contaminated water for drinking purposes. There is a limited possibility that this will occur given that there is no reliance on surface water resources in the area, for domestic use or livestock watering.

The third element is that it is likely that only some contaminants will be at a level which is harmful to humans and livestock. This is influenced both by the quality of any discharged water and by the diluting effect of any rainwater particularly in the rainy season.

As a combination, when considering the nature and location of the proposed infrastructure in proximity to the wetland depressions and drainage lines, the unmitigated probability is medium, reducing to low with mitigation.

Significance

In the unmitigated scenario, the significance of this potential impact is high. In the mitigated scenario, the significance is reduced to low because of the reduction in severity, duration and probability.

Unmitigated – summary of the rated pollution of water resources impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	M	H	L	M	M	M

Mitigated – summary of the rated pollution of water resources impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	L	M	L	L	L	L

GROUNDWATER

ISSUE: REDUCTION OF GROUNDWATER LEVELS AND AVAILABILITY

Information in this section was sourced from the groundwater study (Groundwater Complete, February 2016) included in Appendix H.

Introduction

The pumping of inflow water from the open pit (through abstraction directly from the pit) associated with the proposed opencast activities has the potential to cause dewatering in the operational phase, while the abstraction of water from boreholes for the use as potable and process water has the potential to cause a lowering of groundwater levels in the construction, operation and decommissioning phases. Lowering of groundwater levels through dewatering and abstraction may cause a loss in water supply to surrounding borehole users if they are in the impact zone. Biodiversity related impacts are discussed in the biodiversity section of this appendix. This assessment focuses on potential impacts to third party borehole users.

Activities and infrastructure - link to mine phases

Construction	Operation	Decommissioning	Closure
			N/A
Water supply and use	Open pit mining Water supply and use	Water supply and use	

Rating of impact

Severity / nature

Based on the results of the groundwater study, the cone of depression extends approximately 420 m from the opencast pit. A groundwater level drawdown of approximately 20 m was simulated for the seventh year of active mining. Maximum groundwater level impacts are expected to occur during the tenth and final year of mining and a groundwater level drawdown of ± 50 m was simulated.

The severity in the unmitigated and mitigated scenarios is low given that no users of groundwater for domestic or livestock use are likely to be affected (this takes into account that user borehole CJBH01 is in any case located within the mining rights area and will therefore be destroyed prior to any dewatering impacts being experienced).

Duration

The duration of the impacts is linked to the duration of the dewatering/abstraction and the recharge time thereafter. It is expected that the duration of dewatering/abstraction activities will not extend beyond closure, however water levels will not recover until well after closure in both the mitigated and unmitigated scenarios. This is a high duration.

Spatial scale / extent

According to the groundwater study (Groundwater Complete, February 2016) the cone of depression associated with the project was simulated to extend beyond the pit boundary by approximately 420 meters and with the exception of one user borehole (CJBH01), which will in any case be demolished by the planned opencast workings, no other user boreholes are expected to be affected by the aquifer dewatering associated with the project. This is a medium spatial scale in both the unmitigated and mitigated scenarios.

Consequence

In the unmitigated and mitigated scenarios the consequence is medium.

Probability

Modelling results indicate that the probability of impacting third party water supply is low in both the unmitigated and mitigated scenarios. This takes into account the fact that user borehole CJBH01 will be destroyed before any potential dewatering impacts can be felt.

Significance

The unmitigated and mitigated significance is low.

Unmitigated – summary of the rated dewatering impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Operation						
Unmitigated	L	H	M	M	L	L

Mitigated – summary of the rated dewatering impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Operation						

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Mitigated	L	H	M	M	L	L

ISSUE: GROUNDWATER REBOUND AND POTENTIAL DECANT TO THE ENVIRONMENT

Information in this section was sourced from the groundwater study (Groundwater Complete, February 2016) included in Appendix H.

Discussion

At closure, groundwater levels are expected to rebound. Decant predictions in an opencast mining environment are affected by the following:

- mean annual precipitation (MAP);
- recharge to the mine void (recharge is affected by the size of the surface area disturbed by mining activities, the transmissivity of the backfill material, surface water runoff and the overall porosity of the rehabilitated pit area); and
- groundwater contribution to water inflow, which is determined by the hydraulic properties of the surrounding undisturbed aquifer/s.

Taking into consideration the conditions of the project site (low rainfall, high evaporation rate and relatively small surface area), the groundwater specialist has concluded that the water level within the backfilled opencast pit is not expected to reach the surface and decanting should not occur.

ISSUE: CONTAMINATION OF GROUNDWATER RESOURCES

Information in this section was sourced from the groundwater study (Groundwater Complete, February 2016) included in Appendix H.

Introduction

There are a number of sources in all mine phases that have the potential to pollute groundwater and impact surrounding groundwater users. In the construction, decommissioning and closure phases some of these potential pollution sources are temporary and diffuse in nature. Even though the sources are temporary in nature, related potential pollution can be long term. The operational phase will present more long term potential sources.

