JAN JACOB DE CLERCQ VAN ZYL

MINING OF SILLIMANITE, AGGREGATE AND STONE GRAVEL ON THE FARM KOENABIB 43, A PORTION OF PORTION 1, KHÁI-MA LOCAL MUNICIPALITY, NAMAKWA DISTRICT MUNICIPALITY, NAMAQUALAND MAGISTERIAL DISTRICT, NORTHERN CAPE PROVINCE

FINAL BASIC ASSESSMENT REPORT

FEBRUARY 2020

REFERENCE NUMBER: **NC 30/5/1/3/2/10489 MP**

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EXECUTIVE SUMMARY

JJD Van Zyl currently holds a mining permit and approved Environmental Management Programme (EMPR) over a portion of Portion 1 of the farm Koenabib 43, which falls in the Khâi-Ma Local Municipality in the Registration Division of Namaqualand RD, Northern Cape Province. The project site falls within the quarter degree square 2918BB.

The Section 102 ("S102) amendment application of the mining permit, in terms of the MPRDA, 2002, will be for the expansion of the current mining footprint from 0.7 ha to 5 ha and to include aggregate and stone gravel as commodities to the mining permit. The earmarked extension area falls on a section of the farm that was previously used for sillimanite re-mining. Should the S102 application be approved, the material will be loaded from the existing stockpiles (old mine dumps), and hauled to the mobile crushing and screening plants where the sillimanite, aggregate and stone gravel will be screened to various sized stockpiles. The processed material will be stockpiled until transported to clients via trucks and trailers. All activities will be contained within the boundaries of the site.

The proposed mining area is approximately 5 ha in extent and the applicant, JJD Van Zyl, intents to win material from the area for the remainder of the mining permit timeframe. The sillimanite, aggregate and stone gravel will be used as cement or refactoring industries in the vicinity. Aggregate and stone gravel obtained from the old mine dumps will be used for the infrastructure and road industries in the area. The proposed operation will therefore contribute to the building and building contracts in and around the Pella / Pofadder / Aggeneys area.

The S102 application necessitates an application for a Part 2 amendment of the holder's EMP in terms of GNR 326 Section 31. The proposed S102 application does not constitute a listed activity or specified activity. This report is the Final Basic Assessment Report and EMPR to be submitted to the DMR for consideration and approval.

Should the S102 application be granted, and the mining of sillimanite, aggregate and stone gravel be allowed, the JJD Van Zyl – Koenabib Mine will comprise of activities that can be divided into two key phases (discussed in more details below) namely the:

(1) *Operational phase* that entails the mining of sillimanite, aggregate and stone gravel from the extended approved footprint. The mining method will entail the transportation of the material, from the existing mine dumps, to the crushing and screening processing plant where it will be screened to various sized stockpiles, before it is sold and transported from site to clients.

(2) *Decommissioning phase* which entails the rehabilitation of the affected environment prior to the submission of a closure application to the Department of Mineral Resources (DMR). The permit holder will further be responsible for the seeding of all rehabilitated areas. Once the full area is rehabilitated, the mining permit holder will be required to submit a closure application to the DMR in accordance with section 43(4) of the MPRDA, 2002. The Closure Application will be submitted in terms of Regulation 62 of the MPRDA, 2002, and Government Notice 940 of NEMA, 1998 (as amended).

Development Footprint Alternatives

As this is an existing operation, only one (1) viable site was identified for the proposed extension of the mining area. Site Alternative 1 entails the extension of the 0.7 ha area to 5 ha and was identified as the **preferred option** due to the following:

- The mining site offers the mineral sought after;
- The identified minerals are already in loose sillimanite, aggregate and stone gravel form and therefore no blasting is needed;
- The proposed sites were previously used for mining activities, thus minimal environmental damage will occur;
- The mining area can be reached by an existing farm road that connects to a provincial gravel road. No new road infrastructure need to be constructed;
- Due to the small size of the activity and the remote location of the mining area the potential impacts on the surrounding environment, associated with mining is deemed to be of low significance; and
- No residual waste as a result of the mining activity will be produced that needs to be treated on site. Any general waste that may be produced on-site will be contained in sealed refuse bins to be transported to the local municipal landfill site. The amount of hazardous waste to be produced at the site will be minimal and will mainly be as a result of accidental leakage. Contaminated soil (contained in sealed bins) will be collected from site by a hazardous waste handling removal company to be disposed of at a registered hazardous waste handling site.
- The re-mining of the old mine dumps will have the following positive outcome:
  - An approximate area of 1.2 ha is expected to be processed over a period of 2 years. This will bring about the systematic reduction of the historically abandoned mining area.

Public Participation Process

Initial public participation started on 22 November 2019. The stakeholders and I&AP's were informed of the project by means of I&AP comment/notification letters that were sent directly to the contact persons, and a 30-days commenting period were allowed that ended on 24 January 2020. On-site notices were placed and the project was advertised in the Gemsbok Newspaper. A Draft Basic Assessment report (DBAR) was distributed to the I&AP's and stakeholders upon which comments could be lodged until 24 January 2020. No comments were received on the DBAR that could be incorporated into the Final Basic Assessment Report (FBAR) to be submitted for decision making to DMR.

Basic Assessment Report

The basic assessment report identifies the potential positive and negative impacts that the proposed activity will have on the environment and the community as well as the aspects that may impact on the socio-economic conditions of directly affected persons, and proposes possible mitigation measure that could be applied to modify / remedy / control / stop the identified impacts.

The key finding of the environmental impact assessment entail the following:

Flora Assessment:

- The proposed extension area is located outside any listed CBA or ESA.
- The vegetation of the study site resembles a severely modified and transformed form of Eastern Gariep Rocky Desert surrounded by mostly natural vegetation.
- During the site survey no listed Red Data floral species were recorded within the surveyed site. A total of nine (9) species were however recorded which are protected within either National Forest Act or within the Northern Cape Nature Conservation Act.
- The Botany Study concluded that it is highly unlikely that this development will have an impact on the status of the Ecosystem and Vegetation Types due to the limited extent of the mine as well as the presence of already disturbed areas within the footprint. Furthermore, this mine will not have a significant impact on the services and functions provided by the surrounding natural habitats and development within this area and is regarded as acceptable.
- Subsequently the proposed development area is largely well located in terms of avoiding sensitive receptors and the development will not compromise the survival of any specific flora or terrestrial vertebrate species on the study area or beyond if mitigation measures are fully implemented.

Other Site Specific Environmental Aspects:

- No sites of archaeological or cultural importance were identified during the site inspection located in the mining footprint area.
- The fauna at the site will not be impacts on by the proposed mining activity as they will be able to move away or through the site, without being harmed.
- There are no rivers, streams or wetlands within close proximity of the mining area.
- Although the proposed activity will have a cumulative impact on the ambient noise levels, the impact is deemed compatible with the current operations and of low significance.
- The nearest residential dwelling to the proposed mining area is a farm house of the adjacent landowner approximately 6.2 m north-west of the mining area. Should the Applicant however implement the mitigation measures proposed in this document and the EMPr the impact on the air quality of the surrounding environment is deemed to be of low-medium significance.
- The viewshed analysis showed that the visual impact of the proposed extension will be of very low significance, especially as no permanent structures will be constructed. Should the Applicant successfully rehabilitate the mining area (upon closure), no residual visual impact will remain.
- The topography of the site will be positively altered in that the old mining dumps will be completely removed from the site.
- Upon closure the site will be rehabilitated and sloped to ensure that the visual impact on the aesthetic value of the area is kept to a minimum. The site will have a neat appearance and be kept in good condition at all times.

During the environmental impact assessment process the feasibility of the proposed site was assessed to identify fatal flaws that are deemed as severe as to prevent the activity continuing, or warrant a site or project alternative. The outcome of the assessment showed that should the mitigation measures and monitoring programmes proposed in this document be implemented, no fatal flaws could be identified that prevents the activity continuing.

Environmental Management Programme (EMPR)

The EMPR provides a description of the impact management outcomes and closure objectives. It presents the impacts to be mitigated in their respective phases as well as stipulates the mitigation measures to be applied on site.

The financial provision amount that will be necessary for the rehabilitation of damages caused by the operation, both sudden closures during the normal operation of the project and at final, planned closure gives a sum total of R 882 854.21.

ABBREVIATIONS

BID	Background Information Document
CARA	Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)
CBA	Critical Biodiversity Area
CR	Critical Rate
DBAR	Draft Basic Assessment Report
DENC	Department of Environmental Affairs and Nature Conservation
DMR	Department of Mineral and Resources
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPR	Environmental Management Programme
EN	Endangered
FBAR	Final Basic Assessment Report
FEPA	Freshwater Ecosystem Priority Area
GNR	Government Notice Regulation
HIA	Heritage Impact Assessment
I&AP's	Interested and Affected Parties
JJD Van Zyl	Jan Jacob De Clercq Van Zyl
LED	Local Economic Development
NEMA	National Environmental Management Act, 1998 (Act No 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act, 2004 (Act No 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004)
NC	Northern Cape Province
MHSA	Mine Health and Safety Act, 1996 (Act No 26 of 1996)
MPRDA	Minerals and Petroleum Resources Development Act, 2002 (Act No 28 of 2002)
PPP	Public Participation Process
PPE	Personal Protective Equipment
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SABS	South African Bureau of Standards
SEAMS	Social & Environmental Assessment & Management System
SHE	Safety, Health and Environmental
SKEP	Succulent Karoo Ecosystems Programme
WMA	Water Management Area
WULA	Water Use License Application

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mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

BASIC ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT: Jan Jacob De Clercq Van Zyl
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FAX NO: 054 464 0110
POSTAL ADDRESS: PO. BOX 688, Keimoes, 8860

FILE REFERENCE NUMBER SAMRAD: NC 30/5/1/3/2/10489 MP

I. Important Notice

In terms of the Mineral and Petroleum Resources Development Act (Act 29 of 2002) as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

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

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

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

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

2. Objective of the Basic Assessment Process

The objective of the basic assessment process is to, through a consultative process–

(a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;

(b) identify the alternatives considered, including the activity, location, and technology alternatives;

(c) describe the need and desirability of the proposed alternatives,

(d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:

(i) The nature, signification, consequence, extent, duration, and probability of the impacts occurring to; and

(ii) The degree to which these impacts –

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources; and

(cc) can be managed, avoided or mitigated;

(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to –

(i) identify and motivate a preferred site, activity and technology alternative;

(ii) Identify suitable measures to manage, avoid or mitigate identified impacts; and

(iii) Identify residual risks that need to be managed and monitored.

PART A: SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

3. Contact Person and correspondence address

a) Details of: Greenmined Environmental

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) the proponent must appoint an independent Environmental Assessment Practitioner (EAP) to undertake the environmental impact assessment (EIA) of any activities regulated in terms of the aforementioned Act. Jan Jacob De Clercq Van Zyl (Pty) Ltd (hereinafter referred to as “JJD Van Zyl”) appointed Greenmined Environmental (Pty) Ltd (hereinafter referred to as “Greenmined”) to undertake the study needed. Greenmined has no vested interest in JJD Van Zyl or the proposed project and declares its independence as required by the Environmental Impact Assessment Regulations, 2014 (as amended April 2017) (EIA Regulations).

i) Details of the EAP

Name of the Practitioner:	Greenmined Environmental Yolandie Coetzee
Tel No.:	011 966 4390 / 082 734 5113
Fax No.:	086 546 0579
E-mail address:	yolandie.c@greenmined.co.za

ii) Expertise of the EAP.

(1) The qualifications of the EAP

(With evidence).

Mrs Yolandie Coetzee has a B.Sc. Degree in Microbiology and Biochemistry and an Honours Degree in Environmental Sciences. Please find full CV attached in Appendix J.

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

(In carrying out the Environmental Impact Assessment Procedure)

Yolandie Coetzee is an Environmental Consultant with 8 years’ experience in the environmental sector. She specialized the last 5 years in the rehabilitation of mines where she conducted the conceptual rehabilitation and management designs and the closure plans and programs. She has also been involved in a number of other environmental projects including railway sidings, filling stations, abattoir’s, logistics hub, prospecting and mining sites where she compiled environmental management plans, environmental impact assessments, environmental audits, due diligences, IWULA’s/IWWMP’s and alien invasive encroachment programs.

She studied at the University of Potchefstroom where she has successfully completed her undergraduate degree in microbiology and biochemistry and her Honours degree in environmental sciences. See a list of past project attached as Appendix J.

b) Location of the overall Activity

Table 1: Location of the overall activity

Farm Name:	Portion 1 of the farm Koenabib 43
Application area (Ha)	5 ha
Magisterial district:	Khâi-Ma Local Municipality, Namaqualand Magisterial District
Distance and direction from the nearest town	The farm Koenabib 43 is situated approximately 38 km west of Pella, 148 km east of Springbok and 17 km north-north-west of Aggeneys in the Northern Cape Province.
21 digit Surveyor General Code for each farm portion	C05300000000004300001

c) Locality map

(Show nearest town, scale not smaller than 1:250000).

The requested map is attached as Appendix B.

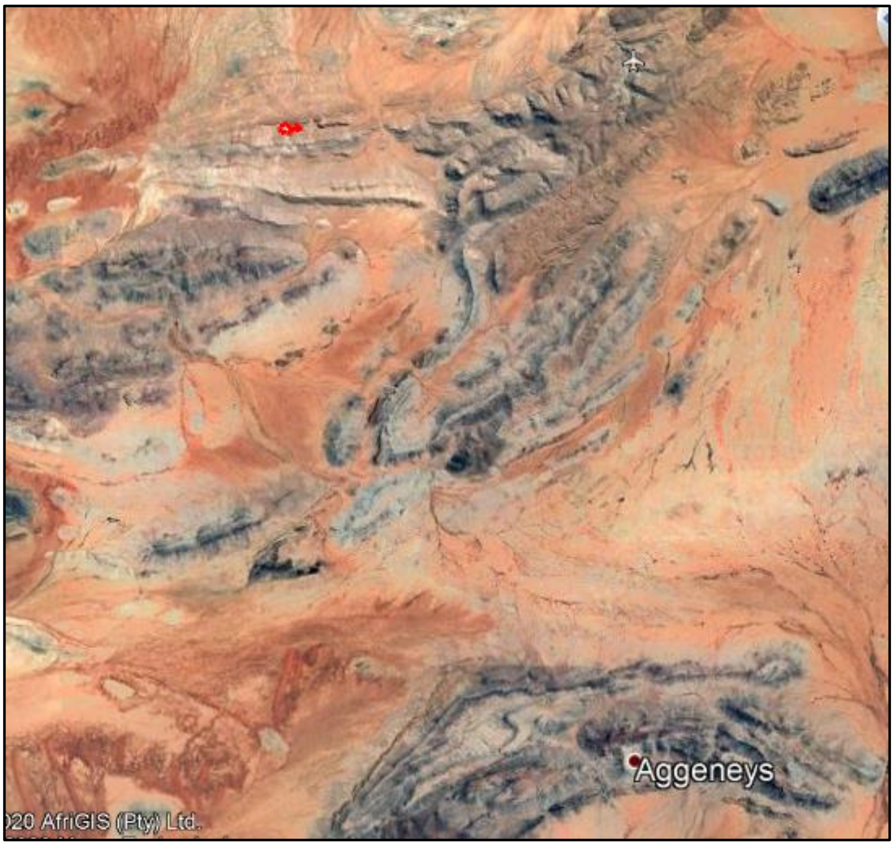

Figure 1: Satellite view of the mining permit area (red figure) of JJD Van Zyl (image obtained from Google Earth).

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

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

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See attached as Appendix C a copy of the site activities map for the proposed project.

i) Listed and specified activities

Table 2: Listed and specified activities triggered by the associated mining activities

NAME OF ACTIVITY whether listed or not listed (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc. Etc.)	**SIZE AND SCALE OF DISTURBANCE** (volumes, tonnages and hectares or m^2)	**LISTED ACTIVITY** Mark with an X where applicable or affected	**APPLICABLE LISTING NOTICE** (GNR 324, GNR 325, GNR 326 OR GNR 327)
Section 102 amendment application to increase the current mining boundary and include additional commodities.	5 ha	X	GNR 326 Section 31 Amendments to be applied for in terms of Part 2: *An environmental authorisation may be amended by following the process prescribed in this Part if the amendment will result in a change to the scope of a valid environmental authorization where such change will result in and increased level or change in the nature of impact where such level or change in nature of impact was not:* *a) assessed and included in the initial application for environmental authorization; or* *b) taken into consideration in the initial environmental authorization;* *and the change does not, on its own, constitute a listed or specified activity.*

ii) Description of the activities to be undertaken

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

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The GPS coordinates of the proposed extension area are as follow:

Table 3: Proposed location of the extension area.

SITE CO-ORDINATES		
Label	**WGS84_Lat**	**WGS84_Long**
1	-29.06543047300	18.76502445390
2	-29.06535024040	18.76501122420
3	-29.06537813280	18.76492629360
4	-29.06542820320	18.76456007340
5	-29.06547571080	18.76408587220
6	-29.06550538710	18.76388745870
7	-29.06557770600	18.76360927460
8	-29.06546005510	18.76348523760
9	-29.06480172770	18.76332881120
10	-29.06462248280	18.76332408090
11	-29.06448509070	18.76332573170
12	-29.06441816210	18.76332989470
13	-29.06428756970	18.76334598050
14	-29.06414477450	18.76388781780
15	-29.06410513830	18.76391560930
16	-29.06386259370	18.76411769960
17	-29.06373556700	18.76419421730
18	-29.06360252420	18.76428360540
19	-29.06344502050	18.76437975870
20	-29.06371389300	18.76488099820
21	-29.06401891930	18.76486090060
22	-29.06406631750	18.76516595470
23	-29.06418476710	18.76533073090
24	-29.06420719680	18.76551270280
25	-29.06413791970	18.76574636960
26	-29.06407341160	18.76595015850
27	-29.06412128960	18.76598674410
28	-29.06417025970	18.76598734310
29	-29.06438626450	18.76582171990

SITE CO-ORDINATES		
Label	**WGS84_Lat**	**WGS84_Long**
30	-29.06451225120	18.76576807340
31	-29.06482269780	18.76565629370
32	-29.06498660010	18.76572553710
33	-29.06500312970	18.76581494570
34	-29.06483701170	18.76695250070
35	-29.06489801710	18.76730137200
36	-29.06489203740	18.76750617930
37	-29.06484827060	18.76768964770
38	-29.06475315360	18.76785230220
39	-29.06465305170	18.76811003990
40	-29.06467635650	18.76827637740
41	-29.06466478260	18.76834108280
42	-29.06456019700	18.76843478060
43	-29.06450311940	18.76846132970
44	-29.06454311380	18.76835759240
45	-29.06455458020	18.76829492680
46	-29.06453551910	18.76824324560
47	-29.06449248520	18.76820789990
48	-29.06441733700	18.76803854860
49	-29.06439016440	18.76794541990
50	-29.06439959670	18.76777354010
51	-29.06443709510	18.76758232420
52	-29.06445736320	18.76752586200
53	-29.06442248390	18.76748141000
54	-29.06433038450	18.76747227070
55	-29.06407411620	18.76728076670
56	-29.06406464230	18.76723880270
57	-29.06408904480	18.76711553050
58	-29.06410124990	18.76703275340

SITE CO-ORDINATES		
Label	**WGS84_Lat**	**WGS84_Long**
59	-29.06408448590	18.76695437490
60	-29.06406591140	18.76692190250
61	-29.06401273580	18.76692587610
62	-29.06398148210	18.76698470540
63	-29.06395367130	18.76708208020
64	-29.06394789650	18.76718837030
65	-29.06396813470	18.76734213990
66	-29.06389616790	18.76747591920
67	-29.06389452450	18.76754656000
68	-29.06386496910	18.76767085900
69	-29.06379643040	18.76771707270
70	-29.06375023930	18.76778019050
71	-29.06374841460	18.76785870190
72	-29.06382955300	18.76784702390
73	-29.06392558810	18.76780621490
74	-29.06398131360	18.76765790140
75	-29.06401326360	18.76754453860
76	-29.06406325300	18.76734141600
77	-29.06428369700	18.76750658100
78	-29.06426741410	18.76768975250
79	-29.06423304210	18.76791665150
80	-29.06421892230	18.76812500310
81	-29.06421249370	18.76825386350
82	-29.06421080700	18.76834353850
83	-29.06423375800	18.76839594100
84	-29.06428046940	18.76841461470
85	-29.06438552810	18.76841890660
86	-29.06445220730	18.76841549610
87	-29.06445095480	18.76854144620
88	-29.06450492000	18.76855849880
89	-29.06457123270	18.76855181020

SITE CO-ORDINATES		
Label	**WGS84_Lat**	**WGS84_Long**
90	-29.06461108610	18.76851489080
91	-29.06470864670	18.76846704220
92	-29.06472779880	18.76840305930
93	-29.06475074320	18.76835650190
94	-29.06482091470	18.76831840440
95	-29.06487400110	18.76828470530
96	-29.06489692460	18.76820990550
97	-29.06492918540	18.76801872520
98	-29.06494470660	18.76796093940
99	-29.06496023670	18.76771165520
100	-29.06494670910	18.76750491570
101	-29.06494547570	18.76729664020
102	-29.06494595770	18.76716720480
103	-29.06490899270	18.76692749140
104	-29.06505463940	18.76579374560
105	-29.06551619350	18.76582077130
106	-29.06562120530	18.76593782360
107	-29.06578926070	18.76590272250
108	-29.06580464990	18.76586233030
109	-29.06578360940	18.76573890080
110	-29.06578625950	18.76569562000
111	-29.06588983340	18.76566748090
112	-29.06592837470	18.76563291560
113	-29.06595046200	18.76555336870
114	-29.06596152690	18.76546609760
115	-29.06592866780	18.76534057100
116	-29.06588066850	18.76527445400
117	-29.06586598490	18.76513002680
118	-29.06544167970	18.76507045840
119	-29.06543047300	18.76502445390

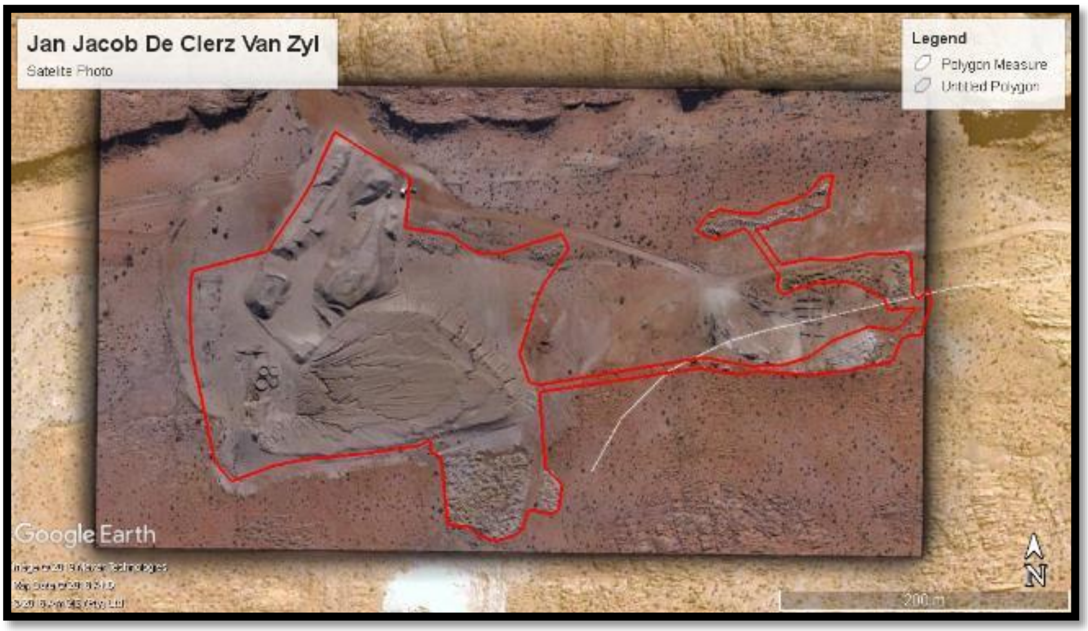


Figure 2: Proposed location of the extension area.