Biodiversity related impacts are discussed in the biodiversity section of this appendix and therefore this section focuses on the potential for human health and livestock impacts.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impacts

Severity / nature

Possible sources of groundwater contamination include seepage from accidental spills and leaks, and seepage from stockpiles (product and WRD). During operation, decommissioning and closure there is also a potential for groundwater resources to be contaminated from backfilling the open pit with waste rock.

With reference to Section 7.4.1.1, the results of the ABA tests concluded that both samples collected from the project area are non-acid forming. The leaching tests also revealed that both the ore and waste rock from the project area are mostly inert and any leachate generated by planned ROM stockpiles and/or waste rock material should be of an acceptable quality. The only metal found to be present in the leachate at significant concentrations were aluminium and manganese. In addition, it is possible that blast residue related nitrates can be associated with some overburden. If this material is stockpiled, used for construction (roads and platforms) or used for backfill, it presents a potential pollution risk for groundwater in both the short and long term.

During the operational phase, the groundwater study predicted that no significant groundwater quality impacts would occur. This is mainly the result of:

- Low groundwater recharge percentage;
- Dilution with fresh groundwater and contaminant dispersion;
- Short simulation time (10 years of active mining); and
- During active mining, the movement of any poor quality leachate generated by the mining activities is likely to move towards the mine void and should not drain towards the immediate surroundings.

In addition, the waste rock dump will be planned with an appropriate barrier system. This translates to a medium severity in the unmitigated scenario, reducing to low in the mitigated scenario.

Post closure, in the unmitigated scenario and where the pit is backfilled with waste rock material (as per the project plan), the groundwater model predicts that a contamination plume of 30% of the original concentration could migrate off site. The groundwater specialist is of the opinion that groundwater quality within the rehabilitated pit will gradually improve due to recharge (dilution) with fresh rainwater and therefore minor groundwater quality impacts are expected. Notably, no third party borehole users are located within the predicted impact zone.

It follows that in the post closure phase the potential groundwater pollution amounts to a medium severity in both the mitigated and unmitigated scenarios.

Duration

Groundwater contamination is long term in nature, occurring for periods longer than the life of the proposed project.

Spatial scale / extent

Post closure, in the unmitigated scenario and where the pit is backfilled with waste rock material, the groundwater model predicts that a contamination plume could migrate up to ± 180 m in the down gradient groundwater flow direction at 25 years post closure and 300m in the down gradient groundwater flow direction at 50 years post closure. This translates to a seepage velocity of approximately 6 meters per year. This is a medium spatial scale.

With mitigation measures focussed on containing the pollution plume within the site boundary this can be reduced to low.

Consequence

The consequence is high in the unmitigated and medium in the mitigated scenarios.

Probability

The probability of the impact occurring relies on a causal chain that comprises three main elements:

- Does contamination reach groundwater resources?
- Will people and animals utilise this contaminated water?
- Is the contamination level harmful?

The first element is that contamination reaches the groundwater resources underneath or adjacent to the proposed project area. Due to the proximity of the sources to groundwater, contaminants could reach groundwater resources.

The second element is that third parties and/or livestock use this contaminated water for drinking purposes. Although one third party borehole is located within the contamination plume zone, this borehole will be destroyed when the mine becomes operational before groundwater impacts are felt in this borehole. No other third party boreholes are predicted to occur within the contamination plume zone.

The third element is whether contamination is at concentrations which are harmful to users. Groundwater is of good quality and is suitable for human consumption according to the South African National Standards for drinking water (SANS241:2011), except for nitrate levels in some boreholes. The groundwater specialist is of the opinion that post-closure groundwater quality within the rehabilitated pit will gradually improve due to recharge (dilution) with fresh rainwater and therefore minor groundwater quality impacts are expected.

As a combination, the unmitigated and mitigated probability is low in both scenarios.

Significance

The unmitigated significance is medium and the mitigated significance is low.

Unmitigated – summary of the rated contamination of groundwater impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	M	H	M	H	L	M

Mitigated – summary of the rated contamination of groundwater impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	L	H	L	M	L	L

AIR QUALITY

ISSUES: AIR POLLUTION

Information in this section was sourced from the air quality assessment report (Airshed, February 2016) and included in Appendix L.

Introduction

There are a number of activities/infrastructure in the construction, operation and decommissioning phases that have the potential to pollute the air. In the construction and decommissioning phases these activities are temporary in nature. The operational phase will present more long term activities. The closure phase will present final rehabilitated areas that may have the potential to pollute the air through long term wind erosion.

Air pollution related impacts on biodiversity are discussed in the biodiversity section of this appendix and therefore this section focuses on the potential for human health impacts.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impact

<u>Severity / nature</u>

The main contaminants associated with the proposed activities include: inhalable particulate matter less than 2.5 and 10 microns in size ($PM_{2.5}$ and PM_{10}), larger total suspended particulates (TSP) that relate to dust fallout, and gas emissions mainly from vehicles and generators. Emissions from vehicles and generators are not considered significant and therefore the assessment below focusses on particulate matter and dust fallout. Only the operational phase air quality impacts were quantified since construction and decommissioning phase impacts will be highly variable but less significant than operational phase impacts.

In order to determine the potential for health impacts, reference is made to South African (SA) National Ambient Air Quality Standards (NAAQS) for pollutants as outlined in Table 55 below. The dust fallout limits in terms of the National Dust Control Regulations (NDCR) is included in Table 56 below.

TABLE 55: AIR POLLUTION EVALUATION CRITERIA FOR PM10 AND PM2.5

Pollutant	Averaging	Limit value (µg/m³)	Frequency of exceedance	Compliance date

PM_{10}	24 hour	75	4 days per year	1 Jan 2015
	1	40	0	1 Jan 2015
$PM_{2.5}$	24 hour	40	4 days per year	1 Jan 2016 to 31 December 2029
	1	20	0	1 Jan 2016 to 31 December 2029

TABLE 56: DUST FALL OUT LIMITS

Pollutant	Application	Limit value (microgram m^2/day)	Compliance date
TSP	Industrial	1200	Current
	Residential	600	Current

Operational phase: $PM_{2.5}$

A summary of simulated results for $PM_{2.5}$ at air quality sensitive receptors (AQSRs) is presented in Table 57 below (refer to Figure 22 for the location of the AQSRs). Simulated annual average $PM_{2.5}$ concentrations exceeds the NAAQS of 20 µg/m3 off-site to the south-west of activities at AQSR no. 1. The 24-hour NAAQS (4 days of exceedance of 40 µg/m3) is however exceeded at AQSRs no. 1, 2 and 4. With additional mitigation measures in place, annual concentrations, but not 24 hour concentrations, reduce to levels below the NAAQS at AQSRs.

A source group contribution analysis indicated vehicle entrained dust, crushing and screening, and materials handling as the main contributors to simulated annual average $PM_{2.5}$ concentrations. Even with additional mitigation, the potential for cumulative off-site $PM_{2.5}$ concentrations in exceedance of NAAQSs is likely, especially at AQSR nos.1 and 4.

TABLE 57: SUMMARY OF SIMULATION RESULTS OF $PM_{2.5}$ AT AQSRS

Pollutant:	$PM_{2.5}$		$PM_{2.5}$ (with additional mitigation)	
Averaging Period:	1-year	24-hour	1-year	24-hour
Reporting Unit:	Concentration in µg/m^3	Frequency of exceedance in 'days per year'	Concentration in µg/m^3	Frequency of exceedance in 'days per year'
Criteria:	20 µg/m^3	4 days of exceedance of 40 µg/m^3	20 µg/m^3	4 days of exceedance of 40 µg/m^3
AQSR				
1	24.4[(a)]	63[(a)]	15.2	17[(a)]
2	10.7	18[(a)]	5.22	1
3	1.98	0	1.04	0
4	12.6	31[(a)]	7.47	14[(a)]
5	2.64	0	1.40	0
6	1.02	0	0.52	0
7	3.81	1	2.06	0

Pollutant:	$PM_{2.5}$		$PM_{2.5}$ (with additional mitigation)	
8	1.92	2	1.20	1
9	1.95	2	1.11	0
10	1.42	1	0.84	0

(a)Exceeds the NAAQS

Operational phase: PM_{10}

A summary of simulated results for PM_{10} at AQSRs are presented in Table 58 below. Simulated annual average PM_{10} concentrations exceeded the NAAQS of 40 µg/m^3 off-site at AQSR nos. 1, 2 and 4 (see Figure 22 for the location of AQSRs). The 24-hour NAAQS (4 days of exceedance of 75 µg/m^3) is also exceeded off-site and at several AQSRs. Additional mitigation measures reduce concentrations to levels that exceed the annual NAAQS at AQSRs 1 and 4, and the 24-hour NAAQS at nos. 1, 2, 4, 8 and 9.

A source group contribution analysis indicated that vehicle entrained dust was the main contributor to simulated annual average PM_{10} concentrations. Furthermore, the potential for cumulative off-site PM_{10} concentrations in exceedance of NAAQSs is likely since baseline PM_{10} concentrations are already in exceedance of NAAQSs.

TABLE 58: SUMMARY OF SIMULATION RESULTS OF PM_{10} AT AQSRS

Pollutant:	PM_{10}		PM_{10} (with additional mitigation)	
Averaging Period:	1-year	24-hour	1-year	24-hour
Reporting Unit:	Concentration in µg/m^3	Frequency of exceedance in 'days per year'	Concentration in µg/m^3	Frequency of exceedance in 'days per year'
Criteria:	40 µg/m^3	4 days of exceedance of 75 µg/m^3	40 µg/m^3	4 days of exceedance of 75 µg/m^3
AQSR				
1	171[(a)]	221[(a)]	81[(a)]	146[(a)]
2	55.2[(a)]	78[(a)]	26.9	33[(a)]
3	10.6	10[(a)]	5.0	1
4	80.3[(a)]	101[(a)]	41.8[(a)]	66[(a)]
5	13.7	9[(a)]	6.8	0
6	5.17	0	2.60	0
7	18.9	10[(a)]	8.8	1
8	10.9	23[(a)]	6.3	9[(a)]
9	10.4	15[(a)]	5.6	5[(a)]
10	7.32	10[(a)]	3.94	2