Should the S102 application be granted, and the mining of sillimanite, aggregate and stone gravel be allowed, the JJD Van Zyl – Koenabib Mine will comprise of activities that can be divided into two key phases (discussed in more details below) namely the:

a) <u>Operational phase:</u>

The operational phase is presently expected to entail the re-mining of sillimanite, aggregate and stone gravel from the approved footprint area. There will be no site establishment phase as this is an operational existing mine.

The mining method will entail the transportation of the material, from the existing mine dumps, to the crushing and screening processing plant where it will be screened to various sized stockpiles, before it is sold and transported from site to clients. Presently the sillimanite is sold to Afrisam, who distributes the product to the Kimberley cement or refactoring industries. Aggregate and stone gravel will be distributed to clients in the road and infrastructure development in the area.

The mining activities will consist out of the following:

- Stripping and stockpiling of topsoil (if applicable);
- Crushing and Screening;
- Stockpiling and transporting;
- Sloping and landscaping upon closure of the site; and
- Replacing the topsoil and vegetation the disturbed area.

The mining site will contain the following:

- Earthmoving equipment
- Mobile crushing and screening plants
- Temporary offices
- Weigh bridge; and
- Storage yard

A generator will be used to power the infrastructure on site. Water will initially be bought from the local municipality that will be stored on site in Jo-Jo tanks. This water will be used in a closed system at the processing plant (continuously recycled), and for dust suppression purposes when needed. A water truck will be used to spray access roads to alleviate dust generation. It is proposed that the mining activities will require between 2 000 – 4 000 l of water per day. Approximately six (6) workers will be employed at the site. Mining will be done in daylight hours, and from time to time it may be required to work an alternative Saturday.

Due to the nature of the project, very little general- and/or hazardous waste (if any) will be generated as a direct result of the mining activities. Any general waste generated during the operational phase, will be contained in a sealable refuse bin to be taken to the local landfill site at Pofadder. Hazardous waste will mainly be the result of accidental spillages or breakdowns. Such contaminated areas will be cleaned up immediately (within two hours of the occurrence) and contaminated soil will be contained in designated hazardous waste containers to be stored at the hazardous waste storage area from where it will be removed by a registered hazardous waste handling contractor. Waste separation will be conducted on site and send for recycling as far as practical.

The mining area is reached by an existing road as shown in the figure below.

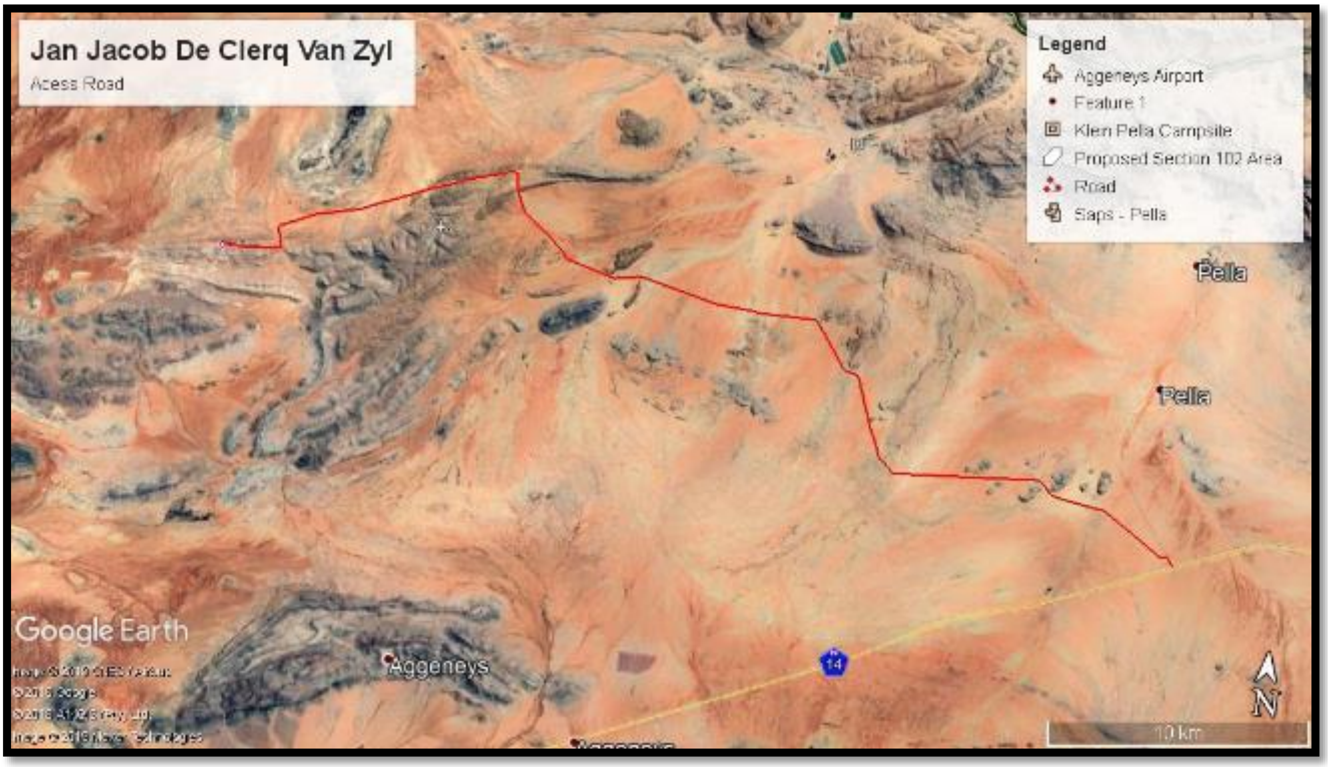


Figure 3: Satellite view showing the first option for the access road (red line) to the proposed mining area (yellow polygon).

b) <u>Decommissioning phase:</u>

The decommissioning phase entails the rehabilitation of the affected environment prior to the submission of a closure application to the Department of Mineral Resources (DMR). The closure objectives for the mining area is to be made safe, and the remainder of the site to be returned to agricultural use (grazing). The affected footprint will be top-dressed with topsoil and vegetated with an appropriate grass mix if vegetation does not naturally establish in the area within six months of the replacement of the topsoil.

Control of weeds and alien invasive plant species will be an important aspect after topsoil replacement and seeding (if applicable) was done in an area. Site management will implement an alien invasive plant management plan (see Appendix K) during the 12 months' aftercare period to address germination of problem plants in the area.

The decommissioning activities will consist of the following:

- Sloping and landscaping the mining area;
- Replacing of topsoil;
- Vegetating the reinstated area; and
- Controlling the invasive plant species.

The Applicant will comply with the minimum closure objectives as prescribed by the DMR and detailed below:

<u>Rehabilitation of plant, office and service areas:</u>

- Stockpiles will be removed during the decommissioning phase, the area ripped and the topsoil returned to its original depth to provide a growth medium.
- On completion of operations, all structures or objects shall be dealt with in accordance with section 44 of the Mineral and Petroleum Resources Development Act [MPRDA], 2002 (Act No. 28 of 2002):
  - Where sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped.
  - Areas containing French drains shall be compacted and covered with a final layer of topsoil to a height of 10cm above the surrounding ground surface.
  - The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora.
- Photographs of the workshop and office sites, before and during the mining operation and after rehabilitation, shall be taken at selected fixed points and kept on record for the information of the Regional Manager.

- On completion of mining operations, the surface of these areas, if compacted due to hauling and dumping operations, shall be scarified and graded to an even surface condition. Where applicable / possible topsoil needs to be returned to its original depth over the area.
- Prior to replacing the topsoil, the material that was removed from these areas will be replaced in the same order as it originally occurred.
- The area shall then be fertilized if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local, adapted indigenous seed mix.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area be seeded with a seed mix to his or her specification.

Final rehabilitation:

- Rehabilitation of the surface area shall entail landscaping, levelling, top dressing, land preparation, seeding (if required) and maintenance, and invasive plant species clearing.
- All mining equipment, and other items used during the mining period must be removed from the site (section 44 of the MPRDA).
- Waste material of any description, including receptacles, scrap, rubble and tyres, must be removed entirely from the mining area and disposed of at a recognized landfill facility. It will not be permitted to be buried or burned on the site. Waste separation will be conducted on site and send for recycling as far as practical. Adequate waste receptacle and recycle bins will be placed on the site for all waste generated from daily operations (e.g. waste containers, food packaging, etc. Waste oils and greases (Hazardous waste) generated by the machinery and equipment on site will be collected by a registered contractor for the disposal at a licensed hazardous waste disposal facility.
- The management of invasive plant species must be done in a sporadic manner during the life of the mining activities. Species regarded as Category 1a and 1b invasive species in terms of NEM:BA (National Environmental Management: Biodiversity Act 10 of 2004 and regulations applicable thereto) will be eradicated from the site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

Once the mining area was rehabilitated the permit holder is required to submit a closure application to the Department of Mineral Resources in accordance with section 43(4) of the MPRDA, 2002 that states: *"An application for a closure certificate must be made to the Regional Manager in whose region the land in question is situated within 180 days of the occurrence of the lapsing, abandonment, cancellation, cessation, relinquishment or completion contemplated in subsection (3) and must be accompanied by the prescribed environmental risk report".* The Closure Application will be submitted in terms of Regulation 62 of the MPRDA, 2002, and Government Notice 940 of NEMA, 1998.

e) Policy and Legislative Context

Table 4: Policy and legislative context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	**REFERENCE WHERE APPLIED**	**HOW DOES THIS DEVELOPMENT COMPLY AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.** (E.g. in terms of the National Water Act a Water Use License has/has not been applied for)
Mineral and Petroleum Resources Development Act, 2002, (Act No. 28 of 2002): - Section 102 amendment application	Part A (d) Description of the scope of the proposed overall activity. Application for amendment of a mining permit Ref No: NC30/5/1/3/2/10489MP	Mineral and Petroleum Resources Development Act, 2002, (Act No. 28 of 2002) - Section 102 – Application for a mining permit amendment submitted to DMR-NC.
National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2017: - GNR 326 Section 31 Amendments to be applied for in terms of Part 2.	Part A (d) (i) Listing and specified activities. Application for amendment of the EMPR Ref No: NC30/5/1/3/2/10489MP	Application for amendment of the EMPR submitted to DMR-NC.
National Environmental Management: Air Quality Control Act, 2004 (Act No 39 of 2004) read together with applicable amendments and regulations thereto specifically the National Dust Control Regulations, GN No R827	Part A (iv) (1) (a) Type of environment affected by the proposed activity – *Air and Noise Quality.*	The mitigation measures proposed for the site take into account the NEM:AQA, 2004 and the National Dust Control Regulations.
National Water Act, 1998 (Act No 36 of 1998) read together with applicable amendments and regulations thereto.	Part A (iv) (1) (a) Type of environment affected by the proposed activity – *Aquatic Features.*	The mitigation measures proposed for the site includes specifications of the NWA, 1998.
National Environmental Management Act: Biodiversity Act, 2004 (Act No. 10 of 2004) and amendments. Regulation on the Threatened and Protected plant species.	Biophysical Environment	The mitigation measures proposed for the site includes specifications of the NEM:BA, 2004
National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) read together with applicable amendments and regulations thereto. NEM:WA, 2008: National norms and standards for the storage of waste (GN 926)	Part A(ii) Description of the activities to be undertaken: *Operational phase – Waste Handling*	The mitigation measures proposed for the site take into account the NEM:WA.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996)	The mitigation measures proposed for the site includes specifications of the MHSA. Part A (iv) (1) (viii) The possible mitigation measures that could be applied on the level of risk – *Management of Health and Safety Aspects.*	The operational phase of the site will trigger the MHSA. The mitigation measures proposed for the site includes specifications of the MHSA, 1996
National Heritage Resources Act, 1999 (No. 25 of 1999)	Cultural and Heritage Environment. Part A(iv)(1)(a) Type of environment affected by the proposed activity – *Human Environment*	No aspects of the project could be identified that triggers the NHRA. A Notice of Intent to Develop in terms of Section 38(8) of the NHRA, 1999 was submitted to SAHRA on 17 April 2019 to determine the action required for the proposed project. SAHRA requested that a HIA and Paleontological Study be conducted. The mitigation measures proposed for the site includes specifications of the NHRA, 1999.
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	Part A (iv) (1) (a) Type of environment affected by the proposed activity: *Physical Environment – Geology and Soil.* Part A (iv) (1) (viii) The possible mitigation measures that could be applied on the level of risk – *Management of weeds- or invader plants*.	The mitigation measures proposed for the site includes specifications of the CARA, 1983.
National Environmental Management: Protected Areas Act, 2003 (NEM: PAA – Act 57 of 2003).	Land use	No protected areas within the proposed mining area. The closest protected area is the recent classified protected area on the farm Rozynbosch >10 km to the south-east.
Land Use Planning Ordinance, 1985 (Ordinance 15 of 1985)	Land use zoning requirements	Land rezoning will be conducted once the mining permit application has been converted to a Mining Right application.
National Forest Act, 1998 (Act No 84 of 1998	Biophysical Environment	Should the proposed walk-through identify plants in need of removal permits, these applications will be in terms of the Northern Cape Conservation Act/Ordinance.
Northern Cape Nature Conservation Ordinance 8 of 1969		
Northern Cape Nature Conservation Act, 2009 (No. 9 of 2009)		
Cape Nature and Environmental Conservation Ordinance 9 of 1974		
Khâi-Ma Local Municipality Spatial Planning and Land Use Management By-law 2013	Description of the current land uses	Land rezoning will be conducted once the mining permit application has been converted to a Mining Right application.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.
Northern Cape Planning and Development Act, 1998 (No 7 of 1998)		
Northern Cape Spatial Planning and Land Use Management Bill 2012		
Khâi-Ma Local Municipality Integrated Development Plan		
Spatial Planning and Land Use Management Act, Act 16		
Public Participation Guideline in terms of the NEMA EIA Regulations	Part A(ii) Details of the Public Participation Process Followed	Public Participation Guideline in terms of the NEMA EIA Regulations

f) Need and desirability of the proposed activities.

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

The increase in building, construction and road maintenance projects in the vicinity of the property triggered the need of the applicant to trade with the available sillimanite, aggregate and stone gravel. The proposed mining will also contribute to the diversification of activities on the property, extending it from agriculture to include small scale mining. This process will form part of educating the local farmers on small scale mining. The need is to find sillimanite, qualify and quantify the sillimanite to develop a business model.

The mine itself will provide various short term jobs during the construction, operation and decommissioning phases. JJD Van Zyl would also provide jobs and skills to local people. The mining footprint will also be fully rehabilitated post mining and thereafter revert to grazable land.

This area, close to Pella, are well known for their rehabilitated historic diamond mining operations and socio-economic poverty. It should also be noted that the earmarked area consist of unrehabilitated mine dumps from historic mining operations, and this application will contribute to the rehabilitation of this un-rehabilitated historic mining area.

g) Motivation for the overall preferred site, activities and technology alternative.

The proposed site earmarked for the mining will entail the re-mining of the old mine dumps. The proposed site was identified as the preferred alternative due to the following reasons:

- The mining site offers the mineral sought after;
- The identified minerals are already in loose sillimanite, aggregate and stone gravel form and therefore no blasting is needed;
- The proposed sites were previously used for mining activities, thus minimal environmental damage will occur;
- The mining area can be reached by an existing farm road that connects to a provincial gravel road. No new road infrastructure need to be constructed;
- Due to the small size of the activity and the remote location of the mining area the potential impacts on the surrounding environment, associated with mining is deemed to be of low significance; and
- No residual waste as a result of the mining activity will be produced that needs to be treated on site. Any general waste that may be produced on-site will be contained in sealed refuse bins to be transported to the local municipal landfill site. The amount of hazardous waste to be produced at the site will be minimal and will mainly be as a result of accidental leakage. Contaminated soil (contained in sealed bins) will be collected from site by a hazardous waste handling removal company to be disposed of at a registered hazardous waste handling site.

h) Full description of the process followed to reach the proposed preferred alternatives within the site.

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

i) Details of The Development Footprint Alternatives Considered.

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

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

As this is an existing operation, only one (1) viable site was identified for the proposed extension of the mining area namely:

1. **Site Alternative 1 (S1) (Preferred Alternative):** JJD Van Zyl currently holds a mining permit over 0.7 ha of Portion 1 of the farm Koenabib 43. Site Alternative 1 entails the extension of the 0.7 ha area to 5 ha. Refer to Table 3 for the proposed GPS coordinates of the extension area as well as Figure 1 for a schematic representation of the area.

Site Alternative 1 was identified as the **preferred option** due to the following:

- The mining site offers the mineral sought after;
- The identified minerals are already in loose sillimanite, aggregate and stone gravel form and therefore no blasting is needed;
- The proposed sites were previously used for mining activities, thus minimal environmental damage will occur;
- The mining area can be reached by an existing farm road that connects to a provincial gravel road. No new road infrastructure need to be constructed;
- Due to the small size of the activity and the remote location of the mining area the potential impacts on the surrounding environment, associated with mining is deemed to be of low significance; and
- No residual waste as a result of the mining activity will be produced that needs to be treated on site. Any general waste that may be produced on-site will be contained in sealed refuse bins to be transported to the local municipal landfill site. The amount of hazardous waste to be produced at the site will be minimal and will mainly be as a result of accidental leakage. Contaminated soil (contained in sealed bins) will be collected from site by a hazardous waste handling removal company to be disposed of at a registered hazardous waste handling site.
- The re-mining of the old mine dumps will have the following positive outcome:
  - An approximate area of 1.2 ha is expected to be processed over a period of 2 years. This will bring about the systematic reduction of the historically abandoned mining area.

2. No-go Alternative:

The no-go alternative entails no change to the status quo and is therefore a real alternative that needs to be considered. The sillimanite, aggregate and stone gravel to be mined from the site will be used by the cement- or refactoring industries in the vicinity, if however, the no-go alternative is implemented the applicant will not be able to utilize the mineral present in the area. This could have major impacts on aspects such as transporting of material to construction sites from far off mining areas, cost effectiveness of material, impact on roads and road users due to long distance hauling of sillimanite and loss of income to the Aggeneys / Pella business area due to the multiplier effect.

The no-go alternative was not deemed to be the preferred alternative as:

- The applicant will not be able to supply in the demand of the cement and refactory industries of the area,
- The application, if approved, would allow the applicant to expand the mining permit area to utilize the available sillimanite, aggregate and stone gravel as well as provide employment opportunities to local employees. Should the no-go alternative be followed these opportunities will be lost to the applicant, potential employees and clients, and

- The applicant will not be able to diversify the income of the property.

ii) Details of the Public Participation Process Followed

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

The Public Participation Process (PPP) for the proposed project was undertaken in accordance with the requirements of the MPRDA, and NEMA, in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other Interested and Affected Parties (I&AP's) are afforded an opportunity to comment on the project.

Initial public participation started on 22 November 2019. The stakeholders and I&AP's were informed of the project by means of I&AP comment / notification letters that were sent directly to the contact persons. A 30-days commenting period were allowed that ended on 24 January 2020. On-site notices were placed at the site entrance at the site entrance onto the farm Koenabib 43, as well as the Proe-i-Biekie local supermarket, and in Pofadder at the local municipality on 22 November 2019. The project was also advertised in the Gemsbok on 20 November 2019.

A Draft Basic Assessment Report (DBAR), with reference number: NC 30/5/1/3/2/10489 MP, was distributed to the stakeholders and I&APs for their perusal over a 30-days commenting period ending 24 January 2020. No comments were received that could be incorporated into the Final Basic Assessment Report (FBAR). This report will be submitted to DMR for decision making.

The neighbouring properties mainly consist of agricultural land utilised for sheep grazing. There are various prospecting rights over the surrounding farms that belongs to Black Mountain Mining (Pty) Ltd (Vedanta) (11296PR), Sitatunga Resources (Pty) Ltd (12168PR), and Horomela Hole Transport Services CC (11594PR). These prospecting rights are for heavy metals (Copper, Iron Ore, Lead, Manganese, Silver, Gold, and Zinc) not inclusive of sillimanite, aggregate and stone gravel.

Table 5: List of stakeholders that were notified of the proposed S102 application.

DEPARTMENT	CONTACT PERSON	DATE CONTACTED
Kai-Ma Local Municipality	Mr Obegang	03/12/2019
Kai-Ma Local Municipality *Ward 4*	Mr Quincy	03/12/2019
Namakwa District Municipality	Mr C Fortuin	03/12/2019
Department of Agriculture, Land Reform and Rural Development	Mr WVD Mothibi (Kimberley) Mr D Engelbrecht (Springbok)	03/12/2019
Department of Environment and Nature Conservation	Mr B Fisher (Kimberley) Mr J Jonk (Springbok)	03/12/2019
Department of Economic Development and Tourism	Mr S Mabilo (Kimberley) Mr J van Schalkwyk (Upington)	03/12/2019
Department of Roads and Public Works	Mr Kholekile Nogwili (Kimberley) Me Van Hinsbergen (Springbok)	03/12/2019
Department of Water and Sanitation	Mr A Abrahams (Kimberley) Mr S Cloete (Upington)	03/12/2019
Department of Labour	Me Z Albanie (Kimberley) Me C Engelbrecht (Springbok)	03/12/2019
SANRAL	Ms N Abrahams	03/12/2019
Succulent Karoo Ecosystem Programme (SKEP)	Mr A Koopman	03/12/2019
Endangered Wildlife Trust	Mr I Little	03/12/2019
Botanical Society of South Africa	Mr M Botha	03/12/2019
Agri Namakwa and Associated Farmers Association	Mr D Jacobs	03/12/2019
Regional Land Claims Commission – Northern Cape	-	03/12/2019
South African Heritage Resources Agency (SAHRA)	-	03/12/2019

Table 6: Registered landowner of the earmarked property

PROPERTY DESCRIPTION				I&AP / LANDOWNER	TITLE DEED
CADASTRAL CODE	FARM	PTN	HA		
C05300000000004300001	Koenabib 43	1	4144.7076 ha	Oonab Boerdery CC	T62340/2001

Table 7: List of interested and affected parties that were notified of the proposed S102 application

I&AP	PROPERTY/INTEREST	DATE CONTACTED
Oonab Boerdery CC Mr Edmund Agenbag Mr Johan James Agenbach Mr Johan James Agenbach Jnr Mr Louis Karel Agenbach	Koenabib 43 Portion 1	03/12/2019
Pieter Andrias van Den Heever	Wortel 42 (Ptn 0) RE	03/12/2019
Petronella (Petru) Catharina Van Den Heever	Wortel 42 Ptn 1	03/12/2019
Pella Plaaslike Oowerheid / Khai Ma Local Municipality	Farm Dabenoris 44 Ptn 0	03/12/2019
Klein Pella Guesthouse	Karsten Boerdery	03/12/2019
Sitatunga Resources Nikitiwe Dlamini	Mineral right holders	03/12/2019
Horomela Mining Investment & Resources Abongile Mdingi	Mineral right holders	03/12/2019
Black Mountain Mining /Vedanta Resources Pieter Venter Koos Smith	Mineral right holders	03/12/2019

iii) Summary of issues raised by I&AP's

Table 8: Summary of issues raised by I&AP's

Interested and Affected Parties List the name of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted	**Date Comments Received**	**Issues raised**	**EAP's response to issues as mandated by the applicant**	**Section and paragraph reference in this report where the issues and or response were incorporated.**
AFFECTED PARTIES				
Landowner/s				
Oonab Boerdery CC	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Lawful occupier/s of the land				
N/A	N/A	N/A	N/A	N/A
Landowners or lawful occupiers on adjacent properties				
Mr Pieter van Den Heever				
Petru Van Den Heever				

Interested and Affected Parties	Date Comments Received	Issues raised	EAP's response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Municipal councillor				
Khâi-Ma Local Municipality *Ward 4 Mr. Quincy*	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Municipality				
Khâi Ma Local Municipality Municipal Manager Mr Obegang *(Also contacted as surrounding landowner)*	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Namakwa District Municipality Mr. Christiaan Fortuin	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS				
Department of Economic Development and Tourism Head of Department: Mr. S Mabilo	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Department of Roads and Public Works Head of Department: Mr Kholekile Nogwili	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
SANRAL Me Nicole Abrahams	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Department of Labour Head of Department Mr Albanie	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Communities				
-				
Dept. Land Affairs				

Interested and Affected Parties	Date Comments Received	Issues raised	EAP's response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Department of Agriculture, Land Reform and Rural Development Head of Department: Mr W D Mothibi	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Commission Of Restitution Land Right	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Traditional Leaders				
-				
Dept. Environmental Affairs				
Department of Environment and Nature Conservation Director for Environmental Quality Management Mr B Fisher	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Other Competent Authorities affected				
South African Heritage Resource Agency Natasha Higgit	N/A	During the mining permit application (2017), SAHRA requested a HIA study. No further correspondence were received. Please refer to Appendix G for proof of the public participation process.	The HIA was conducted as part of the S102 amendment application process, and the findings of the specialist were incorporated into the FBAR.	Part A(3)(h)(iv)(3)(c) Site Specific Archaeology and Cultural Interest. Part A(3)(k) Summary of specialist reports. Appendix M2 Heritage Impact Assessment.
Department of Water and Sanitation Mr A Abraham	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
SANBI M Mokonoto	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Succulent Karoo Ecosystem Programme (SKEP) Mr. Abe Koopman	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A

Interested and Affected Parties	Date Comments Received	Issues raised	EAP's response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
WESSA	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Endangered Wildlife Trust	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Botanical Society of South Africa Mr. Mark Botha	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Agri Namakwa and Associated Farmers Associations Mr. Danie Jacobs.	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
INTERESTED PARTIES				
Klein Pella Guesthouse	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Black Mountain Mining	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Sitatunga Resources	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A
Horomela Mining Services	N/A	No objections received. Please refer to Appendix G for proof of the public participation process.	N/A	N/A

iv) The Environmental attributes associated with the alternatives.