Operational phase: Dust fallout

Operational phase activities were found to result in dust fallout rates in exceedance of 600 mg/m^2-day, the limit for residential areas, only in very close proximity to areas of disturbance and not at any of the AQSRs. Although background dust fallout rates are close to the NDCR for residential areas, the simulated contribution of Jenkins activities to dust fallout at AQSRs is expected to be immaterial.

As a whole the severity of the impact in the unmitigated scenario is high, however it is possible that this can be reduced to medium with strict mitigation for $PM_{2.5}$ and PM_{10}. In the mitigated scenario the severity is low for dust fallout.

Duration

Without mitigation, the duration of health related impacts could extend beyond closure. With mitigation, where the severity is reduced, the duration of impacts can be limited to the life of the project.

Spatial scale / extent

The spatial scale of the potential impact extends beyond the site boundary in both the mitigated and unmitigated scenarios.

Consequence

Without mitigation the consequence for $PM_{2.5}$, PM_{10} and dust fallout is high. With mitigation the consequence is medium in all phases for $PM_{2.5}$, PM_{10} and low for dust fallout.

Probability

The health impact probability is linked to the probability of ambient concentrations exceeding the evaluation criteria in relation to sensitive receptors. Given that there is potential for exceedances of the criteria for $PM_{2.5}$, PM_{10} the probability is medium in the unmitigated scenario. The probability remains medium for $PM_{2.5}$, PM_{10} with mitigation given that even with mitigation exceedances can still be expected at potential receptor point. In terms of dust fallout the unmitigated scenario is medium and can be reduced to low with mitigation given that the probability of exceedance at sensitive receptors reduces.

Significance

The significance of this impact is high in the unmitigated scenario and can be reduced to medium for $PM_{2.5}$ and PM_{10} and low for dust fallout with mitigation.

Unmitigated – summary of the cumulatively rated air pollution impact for PM 2.5, PM 10 and dust fallout per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	H	H	M	H	M	H

Mitigated – summary of the cumulatively rated air pollution impact for PM 2.5, PM 10 and dust fallout per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	M (L for dust fallout)	M	M	M (L for dust fallout)	M (L for dust fallout)	M (L for dust fallout)

NOISE

ISSUES: NOISE POLLUTION

Information in this section was sourced from the noise specialist study undertaken by Airshed Planning Professionals (Airshed, February 2016) for the proposed project and included in Appendix M.

Introduction

Two types of noise are distinguished: noise disturbance and noise nuisance. The former is noise that can be registered as a discernible reading on a sound level meter and the latter, although it may not register as a discernible reading on a sound level meter, may cause nuisance because of its tonal character (e.g. distant humming noises).

Proposed activities/infrastructure present the possibility of generating both noise disturbances and noise nuisance in the project phases prior to closure. Refer to the biodiversity section in this appendix for the potential noise impacts on biodiversity. This section will only focus on the potential human related noise impacts.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
			N/A
Site preparation Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services Demolition	

Construction	Operational	Decommissioning	Closure
	Rehabilitation	Rehabilitation	

Rating of impact

Severity / nature

The IFC guidelines for residential and institutional receptors (55 dBA during the day and 45 dBA during the night) are the evaluation criteria used in this assessment given as these criteria are in line with the SANS 10103 guidelines for urban districts, A 3 dBA increase criteria is used to determine the potential noise impact.

During the day (06:00 to 22:00), operational phase noise is not expected to exceed the day-time guideline of 55 dBA at Noise Sensitive Receptors (NSRs). Although low, the highest day-time impact is expected at the farmhouse and office (no. 1 on Figure 22) with an increase above the baseline of 0.4 dBA. As a result of atmospheric conditions less conducive to noise attenuation and stricter guidelines, night-time noise impacts (22:00 to 06:00) are more notable. The night-time guideline of 45 dBA is expected to be exceeded only at the farmhouse and offices (no. 1 on Figure 22). Jenkins operations are expected to result in a LReq,n (The L_{Aeq} rated for impulsive sound and tonality in accordance with SANS 10103 for the night-time period, i.e. from 22:00 to 06:00) of 47.3 dBA and an increase of 3.4 dBA above the baseline at NSR no. 1. This is in exceedance of the IFC 3 dBA guideline but, according to SANS 10103 (2008), 'little' reaction with 'sporadic complaints' can be expected.

Taking the above into consideration, is the predicted severity of potential noise impacts is medium without mitigation reducing to low with mitigation.

Duration

In both the unmitigated and mitigated scenarios the noise pollution impacts will generally occur until the closure phase of the mine when the noise generating activities are stopped. This is a medium duration.

Spatial scale / extent

In both the unmitigated and mitigated scenarios the noise impacts will extend beyond the site boundary. This is a medium spatial scale.

Consequence

The unmitigated consequence is medium and the mitigated consequence is low.

Probability

The unmitigated probability of the predicted noise increases causing a noise related disturbance at the nearest sensitive receptors is considered to be medium. With mitigation the probability reduces to low.

Significance

The unmitigated significance is medium and can be reduced to low with mitigation given that the severity and probability of the impact are reduced.

Unmitigated – summary of the rated noise pollution impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation and decommissioning						
Unmitigated	M	M	M	M	M	M

Mitigated – summary of the rated noise pollution impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation and decommissioning						
Mitigated	L	M	M	L	L	L

BLASTING

ISSUE: BLASTING IMPACTS

Information in this section was sourced from the information provided to SLR by the Jenkins project team. This section should be read with reference to Figure 22 which shows potential sensitive receptors.

Introduction

The main activity that has the potential to cause blasting hazard is mining of the pit. This activity will occur during the operational phase only. Some blasting may occur during the construction phase, for foundation establishment, but this will be limited (if needed). Blasting activities have the potential to impact on people, animals and structures located in the vicinity of the proposed project area. Air quality impacts and biodiversity impacts are discussed under their respective headings in this appendix and as such will not be re-assessed in this section.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
			N/A
-	Open pit mining	-	-

Rating of impact

Severity / nature

Fly rock generation is related to the energy or mass of explosives and the containment of the energy on all sides of the blast area. In general, larger blastholes tend both to throw larger rocks over greater distances. Containment of fly rock is important because it has the potential to cause injury and death to people and animals. It can also damage structures. In unmitigated scenarios fly rock can extend more than 1000m from the blast site. In the mitigated scenario, this can be kept within a range of less than 500m. Death or injury to a third party is considered a high severity impact in both the unmitigated and mitigated scenarios.

Ground vibrations from blasting travel directly through the ground. The related impact on structures (such as buildings and reservoirs) depends on velocity and frequency of vibrations and the integrity of the built structures. The United States Bureau of Mines (USBM) standard of 12mm/s peak particle velocity is applied as a general guideline for blast management in South Africa as a “safe” limit for brick and mortar structures in the usual range of blasting vibration frequencies (4 – 12 Hz). In the unmitigated scenario, third party structures, depending on their location in relation to the mining activities, could be at risk where peak particle velocities greater than 12mm/s are generated by blasting. In the mitigated scenario, assuming that the blast design will consistently result in a peak particle velocity of 12mm/s or below at all third party structures, these should not be damaged. As a result, the blast design must be specific to manage impacts on surrounding structures.

Airblast is an air pressure pulse that has both a high frequency audible sound and a low frequency inaudible concussion. If the pressure is great enough damage can be caused to structures. If the airblast is contained to 130 dB or less, then damage should not be caused to surrounding structures. In the unmitigated scenario, third party structures, depending on their location in relation to the mining activities, could be at risk outside where airblast greater than 130 dB is generated by blasting. In the mitigated scenario, assuming that the blast design will consistently result in airblast of 130 dB or below, third party structures should not be damaged. As a result, the blast design must be specific to manage impacts on surrounding structures.

It is noted that some or all of the above issues could have greater severity if blasting takes place at the same time as neighbouring mines, and/or when climatic conditions such as low cloud cover, temperature inversions, and unfavourable wind direction occur at the time of blasting.

The severity is therefore high in the unmitigated scenario. In the mitigated scenario, this severity reduces to medium because measures can be taken to control blasts and associated impacts.

Duration

While damage to infrastructure can be repaired in the short term, injury or death is considered to be long term in nature. Therefore the unmitigated and mitigated impact duration is high.

SPATIAL SCALE / EXTENT

Table 59

Table 59 below outlines the structures and residences within proximity to the proposed project area. In both the unmitigated and mitigated scenarios the impacts will extend beyond the site boundary due to the location of the open pit on the boundary of the farm. This is a medium spatial scale.

TABLE 59: THIRD PARTY INFRASTRUCTURE IN RELATION TO THE OPEN PIT

Infrastructure	Distance
Farmhouse and offices	Approximately 2.3km south-west of the pit (indicated as no. 1 in Figure 22)
Farmstead	Approximately 4 km east of the pit (indicated as no. 2 in Figure 22)
Railway housing at Mookaneng	Approximately 1 km north-east of the pit edge (indicated as no. 4 in Figure 22)

Consequence

The consequence is high in both the unmitigated and mitigated scenarios.

Probability

Due to the fact that blasting on surface will only take place when required, the likelihood of this impact occurring is seldom and as such the probability is medium in the unmitigated scenario, reducing to low with mitigation.

Significance

The significance has been rated as high in the unmitigated scenario. This can be mitigated to medium.