(The environmental attributes described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

(3) Baseline Environment

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

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

Climate

According to the saexplorer website, Aggeneys normally receives about 34 mm of rain per year, with most of the rainfall occurring mainly during autumn. The chart below shows the average rainfall values for Aggeneys per month. It receives the lowest rainfall (0 mm) in December and the highest (9 mm) in March. The monthly distribution of average daily maximum temperatures (centre chart) shows the average midday temperatures for Aggeneys range from 17.7 ºC in July to 31.6 ºC in January. The region is coldest during July when temperatures drops to 3 ºC on an average during the night. Refer to chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures.

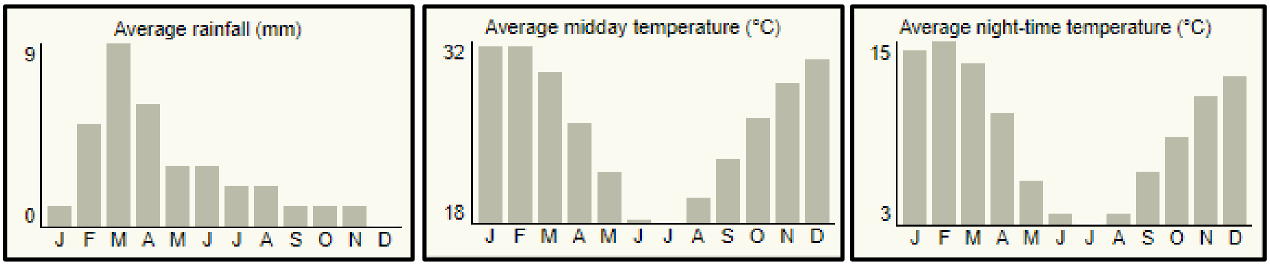


Figure 4: Statistical representation of the average rainfall, midday temperatures and night-time temperatures for the Aggeneys region (Chart obtained from saexplorer).

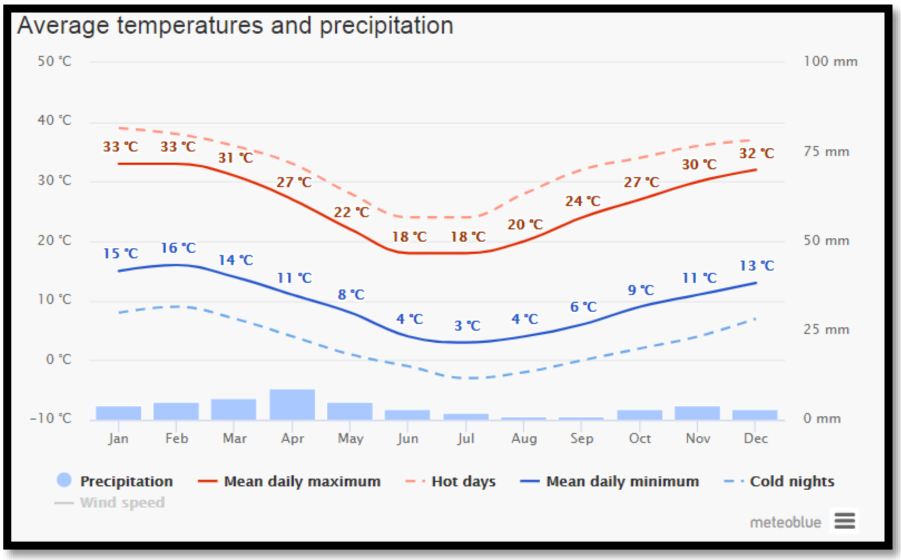


Figure 5: Average rainfall and temperature for Aggeneys (image obtained from meteoblue).

The figure below shows the monthly number of sunny, partly cloudy, overcast and precipitation days. Days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as partly cloudy and with more than 80% as overcast. As indicated in the figure below, the sunniest days are in June-July during winter, with overcast and precipitation days occurring in the summer season in March (Meteoblue, 2018).

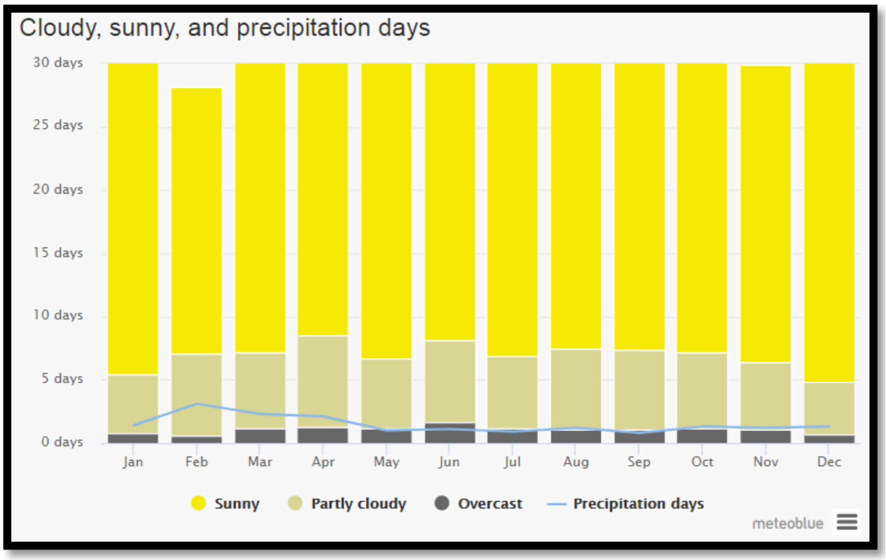


Figure 6: Cloudy, sunny and precipitation days of Aggeneys (image obtained from meteorblue, 2018).

The maximum temperature diagram for Aggeneys displays how many days per month reach certain temperatures. As indicated in the figure below, the hottest temperatures occur during the summer season with temperatures reaching from 17.9 °C in June to 32.7 °C in January and the coldest during July when the mercury drops to 1.3 °C on average during the night when frost can occur. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Aggeneys range from 19.1 °C in June to 33.2 °C in January. The region is the coldest during July when the mercury drops to 1 °C on average during the night. Consult the figure below for an indication of the monthly variation of average minimum daily temperatures (Explorer, 2018) (Meteoblue, 2018).

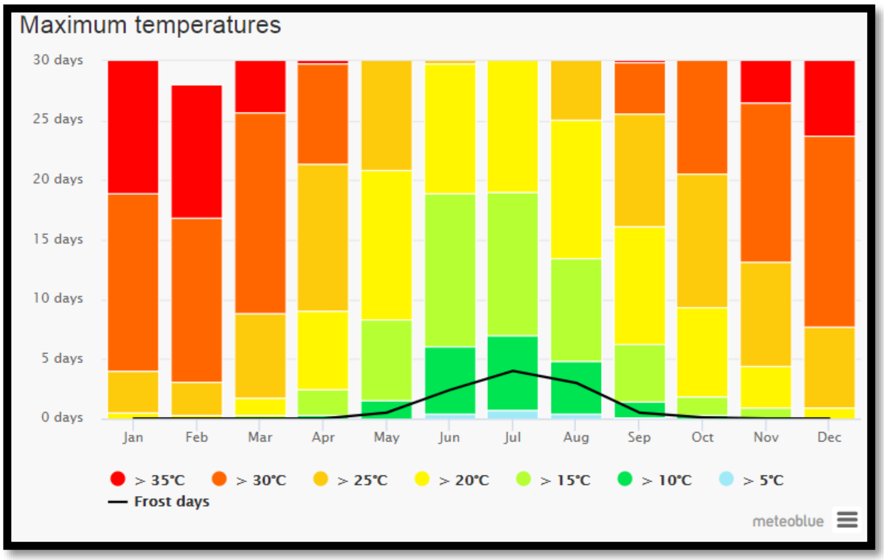


Figure 7: Maximum temperatures of Aggeneys.

The precipitation diagram for Aggeneys shows how many days per month, certain precipitation amounts are reached. In tropical and monsoon climates, the amounts may be underestimated. Aggeneys normally receives about 132 mm of rain per year, with most rainfall occurring mainly during autumn. It receives the lowest rainfall in July and the highest in (38 mm) in March (Meteoblue, 2018) (Explorer, 2018).

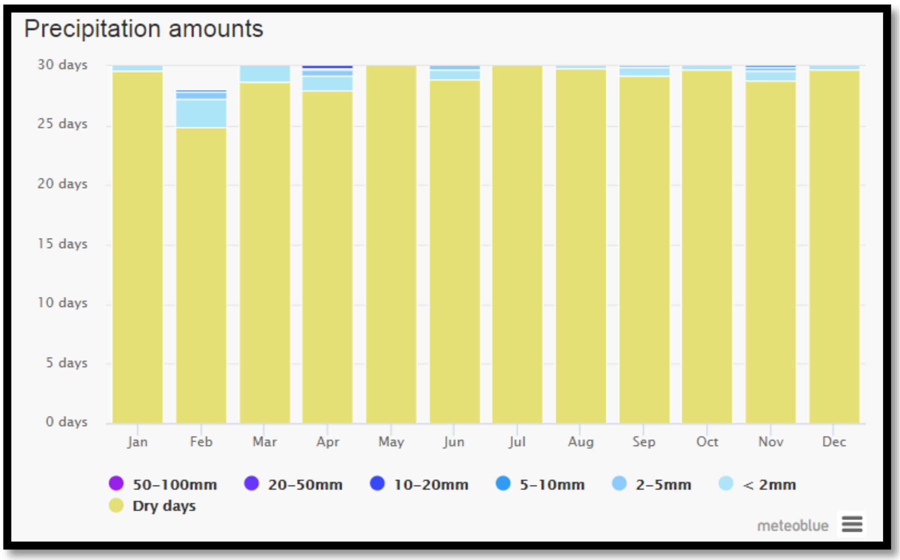


Figure 8: Precipitation amounts for Aggeneys.

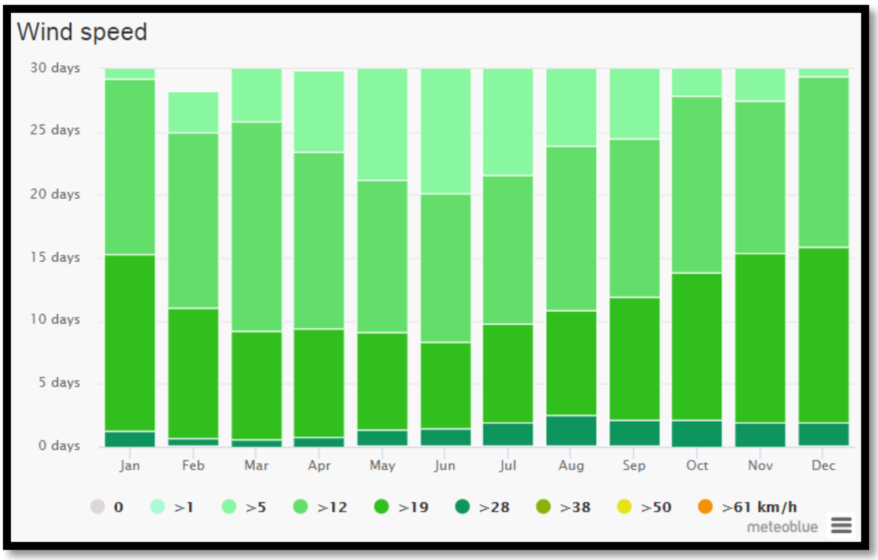


Figure 9: Average wind speeds in Aggeneys.

The above diagram shows the days per month, during which the wind reaches a certain speed. As seen from the figure above, the average wind speeds over the summer season is calculated to be about 19 km/h whereas in the winter season in drops to 5 km/h.

The wind rose for Aggeneys shows how many hours per year the wind blows from the indicated direction. As seen from the figure below, the average wind rose in Aggeneys is a Southerly and South-South Easterly wind, this can be during winter and summer times.

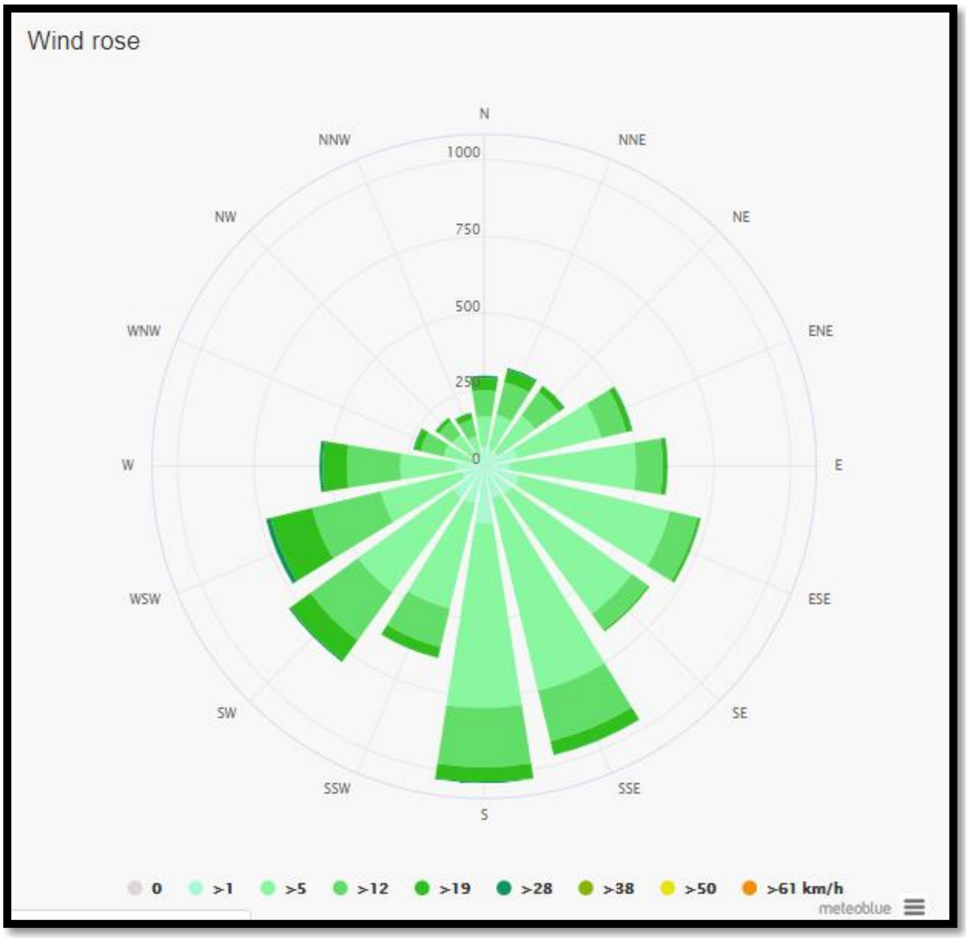


Figure 10: Wind rose for Aggeneys.

Geology

Supracrustal rocks occur in several discontinuous east-west-trending belts within the Bushmanland Terrane, increasing in abundance toward the south in the vicinity of Garies. The heterogeneity of rocks types and the disruption cause by thrust-related deformation and the voluminous sheet-like intrusions make correlation difficult. Moore (1989) suggested a broad two-fold subdivision into a southern succession (Bitterfontein-Kammieskroon area), compromising basal quartzofeldspathic gneisses, and overlying feldspathic sillimanite and garnet-cordierite gneisses, and a northern succession (Springbok-Steinkopf-Pofadder area) known as the Bushmanland Group, which comprises basal leucocratic gneisses and overlying sillimanite and mica-sillimanite schists.

In the region west of Pofadder, Colliston et al. (1989) subdivided the supracrustal rocks of their Aggeneys Terrane into six formations (Wortel, Witputs, Skelmpoort, T'hammaberg, Hotson and Koeris. These were later grouped together as the Aggeneys Subgroup of the Bushmanland Group by Praekelt and Schoch (1997), who provided detailed descriptions of all the formations.

The basal Wortel Formations (650 to 920 m thick) consists of interlayers of biotite-sillimanite schist and sub-ordinate sillimanite, which is magnetite-bearing in places. Lenses of amphibolite occur sporadically, while sillimanite was mined for many years from sillimanite lenses in this formation. In the east mainly leucocratic biotite gneiss and quartz-feldspar gneiss of the Stalhoek Complex and lesser amounts of leucocratic biotite gneiss occur, with intercalations of calc-silicate rocks, mafic gneiss, and a sillimanite -schist association of the Hom Subgroup, Bushmanland Group. In the west the area consist of granodiorite, adamellite, leucoSillimanite, tonalite, and diorite of the Vioolsdrift Suite and intermediate and acid volcanic of the Haib Subgroup of the Orange River Group (all of the above of Mokalian age). Very rocky substrate with little to no soils. Land type lc.

There is limited soils in the area with mostly rock outcrops or mountains. On the lower laying areas, soils have minimal development and are usually shallow on hard or weathered rock, with or without intermitted diverse soils. Lime is generally present in part or most of the landscape.

The application areas are situated in the Koa River valley, which is striking from southeast to northwest, where it eventually joins the Orange River just west of Black Mountain in the Bushmanland region. The paleo Orange River mouth, in Pre-Cambrian time, was at the same position where the Olifants River mouth is on the west coast of South Africa. The Paleo River linked with the present river where Prieska is today. The Paleo River that flowed in a south-westerly direction, was rerouted when the Cape fold belt was uplifted in the mid Palaeozoic Era. This event forced the river in a north-westerly direction, creating the Koa River, today known as the Koa River valley. The diamonds that were transported to the Atlantic Ocean at that stage was then transported along the Koa River were it was partly deposited due to the widening of the valley at places, especially in the Bosluispan/Bitterputs area. This opening up of the valley caused a lost in energy of the transporting medium and the heavier material, such as diamonds, dropped out of suspension, hence the occurrence of the commodity along the Koa River Valley.

The asymmetric uplift of the subcontinent during the Cenozoic Era was responsible for the northerly shift of the Orange River and it's rerouting at Prieska, leaving the south-western extent of the paleo Orange River and the Koa River dry. (Paul Grobbelaar. B.Sc Geology).

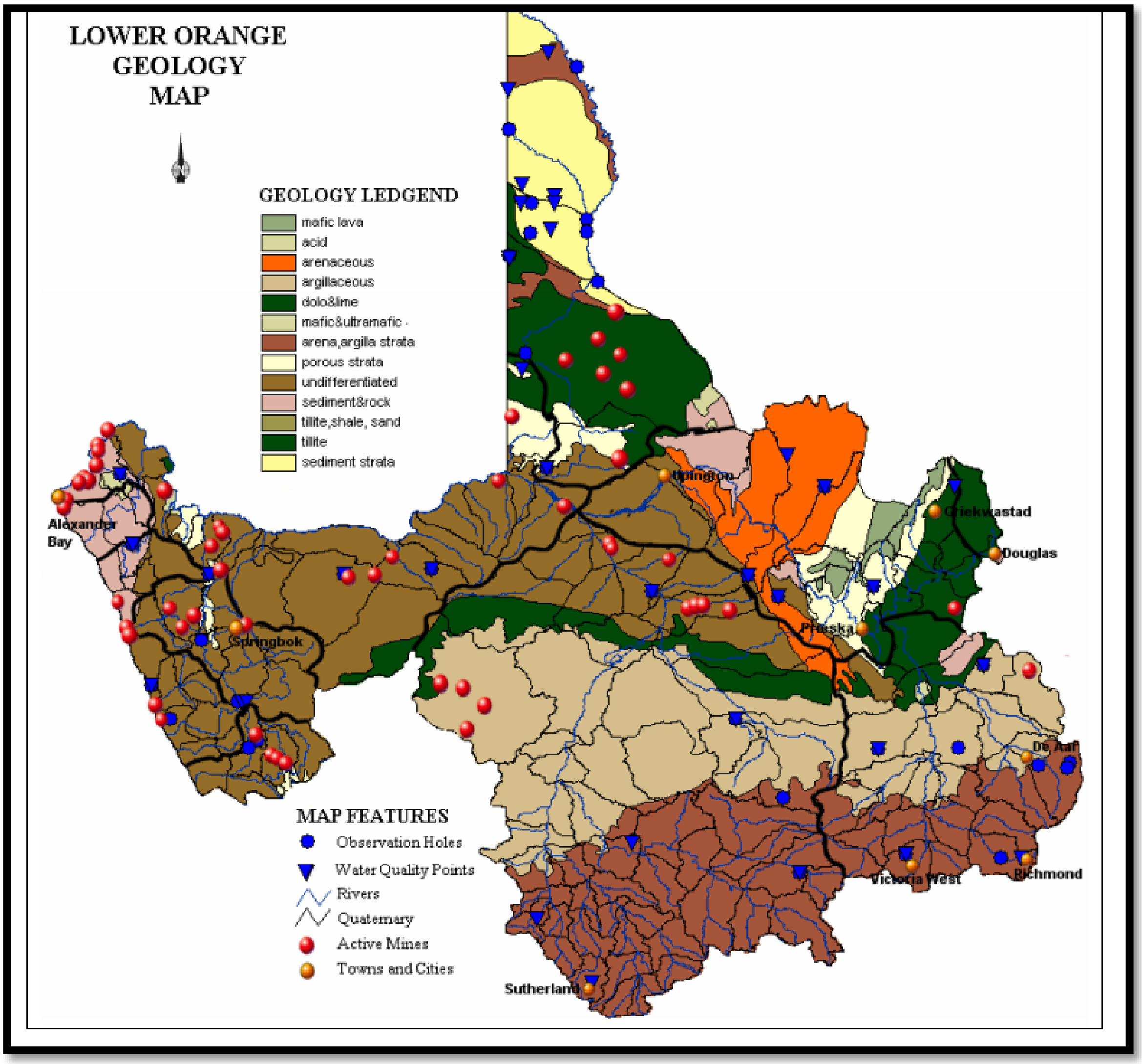


Figure 11: Simplified Geology of the WMA

The Wortel Subgroup is subdivided into the Aluminous Schist (bottom) and White Sillimanite Formations (top). Quartz- biotite- sillimanite- muscovite schist forms the bulk of the Aluminous Schist Formation. The White Sillimanite Formation consists off layered to massive, white to light grey weathering metasillimanite.