Unmitigated – summary of the rated blasting impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Operational						
Unmitigated	H	H	M	H	M	H

Mitigated – summary of the rated blasting impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Operational						
Mitigated	M	H	M	H	L	M

TRAFFIC

ISSUE: ROAD DISTURBANCE AND TRAFFIC SAFETY

Information was sourced from the traffic specialist study (TTT Africa, January 2016) included in Appendix N.

Introduction

Traffic impacts are expected from construction through to the end of the decommissioning phases when trucks, buses, and private vehicles make use of the private and public transport network in and adjacent to the proposed project area. The key potential traffic related impacts are on road capacity and public safety.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
			N/A
Transport system	Transport system	Transport system	

Rating of impact

<u>Severity / nature</u>

Existing traffic volumes comprising public traffic and traffic from nearby mines that utilise the R325 are associated with an acceptable level of service in the context of the existing public and private road infrastructure. The proposed project will generate higher volumes of traffic along the R325 as a result of the transportation of ore, people and materials. The traffic specialist has predicted that the R325 will operate at acceptable levels of service with the addition of project related traffic. In terms of safety related aspects, the following safety risks apply when additional traffic associated with the proposed project is added to the transport network (R325):

- Pedestrian accidents
- Vehicle accidents.

In the unmitigated scenario the severity is high. In the mitigated scenario the severity reduces to medium because the frequency of potential accidents is expected to reduce.

<u>Duration</u>

Any serious injury or death is a long term impact in both the unmitigated and mitigated scenarios.

Spatial scale / extent

Possible accident sites could be located within or outside the proposed project given that both private and public roads will be used for the transport of ore, materials and personnel. Any indirect impacts associated with any injuries or fatalities will extend to the communities to which the injured people/animals belong. This is a medium spatial scale both with and without mitigation.

Consequence

The consequence is high in both the unmitigated and mitigated scenario.

Probability

In the unmitigated scenario, the probability of accidents occurring as a result of the proposed project is medium because although there is a possibility that traffic accidents could occur these are not expected to occur on a continuous basis. With mitigation this reduces to low.

Significance

Without mitigation, the significance is high. With mitigation, this reduces to medium.

Unmitigated – summary of the cumulatively rated road disturbance and traffic safety impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation and decommissioning						
Unmitigated	H	H	M	H	M	H

Mitigated – summary of the cumulatively rated road disturbance and traffic safety impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation and decommissioning						
Mitigated	M	H	M	H	L	M

VISUAL

ISSUE: NEGATIVE VISUAL IMPACTS

Information in this section was sourced from on-site observations and through the review of maps and satellite imagery.

Introduction

Visual impacts on this receiving environment may be caused by activities and infrastructure in all mine phases. The more significant visual impacts relate to the larger infrastructure components (such as the open pit mining, processing facilities, product stockpiles and waste rock dump). After closure the infrastructure should be removed, the open pit backfilled and the site rehabilitated.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

RATING OF IMPACTS

<u>Severity / nature</u>

The severity of visual impacts is determined by assessing the change to the visual landscape as a result of mine related infrastructure and activities.

As discussed in Section 7.4.1.11 of the EIA and EMP report, the visual landscape is determined by considering: landscape character, sense of place, scenic quality, sensitivity of the visual resource and sensitive views. In this regard, the proposed project area lies in a fairly flat, open area characterised by semi-arid vegetation, isolated rocky ridges and ephemeral drainage lines. Livestock and game farms and associated isolated farmsteads are typical of the region. The landscape is characterised by scattered operational and closed mining operations and supportive infrastructure such as rail and road networks and powerlines.

When considering the potential change to the visual landscape the key issues are: visual exposure, visual intrusion, and sensitivity of receptors.

The severity in the unmitigated scenario is moderate when considered in the context of existing mining operations in the vicinity of the proposed project area. The severity is unlikely to reduce with mitigation until the closure phase when the site has been rehabilitated (in the mitigated scenario).

Duration

In the unmitigated scenario the duration is high because the impacts will continue post closure. In the mitigated scenario the impacts are unlikely to extend post closure because all of the sites will have been rehabilitated.

Spatial scale / extent

In all phases visual impacts are likely to extend beyond the proposed project area. This is a medium spatial scale.

Consequence

The unmitigated consequence is high. With mitigation, prior to closure, this reduces to medium. After closure the consequence reduces to low.

Probability

In the unmitigated scenario and mitigated scenario the probability of visual impacts occurring as a result of the proposed project is medium because of the nature of the existing landscape. At closure when the site has been rehabilitated, the probability will be reduced to low.

Significance

The unmitigated and mitigated significance is medium. The mitigated significance reduces to low at closure.

Unmitigated – summary of the rated visual impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	M	H	M	H	M	M

Mitigated – summary of the rated visual impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation and decommissioning						
Mitigated	M	M	M	M	M	M
Closure						
Mitigated	L	L	M	L	L	L

HERITAGE/CULTURAL AND PALAEONTOLOGICAL RESOURCES

ISSUE: LOSS OF HERITAGE/CULTURAL AND PALAEONTOLOGICAL RESOURCES

Information was sourced from the heritage/cultural/palaeontological study undertaken for the propose project (PGS, February 2016) included in Appendix O.