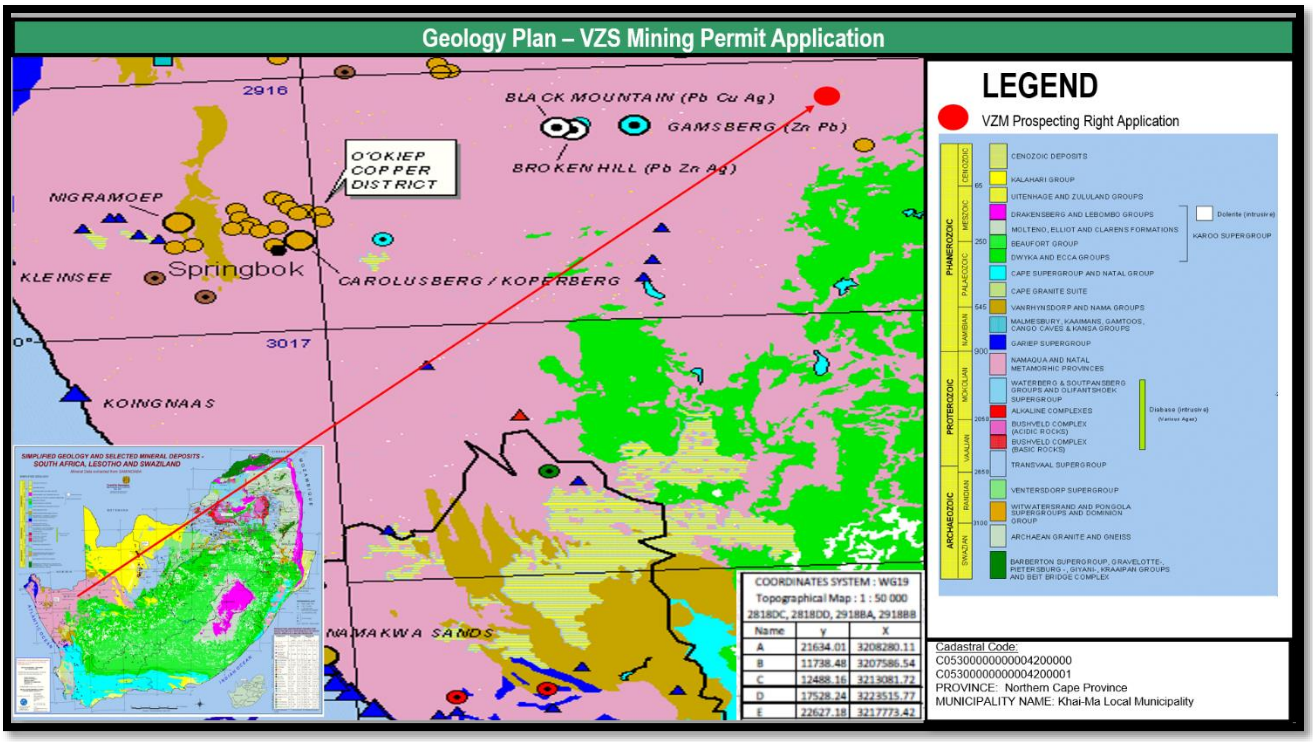


Figure 12: Geology Plan for JJD Van Zyl S102 Application

Topography

Mountainous and undulating landscape situated within the Witberg mountains. The only environmental feature that may proof significant is a relative major non-perennial stream. The topography of Portion 1 of Koenabib 43 can be described as plains with open high hills or ridges, and rolling or irregular plains with low hills or ridges. Towards the south of Portion 1 of Koenabib there are level plains with some relief at 880 m above sea level.

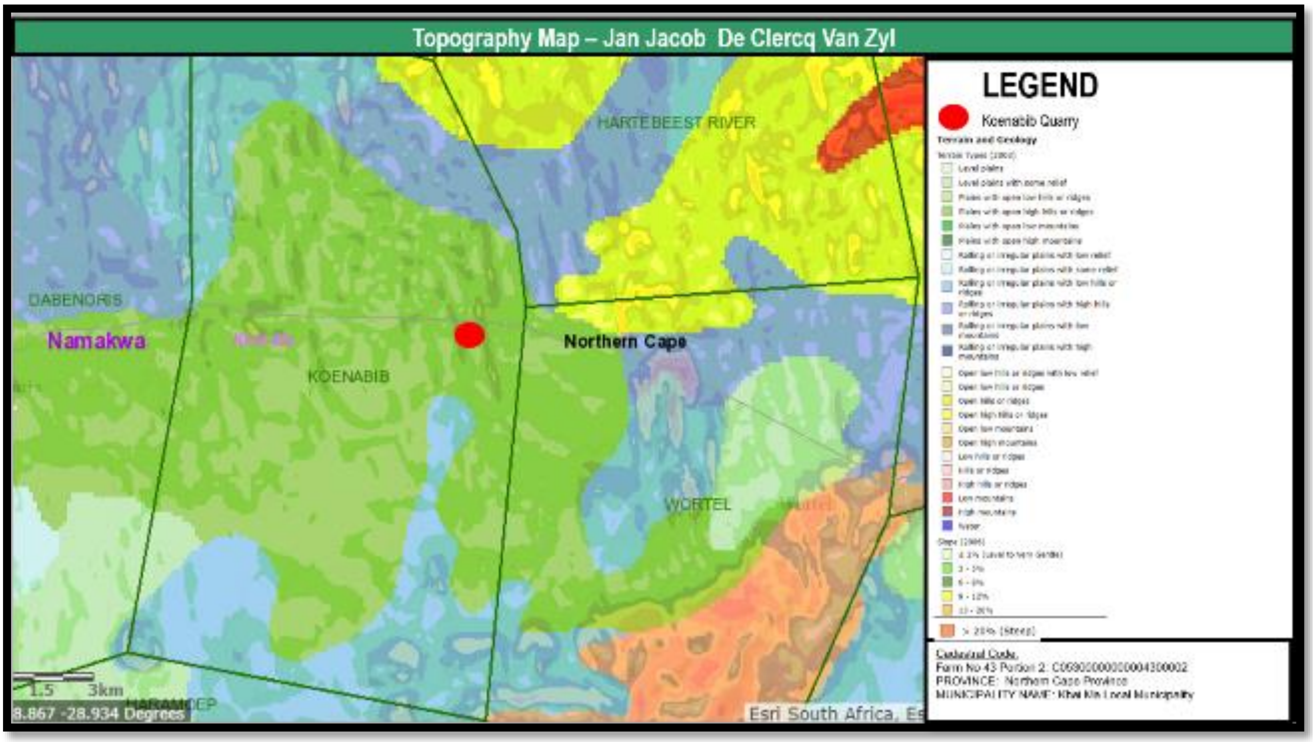


Figure 13: Topography map of the study area (DAFF, 2019).

Also refer to Part A (3)(h)(iv)(1)(c)(i) Site Specific Topography

Soil, land use and land capability

The area is known for soils with minimal development potential that are usually shallow, on hard or weathering rock, with or without intermittent diverse soils. Lime generally present in part or most of the landscape. The natural soil pH for this type of soil is between 7.5-8.4. Rock with limited soils (association of Leptosoils, Regosoils durisols, calcisols, and plitthosols). These soils have a holding capacity of 0-20mm. Land types includes Ib130 (Rock areas with miscellaneous soils), Ag43 or AR (Red Yellow Apedal, Freely Drained soils; Ref High Base < 300mm deep Ag and Ae).

LAND TYPE / *LANDTIP* ......: **Ib130**
CLIMATE ZONE *KLIMAATSONE* ...... : 177S
Area /*Oppervlakte* ...... : 18250 ha
Estimated area unavailable for agriculture
Beraamde oppervlakte onbeskikbaar vir landbou : 50 ha

Occurrence (maps) and areas *Voorkoms (kaarte) en oppervlakte* :
2918 Pofadder (18250 ha)

Inventory by *Inventaris deur* :
F Ellis & B H A Schloms
Modal Profiles *Modale profiele* :
None / Geen

Terrain uni ***Terreineenhei***	1	3	4	5
% of land type *% van landtipe*	10	40	45	5
Area *Oppervlakte (ha)*	1825	7300	8212	912
Slope / *Helling (%)*	3 - 6	25 - 45	0 - 3	0 - 1
Slope length *Hellingslengte (m)*	75 - 150	150 - 250	500 - 1000	50 - 100
Slope shape *Hellingsvorm*	Y	Y	Z	Z-X
MB0, MB1 (ha)	0	0	0	912
MB2 - MB4 (ha)	1825	7300	8212	0

Soil series or land classes / *Grondseries of landklasse*	Depth / *Diepte* (mm)	MB	ha	%	ha	%	ha	%	ha	%	Total / *Totaal* ha	%	Clay content % / *Klei-inhoud %* A	E	B21	Hor	Texture / *Tekstuur* Class / *Klas*	Depth limiting material / *Diepte-beperkende materiaal*
Soil-rock complex																		
Grond-rotskompleks:																		
Rock/Rots		4	1825	100	6570	90	2874	35			11269	61.8						
Mispah Ms10, Mudan Ms20	50-150	3			730	10					730	4.0	3-6			A	coSa	R
Gendam Hu31, Moriah Hu32	100-250	3					2464	30			2464	13.5	1-3		3-6	B	me/coSa	R
Gendam Hu31, Moriah Hu32	200-300	3					2053	25			2053	11.3	1-3		3-6	B	me/coSa	db,ka
Dundee Du10, Moriah Hu32	500-1000	0							912	100	912	5.0	1-3		2-4	A	coSa	R
Nyala Hu41, Quaggafontein Hu42	200-300	3					821	10			821	4.5	1-3		2-6	B	me/coSa	ka,ca,R

Terrain type *Terreintipe* : B3
Terrain form sketch*Terreinvormskets*

For an explanation of this table consult LAND TYPE INVENTORY (table of contents)
Ter verduideliking van hierdie tabel kyk LANDTIPE - INVENTARIS (inhoudsopgawe)

Geology: Gneissic granite and other ultrametamorphic rocks of the Namaqualand Metamorphic Complex.

Geologie Gneissige graniet en ander ultrametamorfe gesteentes van die Metamorfe Kompleks Namakwaland.

Figure 14: Land Type Ib130 (DAFF, 2019).

LAND TYPE / *LANDTIP* ......: **Ag43**
CLIMATE ZONE *KLIMAATSONE* ...... : 177S
Area /*Oppervlakte* ...... : 59550 ha
Estimated area unavailable for agriculture
Beraamde oppervlakte onbeskikbaar vir landbou : 0 ha

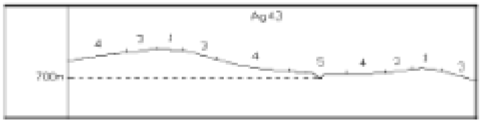
Occurrence (maps) and areas *Voorkoms (kaarte) en oppervlakte* :
2818 Onseepkans (4060 ha) 2918 Pofadder (55490 ha)

Inventory by *Inventaris deur* :
F Ellis
Modal Profiles *Modale profiele* :
None / Geen

Terrain uni ***Terreineenhei***	1	3	4	5
% of land type *% van landtipe*	5	10	65	20
Area *Oppervlakte (ha)*	2978	5955	38708	11910
Slope / *Helling (%)*	0 - 3	3 - 7	0 - 3	0 - 2
Slope length *Hellingslengte (m)*	300 - 500	300 - 500	1000 - 2000	500 - 800
Slope shape *Hellingsvorm*	Y	Y	Z-X	Z-X
MB0, MB1 (ha)	0	596	19354	9528
MB2 - MB4 (ha)	2978	5360	19354	2382

Soil series or land classes / *Grondseries of landklasse*	Depth / *Diepte* (mm)	MB	ha	%	ha	%	ha	%	ha	%	Total / *Totaal* ha	%	Clay content % / *Klei-inhoud %* A	E	B21	Hor	Texture / *Tekstuur* Class / *Klas*	Depth limiting material / *Diepte-beperkende materiaal*
Soil-rock complex																		
Grond-rotskompleks:																		
Rock/Rots		4	298	10	298	5					596	1.0						
Mispah Ms10, Moriah Hu32	100-300	3	596	20	893	15					1489	2.5	3-6			A	coSa	R
Moriah Hu32, Portsmouth Hu35	200-350	3	2085	70	4168	70	19354	50	2382	20	27988	47.0	3-6		3-9	B	coSa-LmSa	R,db
Moriah Hu32, Portsmouth Hu35	400-600	0			596	10	15483	40	4764	40	20843	35.0	3-6		3-9	B	coSa-LmSa	R,db
Gendam Hu31	=1200	0					3871	10	2382	20	6253	10.5	1-4		1-4	B	meSa	
Dundee Du10	=1200	0							2382	20	2382	4.0	2-5			A	coSa	

Terrain type *Terreintipe* : A4
Terrain form sketch*Terreinvormskets*



For an explanation of this table consult LAND TYPE INVENTORY (table of contents)
Ter verduideliking van hierdie tabel kyk LANDTIPE - INVENTARIS (inhoudsopgawe)

Geology: Mainly gneissic granite of the Namaqualand Metamorphic Complex, in places covered by pedisediments.

Geologie Hoofsaaklik gneissige graniet van die Metamorfe Kompleks Namakwaland, in dele oordek deur pedisedimente.

Figure 15: Land Type Ag43 (DAFF, 2019).

Also refer to Part A (3)(h)(iv)(1)(c)(ii) Site Specific Soil, Land Use and Land Capability.

Flora

(Information extracted from the Botanical Study and Assessment, Nkurenkuru Ecology & Biodiversity January 2020 attached as Appendix M1)

The site lies entirely within the Eastern Gariep Rocky Desert vegetation type (Mucina & Rutherford, 2006). The vegetation unit comprises about 2 568 km^2 of land area and is classified as Least Threatened, since its conservation target is 34% with 99.7% of the unit still remaining; the vegetation type has thus not significantly been transformed.

The vegetation type comprises all the rocky desert areas along the Orange River, including Groot Pellaberge, Dabenorisberge, Abbasasberge, and many smaller mountains between Pella and Vioolsdrif, with an altitudinal range of about 250 – 1 205 m at the highest peak of the Groot Pella.

Variation in habitat types are mainly controlled by topography, aspect, local climate and lithology. The vegetation type is characterised by hills and mountains mostly with bare rock outcrops that are very sparsely covered with shrubby vegetation. The southern ravines and rocky drainage lines are typically covered by a higher cover of plants including; *Abutilon pycnodont, Asparagus suaveolens, Ficus cordata, Searsia populifolia* and *S. viminalis*. On the higher southern slopes *Justicia orchioides* is often dominant, with localised grassland directly below steep cliffs (*Enneapogon scaber, Triraphis ramosissima* and *Danthoniopsis ramosa*). The south facing quartzite cliffs and steep slopes support chasmophytes such as *Ficus ilicina, Aloe dabenorisana* and *Bowiea gariepensis*. On the summits and higher northern slopes there is a much higher diversity of succulent species such as *Euphorbia avasmontana, Aloe dichotoma, A. microstigma* subsp. *microstigma, Pelargonium aridum* and *Kleinia longiflora* (Mucina & Rutherford, 2006) *(a) Species of Conservation Concern*

A total of about 32 red data plant species is known to occur in the broad area surrounding the site, as obtained from the SANBI SIBIS database and Threatened Species Programme, Red List of South African Plants (2011) (see Appendix M1 for a list of the species as presented in the Botanical Study and Assessment). The majority of these species are from the Aizoaceae (which includes the formerly classified family of Mesembryanthemaceae, now regarded as a subfamily of Aizoaceae). They are associated with many of the quartzite patches of the surrounding areas, as well as the dry north facing mountain slopes. As a result, the actual number of species of conservation concern which may occur within the site should be significantly less, since the site is not characterised by dense patches of quartz which typically host many endemics and red listed species However, the endemic and endangered *Anacampseros herreana* was observed on the way to the site at a different locality among quartzite pebbles, and it is possible that this species might occur in the vicinity of the site, since the site does have some quartzite elements (although to a much lesser degree than the surrounding areas).

Furthermore, apart from the previous observed red data species a total of 258 species have been recorded which are protected within the Northern Cape Nature Conservation Act (Act No. 9 of 2009). Of these 258 species, only 12 species are Specially Protected namely; *Ozoroa dispar, O. namaensis, O. namaquensis, Pachypodium namaquanum, Aloe dabenorisana, Pelargonium carnosum, P. crithmifolium, P. pulchellum, P. spinosum, P. xerophyton, Pelargonium* spp. and *Ornithogalum bicornutum*. The high number of protected species are mainly due to the fact that the entire Mesembryanthemaceae Sub Family (Aizoaceae Family), Crassulaceae Family and Euphorbia Genus (Euphorbiaceae Family) are protected within this Act. These species are extremely diverse and abundant with this area.

(b) National Protected Areas Expansion Strategy (NPAES)

Focus areas for land-based protected area expansion are large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence, suitable for the creation or expansion of large protected areas. The focus areas were identified through a systematic biodiversity planning process undertaken as part of the development of the National Protected Area Expansion Strategy 2008 (NPAES). They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine-scale planning which may identify a range of different priority sites based on local requirements, constraints, and opportunities.

According to the NPAES spatial data (Holness, 2010), the proposed mining footprint is located outside of any Focus Area. However, the mining footprint is located in close proximity to the Kamiesberg Bushmanland Augrabies NPAES. Subsequently this NPAES Focus Area will not be impacted by the proposed JJD Van Zyl extension. The access road traverses a small portion of this NPAES, however due to the fact that only existing roads will be utilised, there will be no impact on the NPEA as a result of the access road.

The Gamsberg Nature Reserve was proclaimed under the Protected Areas Act, 2003 (Act No 57 of 2003) and declared on 5 August 2019 on the following properties:

- Achab 59
- Remainder of Vogelstruishoek 88
- Remainder of Rozynbosch 41
- Portion 2 of Rozynbosch 41

The Gambsberg Nature Reserve is more than 10 km from the earmarked area on Portion 1 of the farm Koenabib, to the south-east. No mining related activities will enter into/onto Portion 2 of the farm Rozynbosch 41 or the nearby Gamsberg Nature Reserve, and the mining activities will therefore not impact the protected area.

(c) National Level of Conservation Priorities (Threatened Ecosystems)

The vegetation types of South Africa have been categorized according to their conservation status which is, in turn, assessed according to the degree of transformation and rates of conservation. A national process has been undertaken to identify and list threatened ecosystems that are currently under threat of being transformed by other land uses. The first national list of threatened terrestrial ecosystems for South Africa was gazetted on 9 December 2011 (National Environmental Management: Biodiversity Act or NEMBA: National list of ecosystems that are threatened and in need of protection, G 34809, GoN 1002, 9 December 2011). The NEMBA provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected.

According to Mucina and Rutherford (2006), the vegetation type of the study area is classified as Least Threatened with a conservation target of 34%. Currently, none of the vegetation type is conserved in statutory conservation areas. Only 0.3% of this vegetation type has been transformed. Furthermore, this area is not listed within the Threatened Ecosystem List (NEMA:BA). It is highly unlikely that this development will have an impact on the status of the Vegetation Type due to the extent of the development as well as the presence of already disturbed areas within the footprint (existing mine) and the fact that only existing access roads will be used.

(d) Critical Biodiversity Areas and Broad Scale Ecological Processes

Critical Biodiversity Areas have been identified for all municipal areas of the Northern Cape Province (Oosthuysen & Holness, 2016) and are published on the SANBI website (bgis.sanbi.org). This biodiversity assessment identifies CBAs which represent biodiversity priority areas that should be maintained in a natural to near natural state. According to these maps, large tracks of land within the region falls either within Critical Biodiversity Areas 2 (CBA2) or Ecological Support Areas (ESA).

However, the proposed extension area is located outside any listed CBA or ESA. This is most likely due to the fact that this area has been significantly transformed and disturbed by historical mining activities resulting in this localised area losing its ability to fulfil its natural functions and services, comprising of an area either devoid of vegetation or containing a sparse transformed vegetation cover. Furthermore, access to the mining site will be along existing access roads and as such this aspect will also have no impact on the CBAs and ESAs of the region.

(e) Mining and biodiversity guidelines

According to the Mining and Biodiversity Guidelines (as presented in Figure 16) the mining area is situated within areas of high to highest biodiversity importance with a corresponding rating of high to highest risk for mining. The table below provides the definition of an area of high biodiversity importance.

Table 9: Category (High) of biodiversity priority areas in relation to their biodiversity importance and implications for mining.

Category	Biodiversity property areas	Risk for mining	Implications for mining
Highest Biodiversity Importance	• Critical endangered and endangered ecosystems. • CBA form provincial and spatial biodiversity plans. • River and wetlands FEPAs and a 1km buffer around these FEPA's. • Ramsar sites.	**Highest risk for mining**	• Environmental screening, EIAs, and their associated specialist studies should focus on confirmed the, and to provide site specific basis on which to apply the mitigation hierarchy to inform regulatory decision making for mining, WULA's, and EA's. • If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significant of the biodiversity features in these areas and the associated ecosystems services. These areas are viewed as necessary to ensure protection of biodiversity, environment, sustainability, and human wellbeing. • An EIA should include the strategic assessment of optimum, sustainable land use for a particular area, and will determine the significance of the impact on biodiversity. This assessment should take fully into account the environmental sensitivity if the area, the overall environmental, socio-economic cost, and benefits of mining, as well as the potential strategic importance of the minerals to the country. • Authorisations may well not be granted. If granted, the authorisation may set limits on the allowed activities, impacts, and may specify biodiversity offset that would be written into license agreements and / or authorisations.
High Biodiversity Importance	• Protected area buffers (including buffers around National Parks, World Heritage Sites* and Nature Reserves) • Transfrontier Conservation Areas (remaining areas outside of formally proclaimed protected areas) • Other identified priorities from provincial spatial biodiversity plans • High water yield areas are possible. • Coastal Protection Zone • Estuarine functional zone • *Note that the status of buffer areas of World Heritage Sites is subject to a current intra-governmental process.	**High risk for mining**	High risk for These areas are important for conserving biodiversity, for supporting or buffering other biodiversity mining biodiversity priority areas, and for maintaining important ecosystem services for particular importance communities or the country as a whole. An EIA should include an assessment of optimum, sustainable land use for a particular area and will determine the significance of the impact on biodiversity. Mining options may be limited in these areas, and limitations for mining projects are possible. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations.

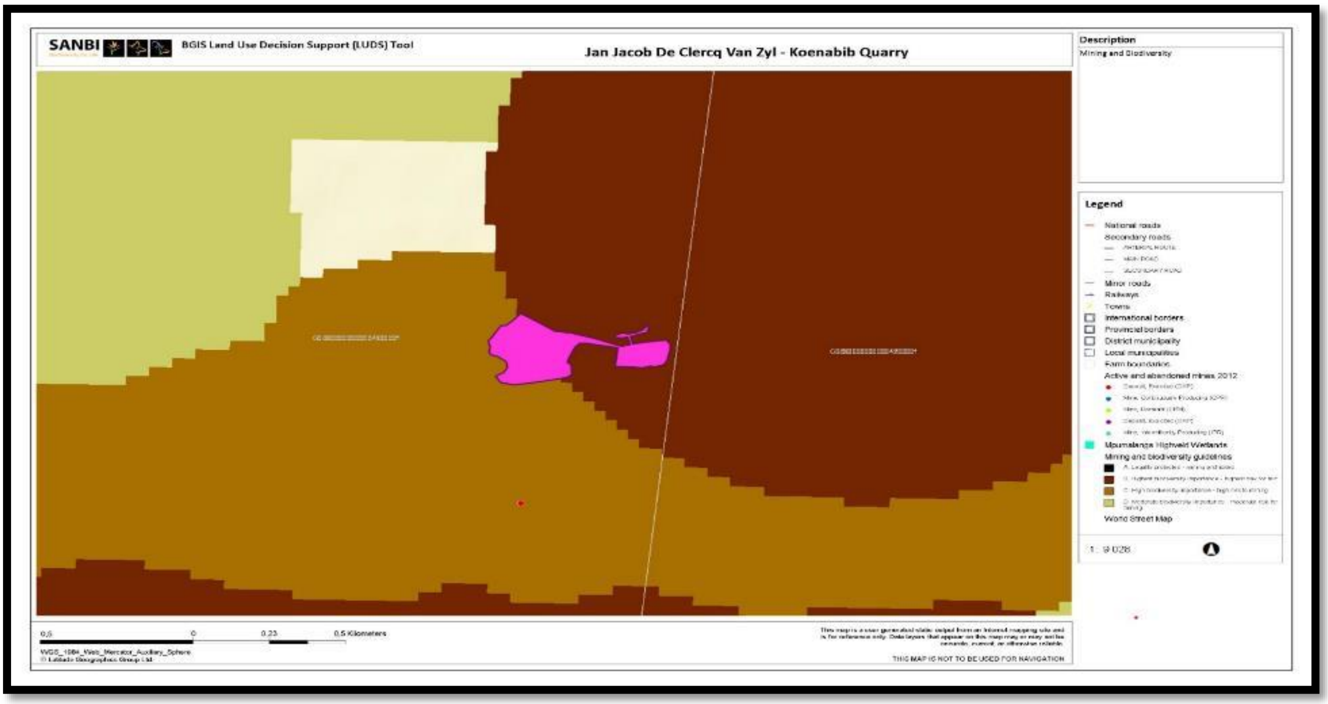


Figure 16: Mining and Biodiversity Guidelines Map (SANBI) (DEA, 2013) where the brown area shows areas of high biodiversity importance, dark brown – highest biodiversity areas and beige – areas of moderate importance.

Although the site is situated within areas of high- & highest biodiversity importance, the nature and scale of the proposed extension area is such that it cannot be considered a threat to biodiversity. The footprint of the proposed area was kept to the already disturbed areas on the property and the existing access road will be used.

The Botanical Study mentioned that cumulative impacts of developments on population viability of species can be reduced significantly if new developments are kept as close as possible to existing developed and/or transformed areas or, where such is not possible, different sections of development be kept as close together as possible. Due to the extent of this proposed footprint (5 ha) as well as the location of the mining area within an already transformed and disturbed footprint these mining activities will have a very limited contribution to the cumulative impacts of the area and will not:

- compromise the ecological functioning of the larger "natural" environment; or
- disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.

Also refer to Part A (3)(h)(iv)(1)(c)(iii) Site Specific Flora

Fauna

Various small mammals and reptiles occur on the property. Larger herbivore species are very scares or absent due to the conflicting land use. Animals that may occur in the area will be very similar to those found around Pella / Aggeneys and surrounding towns. The fauna at the site will not be impacted by the proposed mining activity as they will be able to move away or through the site, without being harmed. Most of the natural wild fauna left within these areas are nocturnal; such as the silver back jackal, bat ear fox, cape hare and several other rodent species.

Mammals

The farm Koenabib, comprise largely of natural habitats, subject to relatively low stocking levels of livestock (sheep, goats and cattle) with the most disturbed areas occurring around the farm houses and outbuildings, water points and access tracks. The local occurrences of mammals are closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupiculous (rock-dwelling) and wetland-associated vegetation cover. It is thus possible to deduce the presence or absence of mammal species by evaluating the habitat types within the context of global distribution ranges.
From a mammal habitat perspective, two of the four major habitats identified above are very prominent on the study site, namely terrestrial and rupiculous (rock-dwelling) habitat. Very little arboreal and wetland-associated habitat occurs on the study site. Although not obvious in dry conditions, during periods of exceptional rainfall there are watercourses that flow, supporting a range of unusual biodiversity. Arboreal habitat is almost non-existent on the study site. A few *Acacia* species and other small trees and bushes occur scattered in the dunes. A few Quiver trees (*Aloe dichotoma*) occur on some of the mountain slopes.

At least fifty six mammal species are expected to occur within the study area (Table below). It should be noted that potential occurrences is interpreted as to be possible over a period of time as result of expansion and contractions of population densities and ranges which stimulate migration. The feral mammal species expected to occur on the study site (e.g. house mice, house rats, dogs and cats) were omitted from the assessment since these species are normally associate with human settlements. Mammals reliant on wetland and arboreal habitats were omitted from the list of occurrences since these habitat-types are absent from the study site. As such a species richness of 56 species in an area with average habitat diversity and a low carrying capacity is presented below.

Table 10: Mammal diversity. The species deduced to occupy the site (Systematics and taxonomy as proposed by Bronner et.al [2003] and Skinner and Chimimba [2005])

	SCIENTIFIC NAME	ENGLISH NAME
*	*Macroscelides proboscideus*	Round-eared elephant shrew
Y	*Elephantulus rupestris*	Western rock elephant shrew
Y	*Orycteropus afer*	Aardvark
Y	*Procavia capensis*	Rock dassie
Y	*Lepus capensis*	Cape hare
Y	*Lepus saxatilis*	Scrub hare
Y	*Pronolagus rupestris* Smith"s	Smith"s red rock rabbit
Y	*Hystrix africaeaustralis*	Cape porcupine
Y	*Petromus typicus*	Dassie rat
Y	*Pedetes capensis*	Springhare
Y	*Xerus inaurus*	South African ground squirrel
?	*Graphiurus ocularis*	Spectacled dormouse
*	*Rhabdomys pumilio*	Four-striped grass mouse
*	*Mus minutoides*	Pygmy mouse
*	*Aethomys namaquensis*	Namaqua rock mouse
Y	*Parotomys brantsii*	Brant"s whistling rat
Y	*Parotomys littledalei*	Littledale"s whistling rat
*	*Desmodillus auricularis*	Cape short-tailed gerbil
*	*Gerbillurus paeba*	Hairy-footed gerbil
*	*Gerbillurus vallinus*	Brush-tailed hairy-footed gerbil
DD*	*Gerbilliscus leucogaster*	Bushveld gerbil
*	*Petromus typicus*	Dassie rat
*	*Gerbilliscus brantsii*	Highveld gerbil
?	*Saccostomus campestris*	Pouched mouse
*	*Malacothrix typical*	Gerbil mouse
*	*Petromyscus collinus*	Pygmy rock mouse
?	*Papio hamadryas*	Chacma baboon
DD*	*Crocidura cyanea*	Reddish-grey musk shrew
?	*Sauromys petrophilus*	Flat-headed free-tailed bat
*	*Tadarida aegyptiaca*	Egyptian free-tailed bat
?	*Cistugo seabrai*	Angolan hairy bat
*	*Neoromicia capensis*	Cape serotine bat
?	*Eptesicus hottentotus*	Long-tailed serotine bat
?	*Nycteris thebaica*	Egyptian slit-faced bat
?	*Rhinolophus fumigatus*	Rüppel"s horseshoe bat
NT?	*Rhinolophus clivosus*	Geoffroy"s horseshoe bat
NT?	*Rhinolophus darlingi*	Darling"s horseshoe bat
?	*Rhinolophus capensis*	Cape horseshoe bat
?	*Rhinolophus denti*	Dent"s horseshoe bat
Y	*Proteles cristatus*	Aardwolf
Y	*Caracal*	Caracal
Y	*Felis silvestris*	African wild cat
?	*Felis nigripes*	Black-footed cat
*	*Genetta*	Small-spotted genet
*	*Suricata suricatta*	Suricate
Y	*Cynictis penicillata*	Yellow mongoose
?	*Galerella sanguinea*	Slender mongoose
?	*Galerella pulverulenta*	Cape grey mongoose
Y	*Otocyon megalotis*	Bat-eared fox
Y	*Vulpes chama*	Cape fox

	SCIENTIFIC NAME	ENGLISH NAME
Y	*Canis mesomelas*	Black-backed jackal
NT?	*Mellivora capensis*	Honey badger
*	*Ictonyx striatus*	Striped polecat
Y	*Oryx gazella*	Gemsbok
Y	*Antidorcas marsupialis*	Springbok
	Raphicerus campestris	Steenbok
Y	*Oreotragus oreotragus*	Klipspringer

Y Definitely present or have a high probability to occur;
***** *Medium probability to occur based on ecological and distributional parameters;*
? *Low probability to occur based on ecological and distributional parameters.*

Red Data species rankings as defined in Friedmann and Daly"s S.A. Red Data Book / IUCN (World Conservation Union) (2004) are indicated in the first column: CR= Critically Endangered, En = Endangered, Vu = Vulnerable, LR/cd = Lower risk conservation dependent, LR/nt = Lower Risk near threatened, DD = Data Deficient. All other species are deemed of Least Concern.

All Red Data species listed in Table 10 as Critically Endangered, Endangered, Rare, Near Threatened or Data Deficient are discerning species and became endangered as result of the deterioration of their preferred habitats. No other Red Data or sensitive species are deemed present on the site, since the site falls outside the distributional ranges of some species, or does not offer suitable.

Four pertinent matters emerge from the list of mammals compiled during the site visit and the subsequent desktop study:

1. The species assemblage is typical of a western semi-arid region (particularly species such as the elephants shrew species, the ground squirrel, the spectacled dormouse, the various gerbil species, the dassie rat, whistling rats, the black-footed cat, the bat-eared fox, the Cape fox,.);
2. The species richness of 56 is typical of an extensive area such as the property (5000 ha) and of adjoining areas, with a near-natural degree of connectivity;
3. Land-use practices and civilization pressures are geared to low-key grazing with a focus on concomitant floral conservation to benefit year-round grazing, which are conducive to species richness; and
4. Field observations suggested that population levels were low during the site visit.

Population fluctuations are not uncommon, and often have a domino effect (for instance when prey population densities decrease in numbers, this will have an adverse effect on carnivore and raptor numbers). The rest of the species richness is made up from common and robust mammals with wide distributional ranges such as aardvarks, springhares, four-striped grass mouse, porcupines, the caracal, the genet, the two mongoose species, the black-backed jackal etc.

The role of insectivorous bats in an ecosystem is often under-estimated, whereas their susceptibility to reigning environmental conditions is under-appreciated. Bats are sensitive to adverse daytime environmental conditions and predation, and suitable daytime roosting sites are of cardinal importance. Especially the mountains have many boulders and rock faces forming many overhangs and deep crevices suitable for daytime roosts.

The proposed mining permit activities will not result in a progressive loss of ecological sensitive and important habitat units, ecosystem function e.g. reduction in water quality, loss of faunal habitat, and of loss/displacement of threatened or protected fauna. The project will not affect mammals which may occur on site in a significant manner. Taking cognisance of the above, the main conservation objectives for mammals on the site are to avoid the mountains and their gravel skirts and the drainage lines, including the untransformed adjacent grassy plains.

Herpetofauna

From a herpetological habitat perspective, the identified terrestrial and rupiculous (rockdwelling) habitats are of significance. Man-made rupiculous habitat exists in the form of homesteads and its surrounding outbuildings, built dams and worker accommodation. These man-made habitats are often islands in the sea of terrestrial habitat and provides excellent artificial habitat for many rupiculous reptile species. In addition, connectivity across the area is fair and real opportunities for migration exist.

The Northern Cape is renowned for its biodiversity and the herpetofauna is no exception to the rule. It is especially true for reptiles in general and lizards in particular. Based on the habitat available on site, a variety of reptile and some amphibian species are expected to occupy the mining permit area. Very few trees occur on the study site, which provided habitat for arboreal (tree-living) herpetofauna. As a result arboreal species like the Kalahari tree skink are excluded from the species list (Table 11).

Table 11: Reptile and Amphibian species diversity deduced to be present on site. Systematic arrangement and nomenclature according to Branch (1998), Alexander and Marais (2007), Minter, et.al (2004) & Du Preez and Carruthers (2009)

	SCIENTIFIC NAME	ENGLISH NAME
	CLASS: REPTILIA	**REPTILES**
	Order: TESTUDINES	**TORTOISES & TERRAPINS**
	Family:Testudinidae	**Tortoises**
Y	*Psammobates tentorius verraxii*	Karoo Tent Tortoise
	Order: SQUAMATA	**SCALE-BEARING REPTILES**
	Suborder:LACERTILIA	**LIZARDS**
	Family: Gekkonidae	**Geckos**
Y	√ *Chondrodactylus angulifer*	Giant Ground Gecko
*	***** *Goggia lineate*	Striped Dwarf Leaf-toed Gecko
?	**?** *Goggia rupicola*	Namaqualand Dwarf Leaf-toed Gecko
?	**?** *Lygodactylus bradfieldi*	Bradfield"s Dwarf Gecko
Y	√ *Chondrodactylus bibronii*	Bibron"s Tubercled or Thick-toed Gecko
?	**?** *Pachydactylus labialis*	Northern Cape Thick-toed or Northern Cape Gecko
?	**?** *Pachydactylus capensis*	Cape Thick-toed or Cape Gecko
Y	√ *Pachydactylus mariquensis*	Marico Thick-toed Gecko
?	**?** *Pachydactylus namaquensis*	Namaqua Thick-toed Gecko
?	**?** *Pachydactylus rugosus*	Rough Thick-toed Gecko
Y	√ *Ptenopus garrulus*	Barking Gecko
	Family: Agamidae	**Agamas**
?	**?** *Agama aculeata*	Ground Agama
Y	√ *Agama anchietae*	Anchieta"s Agama
Y	√ *Agama atra*	Southern Rock Agama
	Chamaeleonidae	**Chameleons**
Y	√ *Chamaeleo namaquensis*	Namaqua Chameleon
	Family: Scincidae	**Skinks**
Y	√ *Acontias lineatus*	Striped Legless Skink
?	**?** *Acontias gracilicauda namaquensis*	Thin-tailed Legless Skink
Y	√ *Trachylepis capensis*	Cape Skink
Y	√ *Trachylepis occidentalis*	Western Three-striped Skink
Y	√ *Trachylepis sulcata*	Western Rock Skink
	Family:Lacertidae	**Old World Lizards or Lacertids**
Y	√ *Meroles suborbitalis*	Spotted Desert Lizard
?	*? Pedioplanis laticeps*	Cape Sand Lizard
Y	√ *Pedioplanis lineoocellata*	Spotted Sand Lizard
Y	√ *Pedioplanis namaquensis*	Namaqua Sand Lizard
*	***** *Pedioplanis inornata*	Plain Sand Lizard
*	***** *Nucras tessellata*	Western Sandveld Lizard
?	**?** *Agama aculeata*	Ground Agama
Y	√ *Agama anchietae*	Anchieta"s Agama
Y	√ *Agama atra*	Southern Rock Agama
	Family: Gerrhosauridae	**Family: Gerrhosauridae Plated Lizards**
?	*? Cordylosaurus subtessellatus*	Dwarf Plated lizard
?	*?Vu Gerhosaurus typicus* Namaqua	Namaqua Plated Lizard
	Family: Cordyidae	**Family: Cordyidae**
*	***** *Cordylus polyzonus*	Karoo Girdled Lizard
Y	*? Platysaurus broadleyi*	Augrabies or Broadley"s Flat Lizard
	Family: Varanidae	**Family: Varanidae Monitors**
Y	√ *Varanus albigularis*	Rock Monitor

	SCIENTIFIC NAME	ENGLISH NAME
	Suborder: SERPENTES	**Suborder: SERPENTES SNAKES**
	Family: Typhlopidae	**Family: Typhlopidae Blind Snakes**
*	***** *Rhinotyphlops lalandei*	Delalande"s Beaked Blind Snake
*	***** *Rhinotyphlops schinzi*	Schinz"s Beaked Blind Snake
	Family: Leptotyphlopidae	**Thread Snakes**
*	***** *Leptotyphlops occidentalis*	Namaqua Worm or Western Thread Snake
	Family: Colubridae Typical Snakes	**Typical Snakes**
Y	*Lamprophis capensis*	Brown House Snake
?	*Lamprophis guttatus*	Spotted House Snake
?VU	*Lamprophis fiskii*	Fisk"s House Snake
	Pseudaspis cana	Mole Snake
?	*Prosymna bivittata*	Two-striped Shovel-snout
Y	*Prosymna frontalis*	South-western Shovel-snout
Y	*Dipsina multimaculata*	Dwarf Beaked Snake
Y	*Psammophis notostictus*	Karoo Whip or Sand Snake
Y	*Psammophis trinasalis*	Kalahari Sand Snake
Y	*Psammophis leightoni namibensis*	Namib Sand Snake
?	*Psammophis crucifer* Crossed	Crossed Whip Snake
Y	*Dasypeltis scabra*	Common or Rhombic Egg Eater
Y	*Telescopus beetzii* Beetz"s	Tiger Snake
	Family: Elapidae	**Cobras, Mambas and Others**
Y	*Aspidelaps lubricus* Coral Shield Cobra	Coral Shield Cobra
Y	*Naja nivea* Cape Cobra	Cape Cobra
Y	*Naja nigricollis* Black-necked Spitting Cobra	Black-necked Spitting Cobra
	Family: Viperidae	**Adders**
Y	*Bitis caudalis*	Horned Adder
Y	*Bitis arietans*	Puff Adder
?	*Bitis xeropaga*	Desert Mountain Adder
?	*Bitis cornuta*	Many-horned Adder
	CLASS: AMPHIBIA	**AMPHIBIANS**
	Order: ANURA	**FROGS**
	Family: Pipidae	**Clawed Frogs**
?	*Xenopus laevis*	Common Platanna
	Family: Bufonidae Toads	
?	*Vandijkophrynus gariepensis*	Karoo Toad
*	*Vandijkophrynus robinsoni* Paradise Toad	Paradise Toad
	Family: Microhylidae Rubber Frogs	
?	*Phrynomantis annectens* Marled Rubber Frog	Marled Rubber Frog
	Family: Breviceptidae Rain Frogs	
?	*Breviceps namaquensis* Namaqua Rain Frog	Namaqua Rain Frog
	Family: Pyxicephalidae	
?	*Amietia fuscigula*	Cape River Frog
*VU	*Strongylopus springbokensis*	Namaqua Stream Frog
?	*Cocosternum boettgeri* Boettger"s	Boettger"s Caco or Common Caco
*	*Cocosternum namaquense*	Namaqua Caco
*	*Tomopterna delalandii*	Cape Sand Frog
?	*Tomopterna tandyi* Tandy"s	Tandy"s Sand Frog

Y Definitely there or have a high probability of occurring;

** Medium probability of occurring based on ecological and distributional parameters;*

? Low probability of occurring based on ecological and distributional parameters.

Red Data species rankings as defined in Branch, The Conservation Status of South Africa's threatened Reptiles": 89 – 103. In: - G.H.Verdoorn & J. le Roux (editors), „The State of Southern Africa's Species (2002) and Minter, et. Al, Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland (2004) are indicated in the first column: CR= Critically Endangered, En= Endangered, Vu = Vulnerable, NT = Near Threatened, DD = Data Deficient. All other species are deemed of Least Concern.

Red Data Listed Reptiles

The study site area falls outside the natural range of the speckled padloper, Namaqua day Gecko, Lawrence's girdled lizard, Armadillo girdled lizard, Loma's blind legless skink, Namaqua dwarf adder and the Southern African python.

The Namaqua plated lizard inhabits dry sandy areas and rocky hillsides (McLachlan 1988), which is abundantly present on the study site. This species has been recorded from Springbok (McLachlan 1988). Although the possibility is very small that this species may occur on the study site, it may potentially be present.

Very few Frisk's house snake specimens are ever collected and little is known of its biology. There is a specimen collected from Steinkopf in the Ditsong National Museum of Natural History (Transvaal Museum) (Broadley 1990). It is very difficult to confirm whether this cryptic snake is present on any study site, but it is highly unlikely that it occurs on this particular study site.

Red Data Listed Amphibians

The study site falls outside the natural range of giant bullfrogs, desert rain frog and the Karoo caco. It is unlikely that these species will occur on the mining permit area.

The Namaqua stream frog occurs in areas which receive annual rainfall of < 60mm. In this arid environment, these frogs are restricted to the proximity of springs, seps, small permanent and non-permanent streams and artificial impoundments (Channing 2004). The study site contains some of these water sources and the fact that a fragmented sub-population has been recorded at the nearby Gamsberg, makes the occurrence of this frog species on the study site a possibility. As a result, it is important that the drainage lines must be avoided and remain unaffected.

As indicated previously, the proposed mining operation is temporary in nature and will result in the disturbance of a relatively small surface areas upon which the disturbed areas will be rehabilitated. The proposed mining permit activities will therefore not result in a progressive loss of ecological sensitive and important habitat units, ecosystem function e.g. reduction in water quality, loss of faunal habitat, and of loss/displacement of threatened or protected fauna. The project will not affect reptiles and amphibians which may utilise the site in a significant manner. Taking cognisance of the above, the main conservation objectives for herpetofauna are to avoid the mountains and their gravel skirts and the drainage lines, including the untransformed adjacent grassy plains.

Birds

Based on the habitats identified on site, a wide variety of bird species occurs, and is expected to occur on the mining permit area. Table 12 shows the bird species expected to occur on and around the mining permit area:

Table 12: Birds species expected to occur on and around the site

COMMON ENGLISH NAME	SCIENTIFIC NAME	STATUS CODES (SEE BELOW)		
		RD	S	E
Common Ostrich	*Struthio camelus*			
Maccoa Duck	*Oxyura maccoa*			
Egyptian Goose	*Alopochen aegyptiaca*			
South African Shelduck	*Tadorna cana*			
Spur-winged Goose	*Plectropterus gambensis*			
Cape Teal	*Anas capensis*			
Yellow-billed Duck	*Anas undulata*			
Cape Shoveler	*Anas smithii*		B/NBM	
Red-billed Teal	*Anas erythrorhyncha*			
Southern Pochard	*Netta erythrophthalma*			
Acacia Pied Barbet	*Tricholaema leucomelas*			
African Hoopoe	*Upupa africana*			
Swallow-tailed Bee-eater	Bee-eater *Merops hirundineus*			
European Bee-eater	*Merops apiaster*			
White-backed Mousebird	*Colius*			
Red-faced Mousebird	*Urocolius indicus*			
Burchell's Coucal	*Centropus burchellii*			
Alpine Swift	*Tachymarptis melba*		BM	
Common Swift	*Apus*		NBM	
Bradfield's Swift	*Apus bradfieldi*			
Little Swift	*Apus affinis*			
Owl	*Tyto alba*			
Cape Eagle-Owl	*Bubo capensis*			
Spotted Eagle-Owl	*Bubo africanus*			
Freckled Nightjar	*Caprimulgus tristigma*			
Rufous-cheeked Nightjar	*Caprimulgus rufigena*		BM	
Rock Dove	*Columba livia*			
Speckled Pigeon	*Columba guinea*			

COMMON ENGLISH NAME	SCIENTIFIC NAME	STATUS CODES (SEE BELOW)		
		RD	S	E
Laughing Dove	*Streptopelia senegalensis*			
Cape Turtle-Dove	*Streptopelia capicola*			
Namaqua Dove	*Oena capensis*			
Ludwig's Bustard	*Neotis ludwigii*	VUL		
Kori Bustard	*Ardeotis kori*	VUL		
Karoo Korhaan	*Eupodotis vigorsii*			
African Rail	*Rallus caerulescens*			
Red-knobbed coot	*Fulica cristata*			
Namaqua Sandgrouse	*Pterocles namaqua*			
Double-banded Sandgrouse	*Pterocles bicinctus*			
Marsh Sandpiper	*Tringa stagnatilis*		NBM	
Common Greenshank	*Tringa nebularia*		NBM	
Wood Sandpiper	*Tringa glareola*		NBM	
Common Sandpiper	*Actitis hypoleucos*		NBM	
Ruddy Turnstone	*Arenaria interpres*		NBM	
Little Stint	*Calidris minuta*		NBM	
Curlew Sandpiper	*Calidris ferruginea*		NBM	
Ruff	*Philomachus pugnax*		NBM	
Spotted Thick-knee	*Burhinus capensis*			
Black-winged Stilt	*Himantopus*			
Pied Avocet	*Recurvirostra avosetta*			
Common Ringed Plover	*Charadrius hiaticula*			
Kittlitz's Plover	*Charadrius pecuarius*			
Three-banded Plover	*Charadrius tricollaris*			
Chestnut-banded Plover	*Charadrius pallidus*	NT		
Blacksmith Lapwing	*Vanellus armatus*			
Crowned Lapwing	*Vanellus coronatus*			
Double-banded Courser	*Rhinoptilus africanus*			
Burchell's Courser	*Cursorius rufus*			
White-winged Tern	*Chlidonias leucopterus*		NBM	
Black-shouldered Kite	*Elanus caeruleus*			
Yellow-billed Kite	*Milvus aegyptius*			
Black-chested Snake-Eagle	*Circaetus pectoralis*			
Black Harrier	*Circus maurus*	NT		(*)
Southern Pale Chanting Goshawk	*Melierax canorus*			
Gabar Goshawk	*Melierax gabar*			
Steppe Buzzard	*Buteo*		NBM	
Jackal Buzzard	*Buteo rufofuscus*			(*)
Verreaux's Eagle	*Aquila verreauxii*			
Martial Eagle	*Polemaetus bellicosus*	VU		
Secretarybird	*Sagittarius serpentarius*	VU		
Pygmy Falcon	*Polihierax semitorquatus*			
Rock Kestrel	*Falco rupicolus*			
Greater Kestrel	*Falco rupicoloides*			
Red-necked Falcon	*Falco chicquera*			
Lanner Falcon	*Falco biarmicus*	NT		
Little Grebe	*Tachybaptus ruficollis*			
Yellow-billed Egret	*Egretta intermedia*			
Grey Heron	*Ardea cinerea*			
Black-headed Heron	*Ardea melanocephala*			
Cattle Egret	*Bubulcus ibis*			
Little Bittern	*Ixobrychus minutus*			
Bokmakierie	Bokmakierie *Telophorus zeylonus*			