Introduction

There are a number of activities/infrastructure in all phases prior to closure that have the potential to damage heritage and cultural resources, either directly or indirectly, and result in the loss of the resource for future generations. Heritage and cultural resources include sites of archaeological, cultural or historical importance.

Although significant fossils are associated with the Vaalian aged rocks of geological units present on site, the fossils are not visible to the naked eye. Significant larger scale fossils are associated with surface calcretes, but these units fall outside the proposed surface infrastructure area. Therefore potential impacts on palaeontological resources are not assessed further. Mitigation measures are however included should there be any chance finds.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impact

<u>Severity / nature</u>

As part of the proposed project a total of seven heritage sites were identified within the project area as illustrated in Figure 21. It is evident that sites JNK 1, JNK 3, JNK 5 and JNK 7 will be directly impacted upon by the proposed development. In addition, impacts are also expected on sites located in close proximity to the mining development footprints, namely JNK 2, JNK 4 and JNK 6. It is recommended that a 100 m buffer around JNK 6 be kept and that this be kept free of any development.

In the unmitigated scenario where activities are uncontrolled, damage to heritage sites will occur. It follows that in the unmitigated scenario, the severity will be high. With mitigation, some sites could be protected and could remain undisturbed as far as practically possible which reduces the severity to medium. It should however be noted that site JNK 5 and JNK 7 will be destroyed by mining activities and this cannot be avoided through mitigation.

Duration

If the heritage resources are removed, damaged or destroyed the impact duration is long term. In the mitigated scenario the duration reduces to less than the project life as the information associated with the site is recorded and preserved.

Spatial scale / extent

The spatial scale is low both with or without mitigation.

Consequence

In the unmitigated scenario the consequence is high. In the mitigated scenario the consequence reduces to low as the duration and severity is reduced.

Probability

The unmitigated probability is high, reducing to medium with mitigation.

Significance

The unmitigated significance is high and the mitigated significance is medium.

Unmitigated – summary of the cumulatively rated heritage resources impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases prior to closure						
Unmitigated	H	H	L	H	H	H

Mitigated – summary of the cumulatively rated heritage resources impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases prior to closure						
Mitigated	M	L	L	L	M	M

SOCIO-ECONOMIC

ISSUE: INWARD MIGRATION IMPACT

Introduction

Mining projects tend to bring with them an expectation of employment in all project phases prior to closure. This expectation can lead to the influx of job seekers to an area which in turn increases pressure on existing communities, housing, basic service delivery and raises concerns around safety and security. This section focuses on the potential for the inward migration and associated social issues.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impact

Severity / nature

The effects of inward migration can be significant. These effects could include, but not be limited to:

- Potential establishment or expansion of informal settlements
- Increased pressure on housing, water supply infrastructure, sanitation and waste management systems and infrastructure, health care and community services and infrastructure
- Potential for increased pressure on natural resources such as water, fauna, flora and soils
- Increase in crime
- Spread of disease, most notably HIV/Aids and tuberculosis.

It is not possible to predict how significant the inward migration may be, however this impact severity has been rated as high in line with the precautionary approach. It may be possible to mitigate this impact by managing expectations with regard to employment.

Duration

In the normal course, social impacts associated with each phase of the project will occur for the life of the project, but negative social issues associated with inward migration can continue beyond the closure of the mine, particularly in the unmitigated scenario.

Spatial scale / extent

In both the unmitigated and mitigated scenarios, the impacts of inward migration could extend beyond the proposed project area and into surrounding communities.

Consequence

In the unmitigated scenario the consequence associated with inward migration is high. In the mitigated scenario, the consequence is reduced to medium.

Probability

In the unmitigated scenario the impact is considered to be possible because although this type of pressure has been experienced in the communities around other mining operations, no informal settlements have been observed in the immediate vicinity of mines neighbouring the proposed project site. With mitigation, probability reduces to low.

Significance

In the unmitigated scenario, the significance of this potential impact is high. With mitigation this may reduce to medium.

Unmitigated – summary of the rated inward migration impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation, decommissioning						
Unmitigated	H	H	M	H	M	H

Mitigated – summary of the rated inward migration impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation and decommissioning						
Mitigated	M	H	M	H	L	M

ISSUE: ECONOMIC IMPACT

Information in this section was sourced from the economic study undertaken by Mercury (Mercury, February 2016) and included in Appendix Q.

Introduction

In the broadest sense, all activities associated with the mine contribute towards a positive and negative economic impact in operation, decommissioning and closure phase.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Open pit mining Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation	Maintenance and aftercare of rehabilitated areas

Rating of impact

Severity / nature

The mine will have a positive economic impact on the national, local and regional economy. Direct benefits will be derived from wages, taxes and profits. Indirect benefits will be derived through the procurement of goods and services, and the increased spending power of employees. In summary the following positive and negative economic aspects apply (Mercury, March 2016):

- The proposed project will result in the loss of grazing land which is estimated to have a production potential of R1.4 million (conservatively assuming that cattle farming takes place) during the life of the project.
- Coza will contribute a total of R5 851 732 582 (R5.8 billion) over the life of the mine.