COMMON ENGLISH NAME	SCIENTIFIC NAME	STATUS CODES (SEE BELOW)		
		RD	S	E
Pririt Batis	Pririt Batis *pririt*			
Cape Crow	*Corvus capensis*			
Pied crow	*Corvus albus*			
Red-backed Shrike	*Lanius collurio*		NBM	
Lesser Grey Shrike	*Lanius minor*		NBM	
Common Fiscal	*Lanius collaris*			
Cape Penduline-Tit	*Anthoscopus minutus*			
Ashy Tit	*Parus cinerascens*			
Grey Tit	*Parus afer*			(*)
Brown-throated Martin	*Riparia paludicola*			
Barn Swallow	*Hirundo rustica*		NBM	
White-throated Swallow	*Hirundo albigularis*		BM	
Greater Striped Swallow	*Cecropis cucullata*		BM	
Rock Martin	*Hirundo fuligula*			
Common House-Martin	*Delichon urbicum*		NBM	
African Red-eyed Bulbul	*Pycnonotus nigricans*			
Fairy Flycatcher	*Stenostira scita*			(*)
Yellow-bellied Eremomela	*Eremomela icteropygialis*			
Karoo Eremomela	*Eremomela gregalis*			(*)
Lesser Swamp-Warbler	*Acrocephalus gracilirostris*			
Layard's Tit-Babbler	*Sylvia layardi*			(*)
Orange River White-eye	*Zosterops pallidus*			
Grey-backed Cisticola	*Cisticola subruficapilla*			
Zitting Cisticola	*Cisticola juncidis*			
Tawny-flanked Prinia	*Prinia subflava*			
Karoo Prinia	*Prinia maculosa*			(*)
Namaqua Warbler	*Phragmacia substriata*			(*)
Rufous-eared Warbler	*Malcorus pectoralis*			
Cinnamon-breasted Warbler	*Euryptila subcinnamomea*			(*)
Cape Clapper Lark	*Mirafra apiata*			(*)
Sabota Lark	*Calendulauda sabota*			
Fawn-coloured Lark	*Calendulauda africanoides*			
Red Lark	*Calendulauda burra*	VUL		
Karoo Lark	*Calendulauda albescens*			(*)
Spike-heeled Lark	*Chersomanes albofasciata*			
Karoo Long-billed Lark	*Certhilauda subcoronata*			
Black-eared Sparrowlark	*Eremopterix australis*			(*)
Grey-backed Sparrowlark	*Eremopterix verticalis*			
Red-capped Lark	*Calandrella cinerea*			
Stark's Lark	*Spizocorys starki*			
Pink-billed Lark	*Spizocorys conirostris*			
Sclater's Lark	*Spizocorys sclateri*	NT		(*)
Large-billed Lark	*Galerida magnirostris*			(*)
Short-toed Rock-Thrush	*Monticola brevipes*			
Karoo Thrush	*Turdus smithi*		NBM	(*)
Chat Flycatcher	*Bradornis infuscatus*			
Spotted flycatcher	*Muscicapa striata*			
Cape Robin-Chat	*Cossypha caffra*			
Karoo Scrub-Robin	*Erythropygia coryphoeus*			
Mountain Wheatear	*Oenanthe monticola*			
Capped Wheatear	*Oenanthe pileata*			
Sickle-winged Chat	*Cercomela sinuata*			(*)
Karoo Chat	*Cercomela schlegelii*			

COMMON ENGLISH NAME	SCIENTIFIC NAME	STATUS CODES (SEE BELOW)		
		RD	S	E
Tractrac Chat	*Cercomela tractrac*			
Familiar Chat	*Cercomela familiaris*			
Ant-eating Chat	*Myrmecocichla formicivora*			
Pale-winged Starling	*Onychognathus nabouroup*		I	
Cape Glossy Starling	*Lamprotornis nitens*			
Wattled Starling	*Creatophora cinerea*			
Common Starling	*Sturnus vulgaris* I			
Malachite Sunbird	*Nectarinia famosa*			
Southern Double-collared Sunbird	*Cinnyris chalybeus*			(*)
Dusky Sunbird	*Cinnyris fuscus*			
Scaly-feathered Finch	*Sporopipes squamifrons*			
Sociable Weaver	*Philetairus socius*			
Southern Masked-Weaver	*Ploceus velatus*			
Red-billed Quelea	*Quelea*			
Southern Red Bishop	*Euplectes orix*			
Red-headed Finch	*Amadina erythrocephala*			
Common Waxbill	*Estrilda astrild*		I	
Pin-tailed Whydah	*Vidua macroura*			
House Sparrow	*Passer domesticus*			
Cape Sparrow	*Passer melanurus*			
Southern Grey-headed Sparrow	*Passer diffusus*			
African Pied Wagtail	*Motacilla aguimp*			
Cape Wagtail	*Motacilla capensis*			
African Rock Pipit	*Anthus crenatus*			(*)?
African Pipit	*Anthus cinnamomeus*			
Long-billed Pipit	*Anthus similis*			
Black-headed Canary	*Serinus alario*			(*)
Black-throated Canary	*Crithagra atrogularis*			
Yellow Canary	*Crithagra flaviventris*			
White-throated Canary	*Crithagra albogularis*			
Lark-like Bunting	*Emberiza impetuani*			
Cape Bunting	*Emberiza capensis*			

Red Status	Status in south Africa (S)	Endemism in South Africa (E)
T = Threatened	BM = breeding migrant	Endemism in South Africa (E) (not southern Africa as in field guides)
NT = Near-Threatened	NBM = non-breeding migrant	
Vul = Vulnerable	V = vagrant	* = endemic
E = Endangered	I = introduced	
CE = Critically Endangered	R = rare	(*) = near endemic (i.e. ~70% or more of population in RSA)
RE = Regionally Extinct	PRB = probable rare breeder	B* = breeding endemic
§ = Refer to footnote	RB = rare breeder	B(*) = breeding near endemic
	RV = rare visitor	W* = winter endemic
Red Status is from *The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland, Barnes (2001).*		

Nine species of international and/or national conservation concern (Red Data species, IUCN/Birdlife International 2011, Barnes 2000), ranging from Near Threatened to Vulnerable, are considered as possible to occur on site. Most of these threatened species fall into a few obvious categories by habitat preference (Table 13) and their likelihood of occurrence on site (following Table).

Table 13: List of threatened species that will possibly make use of the habitats on and around the site, showing their preferred habitat types. Note that one species may have more than one habitat preference

THREATENED STATUS	SPECIES	PREFERRED HABITAT TYPE(S)			
		GRASSY PLAINS	RED SAND/DUNES	BARE WASHES	ROCKY MOUNTAINS & GRAVEL
Near Threatened	Chestnut-banded Plover		X	X	
	Black Harrier	X	X		
	Lanner Falcon	X	X	X	X
	Sclater's Lark				X
Vulnerable	Ludwig's Bustard	X	X	X	
	Kori Bustard	X	X	X	
	Martial Eagle	X	X	X	
	Secretarybird	X	X	X	
	Red Lark	X	X	X	
TOTALS	**9**	**7**	**8**	**7**	**2**

Table 14: The expected frequency of occurrence of threatened bird species on and around the site

THREATENED STATUS	SPECIES	PROBABILITY OF OCCURRENCE ON SITE			
		REGULAR RESIDENT	FREQUENT VISITOR	ERRATIC VISITOR	INFREQUENT VAGRANT
Near Threatened	Chestnut-banded Plover			X	
	Black Harrier			X	
	Lanner Falcon		X		
	Sclater's Lark			X	
Vulnerable	Ludwig's Bustard	X			
	Kori Bustard			X	
	Martial Eagle		X		
	Secretarybird			X	
	Red Lark				
TOTALS	**9**	**1**	**2**	**5**	**0**

Based on the analysis above, the most important habitats to conserve for threatened bird species are the grassy plains and the red sand/dunes, with the bare washes also important during reproductive periods after rains. However, the grassy plains form part of extensive similar habitat in the area, while the red dunes are more restricted but also much more productive, for livestock and birds alike, including the Red Lark that is a restricted-range endemic to Bushmanland. The bare washes (for Chestnut-banded Plover) and gravel fields (for Scalter's Lark) are only really productive after good rains, while the mountains have nest sites for the Lanner Falcon when good rains attract large numbers of nomadic insect- and seed-eating birds.

Two Vulnerable species are expected to be regular breeding residents (Ludwig's Bustard and Red Lark). The Vulnerable Martial Eagle and Secretary Bird, and the Near Threatened Lanner Falcon are expected to be regular visitors to the area, when their prey animals are abundant, but while no sufficiently large trees were seen as likely nest sites for the Eagle or Secretary bird, the large south-facing cliffs could well support nesting ledges for the falcon, as they apparently do for Verreaux's Eagle.

The remaining four threatened species are expected to be erratic visitors when high rainfall creates productive conditions (plant cover, seeds, insects, small vertebrates). Some are resident species in the general area of the Northern Cape whose ephemeral habitats on the property are also only likely to become suitable after good rains, the Chestnut-banded Plover visiting and possibly feeding and breeding in/around the more saline pans and Scalter's Lark using large grass seeds on the few chalky gravel patches. The Kori Bustard generally prefers higher rainfall areas with more ground cover and productivity, so although they do sometimes visit the area it seems unlikely that they breed there. Finally, the Black Harrier is expected only as an erratic, non-breeding winter visitor to the area from the Northern Cape, again most likely when good rains have produced abundant small animals.

As indicated previously, the proposed mining activity is temporary in nature and will result in the disturbance of a relatively small surface area, and disturbed areas will be rehabilitated. The proposed mining permit activities will therefore not result in a progressive loss of ecological sensitive and important habitat units, ecosystem function e.g. reduction in water quality, loss of faunal habitat, and of loss/displacement of threatened or protected fauna. The project will therefore not affect bird species which may utilise the site in a significant manner. Taking cognisance of the above, the main conservation objectives for birds are to avoid the sand dunes, mountains and their gravel skirts, as well as the drainage lines, including the untransformed adjacent grassy plains.

Surface water

The proposed site falls within the Lower Orange Water Management Area (WMA), specifically in the Orange Sub Water Management Area (Boegoeberg Sub Catchment), in the D81G quaternary catchment area. The Lower Orange WMA is the lowest WMA in the Orange River Basin and as such is affected by upstream activities. The area is arid with rainfall varying from 400 mm in the east to 50 mm on the west coast. The topography of the area is flat with large pans or (endoreic areas that do not contribute runoff to the Orange River system. The Orange River, which forms a green strip in an otherwise arid landscape, also forms the border between South Africa and Namibia over about 550 km to the west of the 20-degree longitude. The Vaal River, the main tributary to the Orange River, has its confluence with the Orange River about 13 km west of Douglas. Other tributaries are the Ongers and Hartebeest Rivers from the south, and the Molopo River and Fish River (Namibia) from the north. There are a number of highly intermittent water courses along the coast which drain directly to the ocean. Sheep and goat farming is practised over most of the area. Large parts of the WMA also include conservation areas. Cultivation is restricted to isolated patches where somewhat higher rainfall occurs, and extensive irrigation is practised in the narrow ribbon of fertile alluvial soils along the Orange River valley. This irrigation is supplied by releases from the Vanderkloof Dam. Large mining operations occur in various parts of the water management area. There are no large urban developments or power stations. Groundwater plays a major role in meeting the water requirements of the towns and rural settlements along the tributaries of the Orange. Less than 1% of the Gross Domestic Product (GDP) of South Africa originates from the Lower Orange WMA. The largest economic sectors (in 1997) in the water management, in terms of GGP, were:

- Government 19,4%
- Mining 17,4%
- Agriculture 15,9%
- Trade 15,1%

Economic activity is largely concentrated along the Orange River, with several towns located on the banks of the river, and at mining developments. The two major storage dams Gariep and Vanderkloof, which are both used to supply all the irrigation, urban, mining and environmental requirements along the Lower Orange River are located in the Upper Orange WMA, but are of vital importance to the Lower Orange. There are no large storage dams in the WMA, with only a few smaller dams on some of the main tributaries. These include:

- Smart Syndicate Dam on the Ongers River.
- Van Wyksvlei on the Carnarvonleegte.

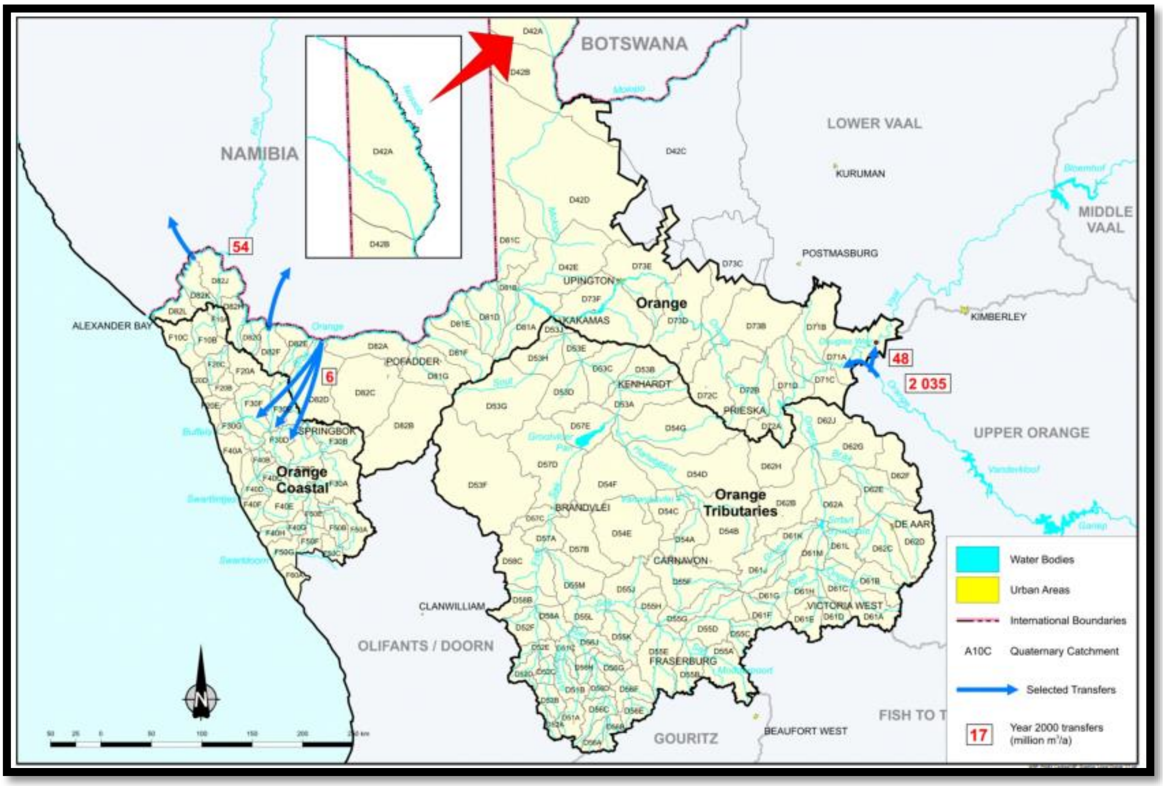


Figure 17: Layout and location of the Lower Orange WMA

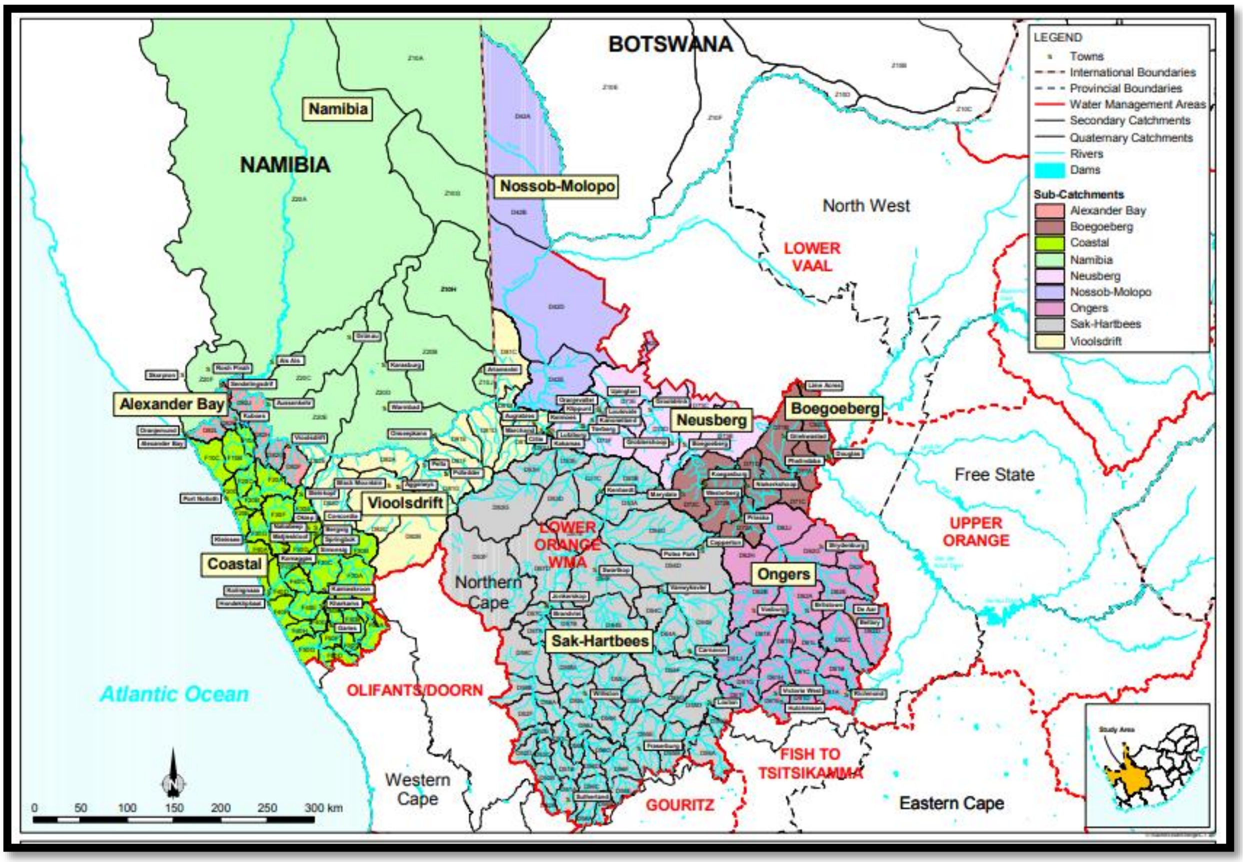


Figure 18: Sub Catchments in the WMA

In its historical natural state, the quality of water in the Orange River was good, although of high turbidity during flood flows. Water from the tributary streams tends to be of high salinity. Both the flow regime and water quality in the Orange River has, however, been severely impacted upon by extensive upstream developments. Salinity in the Orange River has increased due to the transfer of high quality water out of the Orange River (in Lesotho and the Upper Orange WMA) and as a result of high salinity irrigation return flows along the Orange River. Poor quality water from the Vaal River, which contains a high proportion of irrigation return flows as well as treated urban effluent, also enters the Orange River. Salinity is at present still moderate and acceptable along the main stem of the Orange River. Deterioration can be expected with increased upstream irrigation and the situation must be closely monitored. There are algal blooms experienced in the main stem due largely to irrigation return flows, diffuse sources and poor quality water from the upstream Vaal WMAs.

There are algal blooms experienced in the main stem due largely to irrigation return flows, diffuse sources and poor quality water from the upstream Vaal WMAs. The algal blooms are of particular concern as they are potentially toxic. An algal monitoring programme along the Orange River as well as management and communication protocols have been developed by DWS if the algal blooms are identified as toxic. Studies and monitoring programmes are underway to understand the current algae behaviour. (DWAF, ISP Lower Orange WMA, 2004)

Ninety percent of the runoff generated in the two Orange River WMAs is generated in the Upper Orange WMA. The bulk of the runoff generated in the Lower Orange comes from the Fish River in Namibia (approximately 60% of the Lower Orange runoff) but this only enters the main Orange River close to the river mouth. The bulk of the surface water in the Lower Orange Water Management Area is therefore found in the main stem of the Orange River, with virtually all the surface water flowing into the Orange River from the Upper Orange and Lower Vaal WMAs.

There are also several diversion weirs in the Orange River of which Boegoeberg (20 million m^3 storage) is the largest. The total water available for use in the Lower Orange water management area during the year 2000 development levels is summarised in Table 15.

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Table 15: Available water in year 2000 (million m3/a)

Sub-area	Natural resource		Usable return flow			Total local yield (1)	Transfers in	Grand Total
	Surface water	Ground-water	Irrigation	Urban	Mining and bulk			
Orange	(1 092)	9	96	1	0	**(986)**	2 083	**1 097**
Orange Tributaries	9	13	0	0	0	**22**	0	**22**
Orange Coastal	0	3	0	0	0	**3**	6	**9**
Total	**(1 083)**	**25**	**96**	**1**	**0**	**(961)**	**2 083**	**1 122**

The negative yield for the Orange River within the Lower Orange water management area, as shown in

Table *15*, is as a result of evaporation losses and evapotranspiration by riparian vegetation along this reach of the river, which by far exceed the run-of-river yield contributed by local inflows. It also includes a component for losses associated with insufficient management of releases from Vanderkloof Dam.

Potential for a dam in the Lower Orange River has been identified for the re-regulation of releases from Vanderkloof Dam as well as the storage of flood flows mainly from the Upper Orange and Vaal Rivers and to a lesser extent also from the flows generated in the Lower Orange. This would contribute to the improved management of the Orange/Vaal River System, and facilitate more water being made available for use.

No meaningful potential for surface water regulation exists in the Orange Coastal sub-area. Factors that could have a significant impact on the available surface water resources include:

- Saving in operational losses with regards to releases from Vanderkloof Dam (See Orange River Overarching ISP; DWAF, 2004a).
- Implementation of the Reserve on the Orange River (See Orange River Overarching ISP; DWAF, 2004a). Indications are that the reserve can vary significantly from the current environmental flows released from Vanderkloof and will therefore significantly impact on the current surplus available in the system.
- Utilising inflows from the Vaal River.
- Irrigation Return Flows. Very little data is available but return flows commonly amount to 10% of irrigation water. Yield analysis assessments for local surface water resources beyond the Orange River main stem can, with the current available hydrology, only be undertaken on a cursory level (using WR90 data).

This should be carried out only when the need exists and will be the responsibility of the specific towns or towns in need. (DWAF, ISP Lower Orange WMA, 2004)

Ground water

The mining permit processes should not have any influence on the quality or quantity of ground water. A negative impact on groundwater usually occurs where subsurface water is pumped out of boreholes. The proposed method of mining permit will not entail deep excavations from which groundwater will need to be removed and there are no known shallow groundwater on the farm.