It follows that even without mitigation the economic contribution from the proposed project is high and the potential loss to agriculture is relatively low so the net impact severity is high positive. With mitigation, Coza could identify mitigation measures that would increase the net positive severity further benefiting the region.

Duration

In the normal course, the direct positive and negative economic impacts associated with the proposed mine will occur for the life of mine. Post closure, in the unmitigated scenario, the scale of the impacts will be reduced. Furthermore, the proposed mine would have contributed to income creation, and a better skilled workforce is expected to continue beyond the life of mine. Quantitatively assessing the post closure impacts is not possible because there are a number of important unknown factors such as the general state of the future economy (local, national and world wide) and the future state of the mining sector in particular. There may also still be some negative impacts due to an un-rehabilitated site.

Spatial scale / extent

In both the mitigated and unmitigated scenarios, the spatial scale of the impact is high because it will extend far beyond the proposed project area on a regional and national scale.

Consequence

In both the unmitigated and mitigated scenarios the consequence is high and positive.

Probability

In the normal course of economic activity the net positive impacts will definitely occur.

Significance

In the unmitigated scenario, the significance of this potential impact is high positive. In the mitigated scenario, the significance is further increased.

Unmitigated – summary of the rated economic impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	H+	H	H	H+	H	H+

Mitigated – summary of the rated economic impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Mitigated	H+	H	H	H+	H	H+

LAND USE

ISSUE: LAND USE IMPACT

Information in this section was sourced from on-site observations and the project team.

Introduction

There are project related activities and infrastructure that may have an impact on other land uses in the proposed project areas in all mine phases.

Project phase and link to activities/infrastructure

Construction	Operational	Decommissioning	Closure
Site preparation	Open pit mining	Open pit mining	Maintenance and aftercare

Construction	Operational	Decommissioning	Closure
Earthworks Civil works	Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Rehabilitation	Processing plant Transportation Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation	of rehabilitated areas

Rating of impact

Severity / nature

Land uses within and surrounding the proposed project area include: residential, mining, powerlines, rail and agriculture (ad-hoc livestock grazing and game).

These land uses within and surrounding the proposed project area may be affected by one or more of the following environmental and social impacts:

- Hazardous infrastructure and excavations
- Land clearing (vegetation and soil) for infrastructure and activities
- Surface and groundwater quality and quantity
- Noise pollution
- Air pollution
- Traffic related safety impacts
- Visual
- Inward migration.

In the unmitigated scenario the cumulative severity could be high. This can be reduced to medium/low with mitigation that is focussed on prevention and/or controls for each environmental and social impact type.

Duration

In the unmitigated scenario the impact on land use will extend beyond mine closure. With mitigation the majority of the land use impacts are expected to be limited to the phases prior to mine closure.

Spatial scale / extent

The spatial scale extends beyond the proposed project area in both the mitigated and unmitigated scenario.

Consequence

The unmitigated consequence is high in all project phases. The mitigated consequence is low.

Probability

In the unmitigated scenario, where environmental and social impacts are uncontrolled, the probability that land uses will be impacted by mining is definite. With mitigation, the probability reduces to medium prior to closure and low post closure.

Significance

The unmitigated significance is high in all project phases. With mitigation this reduces to medium prior to closure and to low post closure.

Unmitigated – summary of the rated land use impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
All phases						
Unmitigated	H	H	M	H	H	H

Mitigated – summary of the rated land use impact per phase of the project

Management	Severity / nature	Duration	Spatial scale / extent	Consequence	Probability of Occurrence	Significance
Construction, operation and decommissioning						
Mitigated	M-L	M	M	L	M	M
Closure						
Mitigated	M-L	L	M	L	L	L

APPENDIX G: COMPOSITE MAP

APPENDIX H: GROUNDWATER IMPACT ASSESSMENT REPORT

APPENDIX I: SOILS AND LAND CAPABILITY IMPACT ASSESSMENT REPORT

APPENDIX J: BIODIVERSITY IMPACT ASSESSMENT REPORT

APPENDIX K: SURFACE WATER MANAGEMENT PLAN AND WATER BALANCE REPORT

APPENDIX L: AIR QUALITY IMPACT ASSESSMENT REPORT

APPENDIX M: NOISE IMPACT ASSESSMENT REPORT

APPENDIX N: TRAFFIC IMPACT ASSESSMENT REPORT

APPENDIX O: HERITAGE/CULTURAL IMPACT ASSESSMENT REPORT

APPENDIX P: PALAEONTOLOGICAL IMPACT ASSESSMENT REPORT

APPENDIX Q: ECONOMIC AND SUSTAINABILITY LAND USE ANALYSIS

APPENDIX R: CLOSURE COST ASSESSMENT

RECORD OF REPORT DISTRIBUTION

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