Groundwater quality is one of the main factors affecting the development of available groundwater resources. Although there are numerous problems associated with water quality, some of which are easily corrected, total dissolved solids (TDS), nitrates (NO_3 as N) and fluorides (F) are thought to represent the majority of serious water quality problems. The water quality was evaluated in terms of TDS and potability. The information was obtained from DWS Geohydrology. The potability evaluation done was based on the evaluation of chloride, fluoride, magnesium, nitrate, potassium, sodium, sulphate and calcium using the Quality of Domestic Water Supplies, Volume 1 (DWAF, 1998). The portion of the groundwater resources considered to be potable has been calculated as the portion classified as ideal, good and marginal (Class 0 -blue, 1- green and 2 - yellow). Water classified as poor and unacceptable (Class 3 - red and 4 - purple) is considered not to be potable (See Point and diffusive pollution Agricultural activities are a source of diffuse water contamination.)

The contribution of each farm on a local scale is often fairly small but the contribution on a catchment scale needs to be included in assessing any pollution situation. Most findings regarding this issue can only be assessed in a generic way due to the lack of data in the WMA. Nitrates are the contaminant of most concern, since they are very soluble and do not bind to soils, nitrates have a high potential to migrate to groundwater. Because they do not evaporate, nitrates/nitrites are likely to remain in water until consumed by plants or other organisms.

Generally, on a local scale the areas of intense cultivation are the major contributors in terms of inorganic nitrates. The primary inorganic nitrates, which may contaminate drinking water, are potassium nitrate and ammonium nitrate both of which are widely used as fertilizers. Where feedlots are operated the contribution of organic nitrates to groundwater contamination can be far more problematic. For most farming activities organic nitrate is not a severe problem in South Africa. High-density cultivation at surface water irrigation schemes along the Orange River contributes to the nitrate load of localized aquifers in the WMA. Other contaminants of concern are pesticides and herbicides. The contribution of these to groundwater contamination is very difficult to quantify on catchment scale. Site-specific data relating to likely loading/application volumes and history, soil profile and local geohydrology are required. The mineralogical groundwater quality in the Lower Orange Water Management Area is not particularly good in terms of its TDS rating.

In general, the groundwater quality is rated as class 2 to class 4, marginal to completely unacceptable. The southern portion of the inland region, De Aar, Victoria West and Sutherland has a class 2 rating, together with the areas surrounding Prieska, Griekwastad, Upington and Springbok. The rest of the WMA, particularly north of Brandvlei and Carnarvon and the coastal strip are rated as class 3 and 4. The Sutherland, De Aar, Upington belt has a varying range of potable groundwater from a moderate 50% to approximately 90%. The balance of the WMA, has a predominant potable usage of less than 4 30%, with the occasional improvement to 50% (V3, 2002).

See Figure 19 for average TDS values for the area under investigation as mapped by Simonic (1999). Natural occurring radioactivity is found in some of the groundwater resources associated with geological formations such as sillimanite and gneisses. Fortunately, the values are mostly low except at Kotzerus, Kharkams, Bulletrap, Fonteintjie, Kenhardt and Riemvasmaak, which fall into Class 2 according to the potable water classification (Van Dyk, 2003).

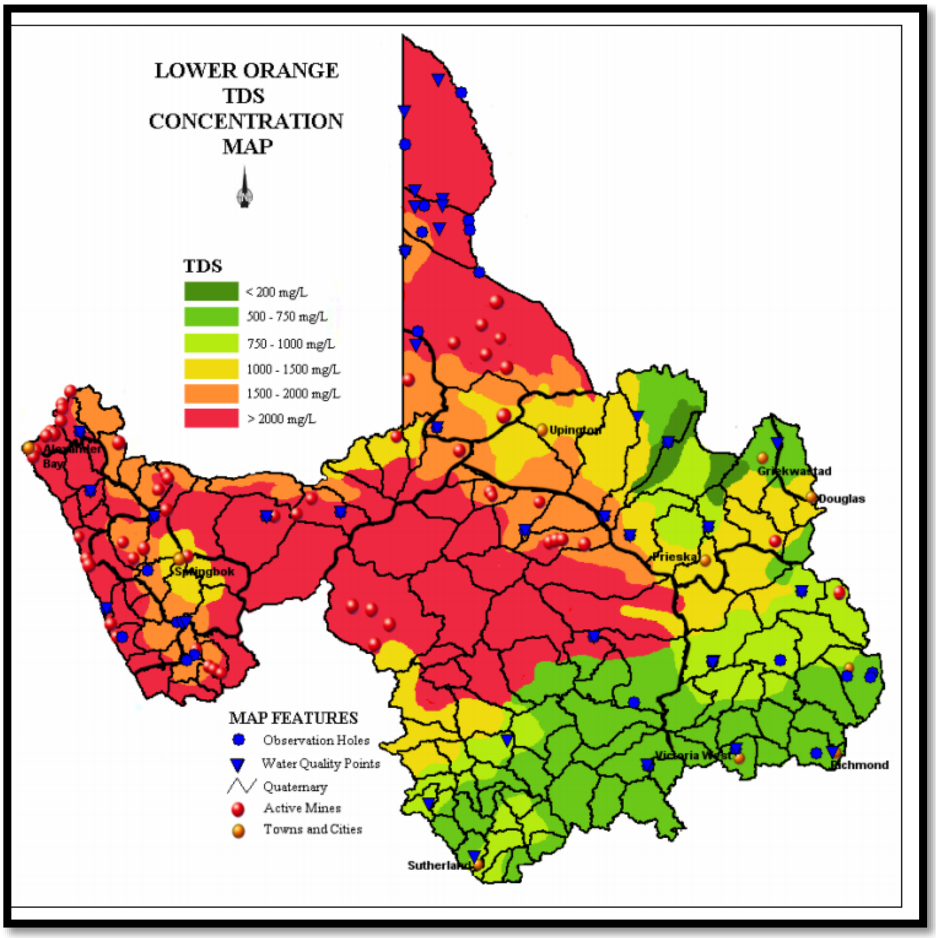


Figure 19: Total dissolved solids for the WMA with main abstraction and water quality monitoring points (DWAF, ISP Lower Orange WMA, 2004).

Activities related to urban areas can also result in localized or even diffuse pollution of groundwater. Poor management of sewage treatment works can contribute to the groundwater pollution as can landfill sites, on-site sanitation (especially in informal settlements) and spills resulting from accidents or leaking underground tanks. Uncontrolled dumping and accidents related to the transport industry also contribute to localized pollution in the WMA. Often goods that contain hazardous substances or perishables are confiscated by authorities and these are then dump at illegal sites.

A need for incinerators has been identified. Mining activities that potentially impact on the groundwater quality include the Okiep Copper mine and the Black Mountain lead, zinc, copper and silver mine. Mineralisation in the Okiep area tends to occur in basic rocks intruded in the form of 'steep structures' into granitic terrain of the Namaqualand Metamorphic Complex, and may extend to depths of over 1000 m (www.metorexgroup.com/Ookiep.htm). The major copper minerals are bornite (Cu5 FeS4) with 62% copper, and chalcopyrite (CuFeS2) with 32.5% copper. Open stopping is employed at the mine, together with backfilling at times at O'okiep. Ore is concentrated by flotation and transported to the nearest available smelter. O'okiep smelts its own concentrates. The Black Mountain Mine is situated in the Northern Cape near Aggeneys. The facility produces zinc concentrate together with lead and copper concentrates, from which silver is also recovered.

Development of the nearby Gamsberg zinc deposit, is currently under consideration (http://www.dwaf.gov.za/orange). There are many impacts on the environment dealing with the water quality and waste disposal from copper mining. These adverse water quality impacts are caused primarily by land disposal practices that fail to contain wastes, by run-on and run-off controls that are inadequate to prevent surface water from flowing through impoundments, or by groundwater infiltrating surface impoundments. These open-pit mining methods also can cause disturbances that can lower the water table in an area, causing water shortages, land subsidence, and fracturing. However due to the low rainfall in area the impacts on the groundwater quality are less than expected and very localized. Acid Mine Drainage, elevated TDS, SO4, and low pH with associated higher trace metal concentrations have been found at tailings dumps. A radioactive waste disposal site for low- and intermediate level waste generated at the Koeberg Nuclear Power Plant, is located north of Springbok on the flat plains of the Bushmanland plateau. Waste is buried in metal drums and solidified in concrete in the trenches. Up to date no significant contamination of the groundwater has occurred (Van Blerk, 2000). Springbok Hard Chrome is an industry located in Springbok, an incident has occurred where Cr+6 was released into the environment but no data is available on the impact the incident had on the groundwater resource. As discussed impacts on groundwater quality from the diamond mining industry in the WMA is negligible.

The Lower Orange WMA, is underlain by very diverse lithologies. Several broad lithostratigraphic units fall within the boundaries. A simplified geological map of the WMA is presented in Figure 11.

From oldest to youngest these units comprise the following (V3, 2002):

- Namaqualand-Natal Basement Complex. Rock of this complex, ranges from homogenous sillimanite through to migmatites and gneisses. The area underlain by the Namaqualand-Natal Complex is situated in the vicinity of the Orange River between Upington and Springbok. The area is an assembly of compact sedimentary, extrusive and intrusive rocks.
- Ventersdorp Supergroup, represented by andesitic lavas and occasional sedimentary rocks related to post extensive erosion, are encountered in very small 2-5 isolated inliers between Prieska and Douglas.
- Dolomitic and related carbonate rocks of the Postmasburg Group, Campbell and Griquatown Sequence, all forming part of the Griqualand West Sequence, occupy the north-eastern lobe of the WMA. Dolomites, limestones and related sedimentary rocks (often iron or manganiferous ore bearing) make up this broad lithostratigraphic unit.
- Abbabis and Kheis Groups are represented by relatively small inliers of diverse sedimentary successions consisting of shales, sandstones, banded iron formations and conglomerates. These rocks are encountered in the vicinity of Upington and are not widespread.
- Damara Sequence encountered in the immediate vicinity of Alexander Bay and Port Nolloth, is represented by the Fish River, Schwarzrand, Kuibis, Malmesbury, Gariep, Swakop, Otavi, Nosib, Rehoboth and Sinclair Groups. Lithologies in these various groups are very diverse, ranging from shales, sandstones, diamictites, banded iron formation through to limestones and calcareous sedimentary formations.
- Karoo Sequence represented by the Ecca Group and Dwyka Formation, and to a lesser extent the Beaufort Group, occupy the southern lobe of the WMA, and comprises thick successions of sedimentary rocks. Sedimentary rocks range from mudrocks through coarser varieties (sandstones, conglomerates) to diamictites and rhythmites (pleistocene deposits). Karoo or Jurassic dolerite is fairly common throughout the sequence and also frequently intrudes older rocks.
- Quaternary and Tertiary dune deposits, consisting of “Kalahari red sands”, occupy the extreme northern part of the WMA bordering on Namibia. These dune deposits are of considerable thickness and comprise fine aeolian sands with occasional coarser gravel deposits.

The geohydrology is just as complex as the geology in the area but can be simplified to four main aquifers namely the Karoo sediments, the weathered sillimanite and gneisses from the Basement complex, dolomites and associated formations and the primary aquifers such as the Kalahari sands and the alluvial deposits along streams and rivers and the coastal plains north of the Buffelsrivier. The first three of these aquifer types are typical dual porosity or secondary aquifers water associated with weathering and fracturing of the matrix. Primary aquifers are found in Kalahari sands and alluvial deposits associated with rivers and coastal plains.

At small scale a number of these aquifers are utilized mostly along dry riverbeds, Buffelsriver, Saaipoort along Carnarvon leegte, along Gamagara River, Driekop Kanhardt. In the drier west almost all abstractions from boreholes associated with a proximate riverbed. Along the Orange River some abstraction along riverbeds is also taking place (Van Dyk, 2003).

General characteristics of riverbed aquifers can be summarized as:

- Coarse gravels and sands are more typical of alluvial deposits. However, flood plains consist mainly of fine silt. Towards the end of a river's course, the river slows down dumping some of the heavier materials on these flood plains. Boreholes drilled into these types of formations normally have higher yields. It is important to note that borehole design is plays an important role in the yield of boreholes drilled into riverbed aquifers.
- Alluvial deposits grain size varies considerably, fine and coarse materials are intermixed. The hydraulic conductivities vary between 10-3 to 103 m/d and their porosities vary 12 between 25 – 70%. However, flood plain porosities usually range 35 – 50% and the hydraulic conductivities vary between 10-8 – 10-1 m/d.
- In general riverbed aquifers are high recharge areas and often recharge deeper underlying aquifers and are unconfined in nature. The surface-water groundwater interaction is often intermittent (depending on the elevation of the water level, groundwater may recharge the surface water body or the surface water may recharge groundwater). This is normally dependent on the rainfall cycle. Therefore, boreholes drilled into these aquifers are almost always successful.

<u>Groundwater-Surface Water Linkage</u>

Groundwater-surface water interaction has not been studied sufficiently in the Northern Cape due to the limited surface water. According to records documented by Van Tonder and Dennis (2003), under natural conditions there is seldom a connection between surface water and groundwater. However, observed surface water recharge in normally dry riverbeds. Current quality problems experienced in the Vaal and Orange rivers, waterlogging experienced with irrigation along these riverbanks indicate interaction. Therefore, a study is currently motivated by DWS Geohydrology to investigate Groundwater-surface water interaction in the Vaal and Orange rivers (Van Dyk, 2003).

Summarised information on groundwater is given in this section. Groundwater utilisation is of major importance across wide areas in the Lower Orange WMA and often constitutes the only source of water. It is mainly used for rural domestic supplies, stock watering and water supplies to towns off the main stem of the Orange. These resources must be properly managed and developed.

As a result of the low rainfall, recharge of groundwater is limited and only small quantities can be abstracted on a sustainable basis. Artificial recharge of groundwater is practised in some areas where water from small dams is transferred through pipelines into boreholes located in the area of recharge of the main production boreholes. Aquifer characteristics (borehole yields and storage of groundwater) are also typically unfavourable because of the hard geological formation underlying most of the water management area. In the Orange Tributaries sub-area 60% to 70% of the available water is supplied from groundwater sources.

Groundwater also constitutes an important source of water for rural water supplies in the Orange River, although only a small proportion of the total available water. Much of the groundwater abstracted near the river (Orange sub-area), is actually recharged from the river and could also be accounted for as surface water. Groundwater availability in the coastal region is extremely limited as a result of the lack of rainfall. Close to the sea there is a strong risk of seawater intrusion into coastal aquifers.
The interaction between a mining activity and groundwater is managed through the EMPR and the water use licensing process. Some impacts do exist with regard to localized dewatering of aquifers. These impacts are however localized and very little data exist in this regard. The information from the compliance monitoring systems at the mines needs to be integrated into the DWS monitoring systems and regularly reviewed. Mines utilise the groundwater available but are still largely dependent on surface water, which is in most cases supplied from the Orange River. Boreholes and abstraction from boreholes are seldom managed properly and therefore the failure of boreholes is experienced. Borehole siting needs to be based on proper geo-technical work to limit the drilling of unsuccessful boreholes. As result of this some towns have drilled many boreholes without much success.

From the list of towns and related water resources given it is evident that shortages in the supply from groundwater are experienced at Vanwyksvlei, Strydenburg, Carnarvon and Garies. Proper management and monitoring of groundwater sources by municipalities and other users are of vital importance. There is a need to provide groundwater information and to create an improved understanding of groundwater at a local level.

Municipalities should also investigate groundwater potential outside town boundaries as a possible source. Groundwater monitoring and data on the availability of groundwater in general is insufficient (DWAF, ISP Lower Orange WMA, 2004).

No drainage channels occur within the proposed mining area and there is no dendritic system which could be disturbed. Given the variability of semi-arid rainfall, the calculation of the mean annual runoff (MAR) would be of no use. The MAR is very low given the low rainfall (less than 250 mm/year) occurring mainly in the winter months, high evaporation rates, and shallow grade of the slope toward the drainage channels and the permeability of the soils. The surface water quality (when available after severe rainstorms) is suitable for animal consumption but not as potable water. No natural wetlands exist in the area.

- The proposed mining area will be further than 100 m from any natural water source.
- The proposed activities are not expected to have a negative impact on the ground water of the area.

Less than 20 m³ process water will be used per day. Water will be obtained from a borehole of the landowner. The taking and storing of water is covered by a General Authorisation in terms of section 39 of the National Water Act, 1998 (Act No. 36 of 1998). According to the authorisation no “groundwater taking zones” are excluded for “small industrial users”. This mining activity classifies as a “small industrial users” as it qualify as a work creating enterprise that do not use more than 20 cubic metres per day. Mining and quarrying are also a category identified in the Standard Industrial Classification of All Economic Activities (5th edition), published by the Central Statistics Service, 1993, as amended and supplemented as a small industry.

The applicant will however in accordance with the general authorisation adhere to Record-keeping and disclosure of information.

The general authorisation states that the water user must ensure the establishment of monitoring programmes to measure the quantity of water taken and/or stored, as follows -

a) the quantity of groundwater or surface water abstracted must be metered or gauged and the total recorded as at the last day of each month,
b) The quantity of water stored must be recorded as at the last day of each month.

Air quality

The site is situated primarily in a livestock farming area, with no ploughing within close proximity. There are currently no sources of air pollution present on site and the ambient air quality is generally considered as good. The main potential sources of air pollution in the area includes dust generated from gravel roads, domestic fuel burning and veld fires. Neighbouring farmstead (in proximity to mining area) are considered sensitive air quality receptors, but it is not anticipated that the proposed mining activated will introduce excessive pollution, (dust) to the surrounding area.

Emission into the atmosphere is controlled by the National Management: Air Quality Act, 2004. The proposed activity will however not trigger an application in terms of the Air Quality Act as the emissions to be produced will only entail dust generation due to the movement of earthmoving equipment, the loading of material and transporting of material from site.

Dust generation on the access and haul roads can be managed through the implementation of dust suppression measures via water carts and a sprinkler system. The applicant has to conduct formal dust monitoring on site to provide management with an effective management tool for mitigating the impact of the mining permit activity on the surrounding environment with regard to dust pollution.

Noise

There are currently no sources of noise pollution present on site and the ambient noise levels within the project area is representative of a rural farming district. The only noise sensitive sites are the interspaced farmhouses and associated structure in proximity to proposed mining area.

Due to the nature of the proposed activity, noise will be generated as a result of the movement of machinery and the processing of material. The nuisance value of noise generated by heavy earthmoving equipment for residence in the near vicinity is deemed to be of low-medium significance, as the mine is expected to be operational only during daylight hours, and when necessary on Saturdays. All mining related vehicles will also be equipped with silencers and maintained in a road worthy condition in terms of the National Road Traffic Act, 1996 (Act No. 93 of 1996). Noise levels will be compared against those described in *Table 16*.

Table 16: Typical rating levels for ambient noise in districts (extracted from the sans cop 10103:2003)

TYPE OF DISTRICT	EQUIVALENT CONTINUOUS RATING LEVEL, LREQ.T FOR NOISE					
	OUTDOORS			INDOORS, WITH OPEN WINDOWS		
	DAYNIGHT	DAY TIME 06:00 TO 22:00	NIGHT TIME 22:00 TO 06:00	DAYNIGHT	DAY TIME 06:00 TO 22:00	NIGHT TIME 22:00 TO 06:00
Residential Districts/ Rural Districts	45	45	35	35	35	25
Industrial districts	70	70	60	60	60	50

Archaeological and cultural interest

(Information extracted from the Heritage Impact Assessment, HCAC 2020 see Appendix M2)

GENERAL HISTORY OF THE AREA

The Stone Age:

According to the Heritage Impact Assessment (HIA) conducted by HCAC in February 2020 archaeological sites in the area around Aggeneys tend to be focused on three types of landscape features:

1. Places where water can be obtained – generally after rain storms. These include pans and low, flat bedrock outcrops that have hollows and crevices that trap water;
2. The bases of rocky hills and outcrops. These areas frequently reveal low stone-walled structures, either at the base of the hills or, less frequently, on the rocky hills; and
3. On and along sand dunes.

Beaumont et al. (1995) noted that there is a low-density background scatter of artefacts throughout Bushmanland. In the Aggeneys area, however, this scatter tends to be quite ephemeral. Within the Gamsberg inselberg, scatters of Early Stone Age (ESA) artefacts have also been recorded in open, often eroding areas (Morris 2010; Orton 2014). Morris (2010) located bedrock exposures with fissures in them that trap water after rain and sites were reported from the area to the south of Aggeneys (Morris 2013). The rocks bear grinding hollows with associated scatters of stone artefacts, pottery and ostrich eggshell located around them. To the west of Aggeneys, Orton (2016) found a very large bedrock outcrop with a pool of water collected at a low point and many grinding grooves and artefact scatters around it. Pans tend to be rare in the Aggeneys area, but Orton (in prep.) did locate a small LSA scatter alongside a pan to the south of Aggeneys. Just east of Aggeneys, Webley and Halkett (2012) examined an area to the north of the N14 and recorded many isolated artefacts, and a few occurrences of light quartz and quartzite artefact scatters. Orton (2015) worked in the same area and located an isolated heavily used, grooved double-sided lower grindstone. Morris's (2011b) nearby survey found much sand cover and only a small number of isolated quartz artefacts. Morris (2011b) notes the presence of a rock painting on a boulder at Aggeneys. The painting is a finger painting likely associated with the Khoekhoen. A small finger-painted image also lies within the Gamsberg Inselberg (Morris 2010; Orton 2014). Neither of these sites has any associated archaeological deposits, but a small rock shelter high on Gamsberg has been excavated and found to contain a deposit some 30 cm deep (Orton 2014). Sites with deep deposits are incredibly rare in Bushmanland, and sadly excavations at this site were never completed, and the deposit has not been dated.

Historical Information

The northern Bushmanland was colonised quite late with most farms only surveyed and granted in the very late 19th or even early 20th centuries. As a result, very few historical structures and features exist on the landscape. A number of surveys in the Bushmanland area have recorded possible isolated graves represented by unusual rocks (either isolated standing rocks or unnatural clusters). Two examples occur alongside a rocky koppie to the southeast of Aggeneys (Orton, in prep.), while others were seen to the west of Aggeneys (Orton 2016). These could be related to early '*trekboers'* passing through the area. Because they lived a very nomadic lifestyle, the physical traces of these early European stock farmers are extremely ephemeral. The ruins of small stone structures that are occasionally found alongside rock outcrops in Bushmanland are likely to represent huts and small livestock enclosures built either by 19th century '*trekboers*' or by early 20th century shepherds. They may have been covered with sticks and skins or by tarpaulins.

Some of the place names in the region reflect the living heritage of the Khoekhoen. Gamsberg (also Ghaamsberg), for example, derives from the Khoekhoen word meaning 'grassy spring' (Raper n.d.). There are unconfirmed historical reports that a massacre of Bushmen may have occurred in a kloof of the Gamsberg (Robinson 1978) but surveys have failed to yield any evidence of this. Morris (2013) seems confident of this event, however, and suggests that the kloof at the south-eastern edge of the inselberg was the location where the killing occurred.

Cultural Landscape:

Historical land use and the cultural landscape are linked since the cultural landscape shaped to some extent by the history of the area. Although the farm seems to have been fallow in recent years, some sort of agricultural activity no doubt took place and is evident by fences and watering holes. This is largely related to small stock but has not left much trace. The major historic aspect that left the most visible remains on the landscape is the previous Sillimanite mining activities.

Palaeontological Heritage Resources

In terms of the paleontological component, the general study area is indicated as of insignificant or low significance on the SAHRIS Palaeontological sensitivity map, and no further studies are required for this aspect.

Also refer to Part A (3)(h)(iv)(1)(c)(iii) Site Specific Archaeological and Cultural Interest.

Visual exposure

The visual character of the surrounding areas comprises of a rural landscape with an agricultural setting, intersected by farming infrastructure, the N14 national road, and the towns of Aggeneys (to the south) and Pella (to the east). The Orange River that also forms the border between South Africa and Namibia passes the study area ±23 km to the north. The aesthetic ambiance of the area is that of a rural area with highly natural landscapes.

Regional socio economic structure

Khâi-Ma Local Municipality falls within the Namakwa District of the Northern Cape Province. Khâi-Ma lies in the central north region of the Namakwa District, which is the furthest north in terms of the provincial boundaries. The Northern Cape is spatially the largest province in the country, but also has the lowest population and some of the least developed areas in terms of its economic and social development. The Khâi-Ma Municipality is classified as a Category B municipality, and was proclaimed as a local municipality with a council combined with a ward participatory system. The Khâi-Ma Municipality is deemed to be a low capacity municipality, and shares executive and legislative authority with the Namakwa District Municipality. The municipal area is demarcated into four wards (Khai-Ma, 2017).

The situational analysis and statistics presented in this chapter indicate the developmental challenges facing Khâi-Ma Municipality, such as poverty, unemployment, and service delivery backlogs. The programmes and projects in this IDP are informed by this scenario (Khai-Ma, 2017).

(a) Demographic Profile

The population for Khâi-Ma is estimated at 11 340 people (2001). The municipality is sparsely populated (+/- 1 person/km^2); most people are settled in its five (5) towns. The municipality is characterized by vast tracts of land, pristine natural environment, unique mountains and its limited cell phone reception, which can be regarded as a unique attraction by some urban dwellers who wish to escape the rush of the cities. This inherent potential for eco-tourism needs to be exploited and managed in a sustainable manner in order to retain this unique setting.

(b) Population Distribution

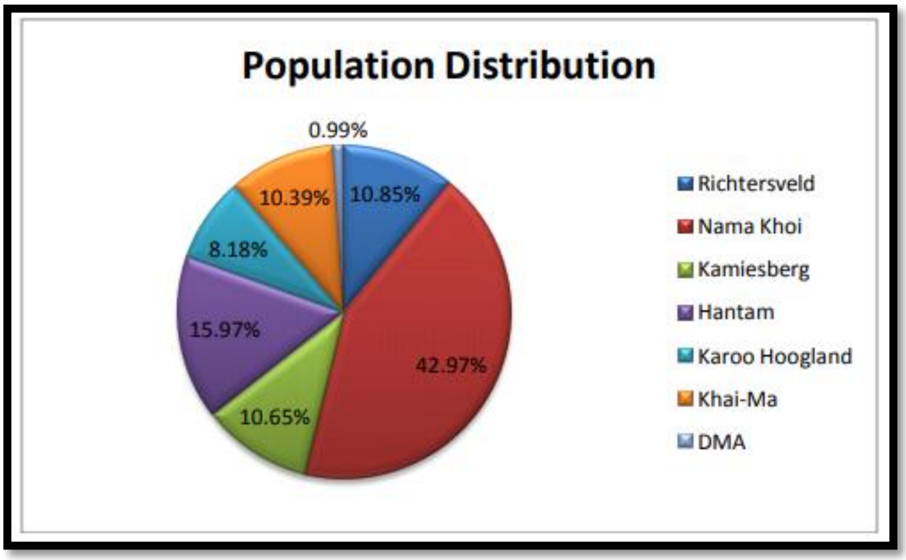


Figure 20: Population Distribution

(c) Households per town

Table 17: Household figures

Household figures per urban area.		
Towns	Population	Current households
Aggeneys	2053	666
Khâi-Ma rural	4035	1404
Onseepkans	912	204
Pella	1425	355
Pofadder	2919	733
TOTALS	**11344**	**3362**

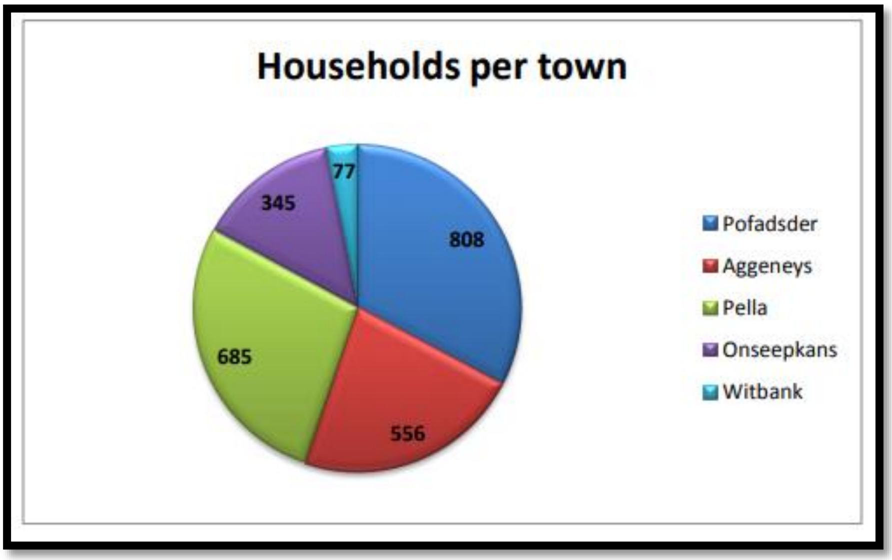


Figure 21: Households per town

Table 18: Population and Household trends.

Population and Household trends						
Khâi-Ma	Population			Households		
	1996	2001	2007	1996	2001	2007
	Statistics SA	Statistics SA	Community Survey	Statistics SA	Statistics SA	Community Survey
	9355	11344	12571	2223	3362	3787
% Increase/Decrease	n/a	21.26%	10.82%	n/a	51.24%	12.64%

CURRENT REALITY: BASIC FACTS & FIGURES

The Municipal Area is divided into 4 wards	
Ward 1	Onseepkans and it includes: Vrugbaar, Raap & Skraap, Pella Brak and Rooiklippe.
Ward 2	Blyvooruitsig and Pofadder.
Ward 3	Pella and it includes: Witbank, Klein Pella.
Ward 4	Aggeneys includes Pofadder town area and Dwaggasoutpan.

The Municipal Council of Khâi-Ma consists of 7 members. 4 represents wards and three (3) are proportional representatives of political parties. The ruling party in all the wards is the ANC.

(d) Age and Gender

Table 19: Age

Age	Male	Female
0 to 4	567	493
5 to 14	1157	1083
15 to 34	2208	1844
35 to 64	1652	1646
Over 65	254	333
Total	5838	5399

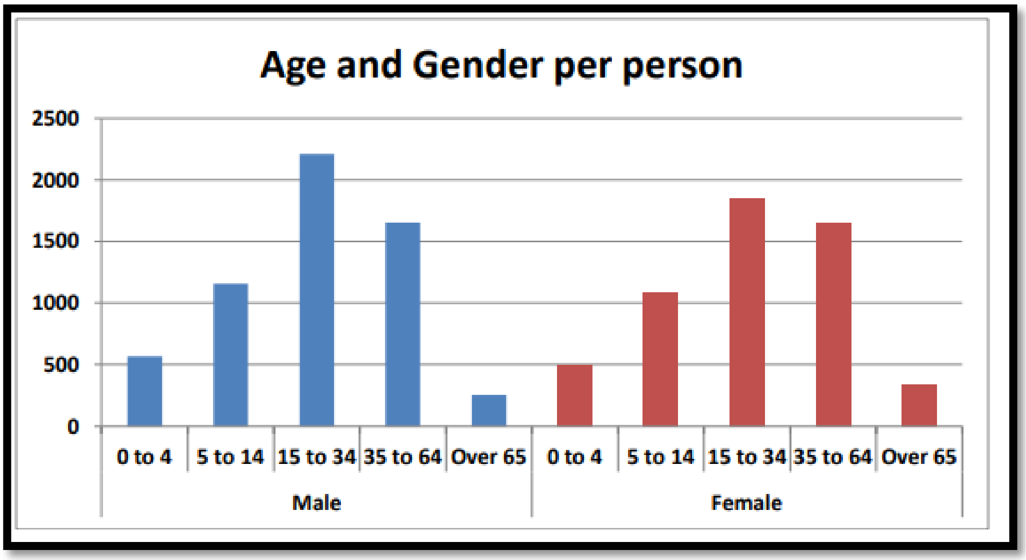


Figure 22: Age and Gender per person

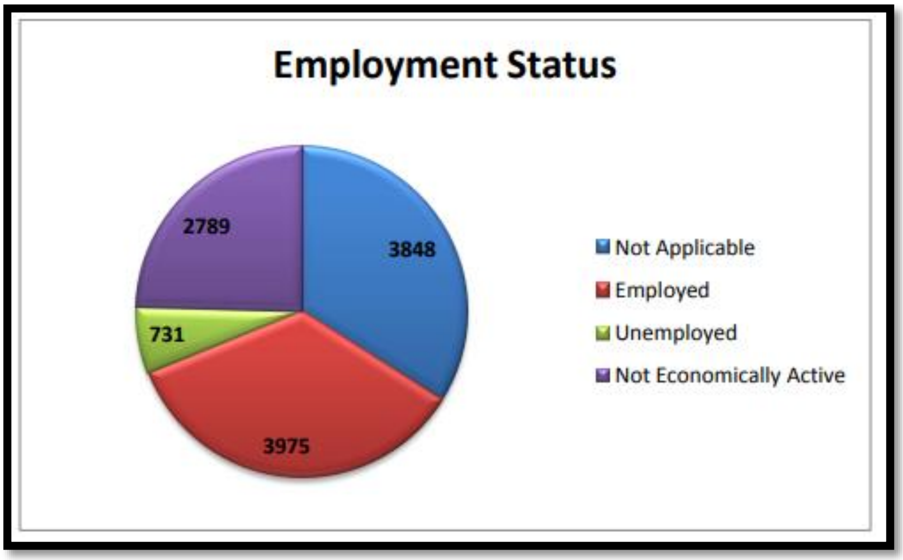


Figure 23: Employment status

(e) Employment status

Table 20: Labour force

Status	Male	Female
Employed	2589	1386
Unemployed	331	400
Not Economically Active	960	1829
Total Labour Force	3880	6315

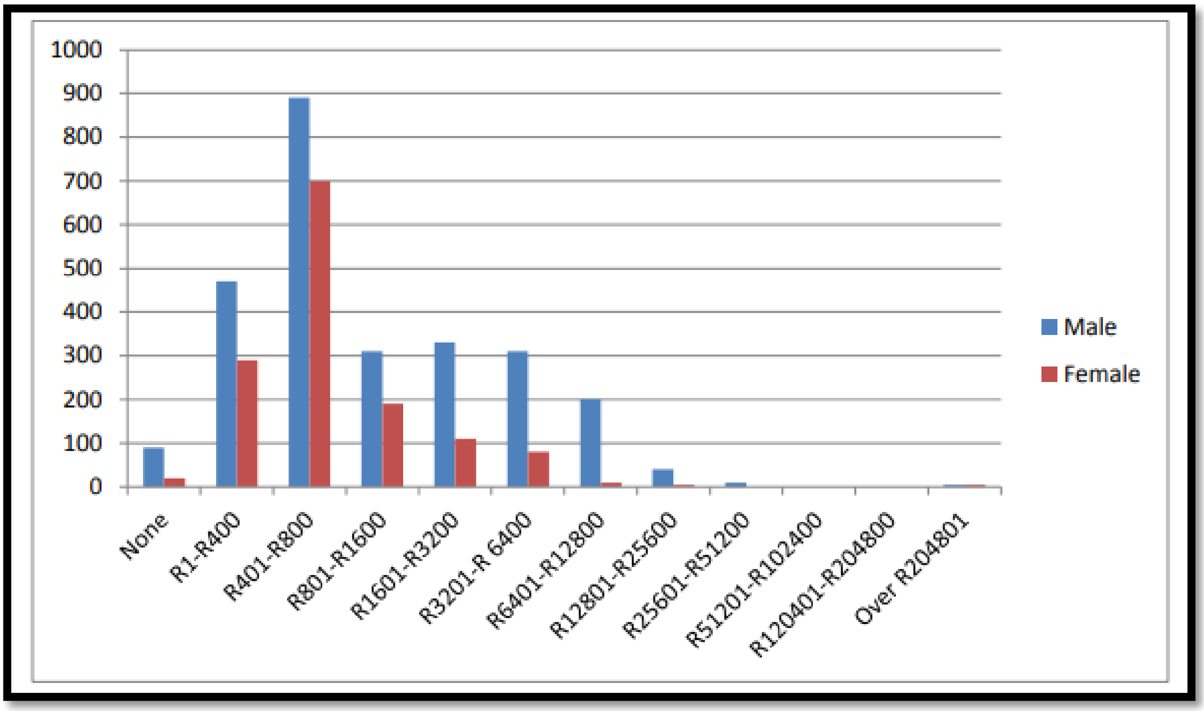


Figure 24: Salary per income.

(f) Education

Table 21: Industry monthly income

Income	Male	Female
None	76	23
R1 – 400	462	285
R401 – 800	882	688
R801 – 1600	301	179
R1601 – 3200	324	116
R3201 – 6400	313	80
R6401 – 12800	188	13
R12801 – 25600	40	3
R25601 – 51200	12	0
R51201 – 102400	0	0
R102401 – 204800	0	0
Over R204801	6	3

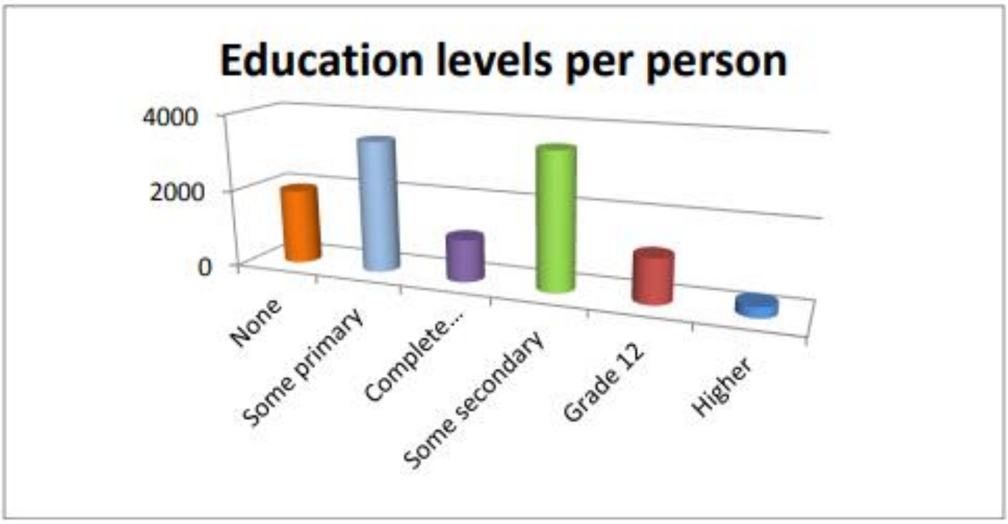


Figure 25: Education levels for person

Table 22: Education

Education Level	Persons
None	1942
Some primary	3399
Complete primary	1091
Some secondary	3497
Grade 12	1141
Higher	274

(g) Employment per industry

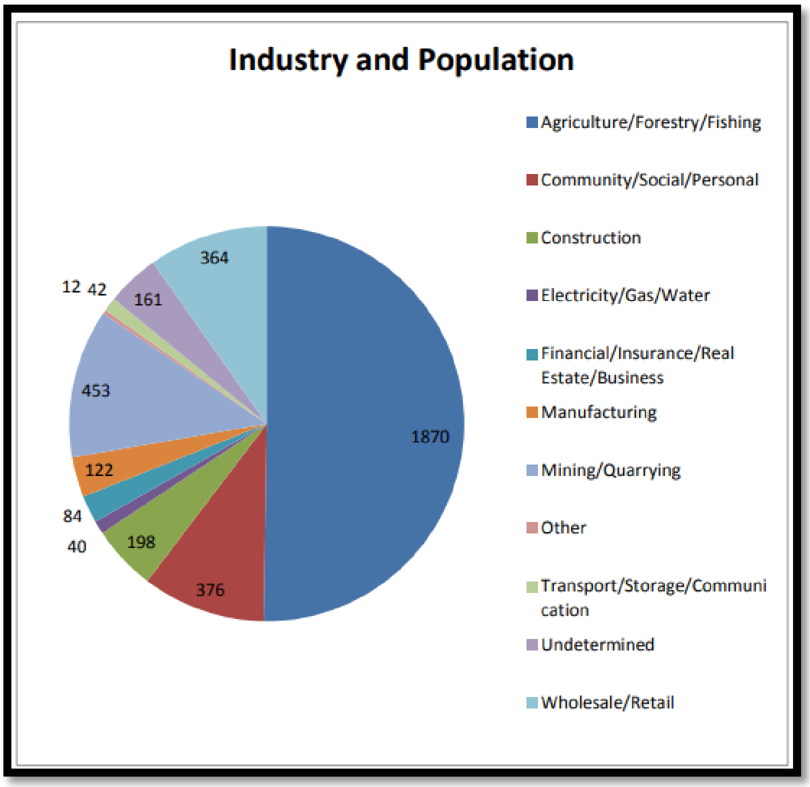


Figure 26: Industry and Population

Table 23: Employment distribution per person

Industry	Population
Agriculture/Forestry/Fishing	1870
Community/Social/Personal	376
Construction	198
Electricity/Gas/Water	40
Financial/Insurance/Real Estate/Business	84
Manufacturing	122
Mining/Quarrying	453
Other	12
Transport/Storage/Communication	42
Undetermined	161
Wholesale/Retail	364

JJD Van Zyl intends to employ up to six (6) workers at the proposed extension area. The workers will be sourced from the local community as far as practicable depending on skill and expertise. Workers will daily be transported to the site. The material to be sourced from the mining area can be used for the upgrading of the road infrastructure in the vicinity of the site, and can therefore contribute to infrastructure development and indirectly to the economy of the area.

(b) Description of the current land uses.

The farm Koenabib 43 is situated in an agricultural setting, intersected by road, rail, telephone lines and electrical infrastructure. The land use of the property comprises of the following:

- Agriculture – Grazing
- Mining – Historic mining.

JJD Van Zyl intends submitting a S102 amendment application to extend the current mining footprint and add commodities to the mining permit. The extension area encompasses an area that was previously used for sillimanite mining. Mining of the old mine dumps will be temporary where after the land use will revert to grazing.

There are no tourism destinations in the immediate vicinity of the proposed mining area (15 km radius). The main land use of the surrounding properties (>20 km from the mining area) comprises of the following:

- Agriculture - Grazing, and Date Farming
- Mining - Black Mountain, Gamsberg, Aggeneys
- Tourism - Various Campsites (e.g. Klein Pella, Amam Melkbos)
- Conservation - Gamsberg Nature Reserve

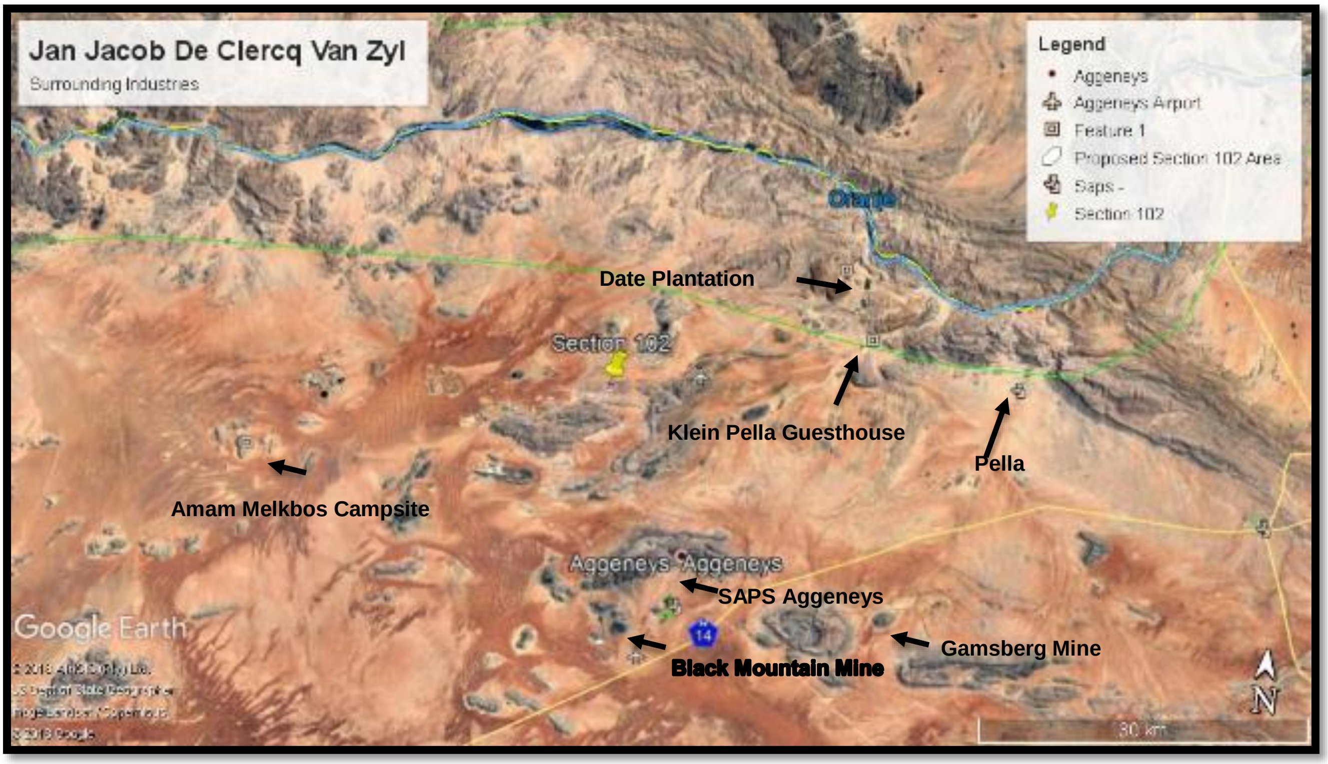


Figure 27: Land use in the vicinity of the Koenabib mine

The following table provides a description of the land uses and/or prominent features that currently occur within a 500 m radius of the site:

Table 24: Land uses and/or prominent features that occur within 500 m radius of the site.

LAND USE CHARACTER	YES	NO	DESCRIPTION
Natural area	YES	-	The study area is surrounded by natural areas used some of which are used for agricultural purposes.
Low density residential	-	NO	
Medium density residential	-	NO	
High density residential	-	NO	
Informal residential	-	NO	
Retail commercial & warehousing	-	NO	
Light industrial	-	NO	
Medium industrial	-	NO	
Heavy industrial	-	NO	
Power station	-	NO	
Telecoms Tower	-	NO	
High voltage power line	-	NO	
Office/consulting room	-	NO	
Military or police base / station / compound	-	NO	
Spoil heap or slimes dam	YES	-	Old mines dumps is evident in the area, left by previous prospectors/miners. The mining method entails the re-mining of old mine dumps.
Quarry, sand or borrow pit	-	NO	
Dam or reservoir	-	NO	
Hospital/medical centre	-	NO	

LAND USE CHARACTER	YES	NO	DESCRIPTION
School/ crèche	-	NO	
Tertiary education facility	-	NO	
Church	-	NO	
Old age home	-	NO	
Sewage treatment plant	-	NO	
Train station or shunting yard	-	NO	
Railway line	-	NO	
Major road (4 lanes or more)	-	NO	
Airport	-	NO	
Harbour	-	NO	
Sport facilities	-	NO	
Golf course	-	NO	
Polo fields	-	NO	
Filling station	-	NO	
Landfill or waste treatment site	-	NO	
Plantation	-	NO	A date plantation is located approximately 23 km north from the mining area.
Agriculture	YES	-	As mentioned earlier the proposed mining area is situated within an area used for grazing purposes.
River, stream or wetland	-	NO	
Nature conservation area	-	NO	
Mountain, hill or ridge	YES	-	The proposed mining area is situated in undulating ridges.
Museum	-	NO	
Historical building	-	NO	
Protected Area	YES	-	The Gamsberg Nature Reserve lays to the south-east.
Graveyard	-	NO	
Archaeological site	-	NO	
Other land uses (describe)	-	NO	

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

Site Specific Topography

The topography of the mining area on Portion 1 of the farm Koenabib 43 can be described as plains with adjacent open high hills or ridges. The elevation of the JJD Van Zyl mining operation ranges between 904 m and 924 m above sea level

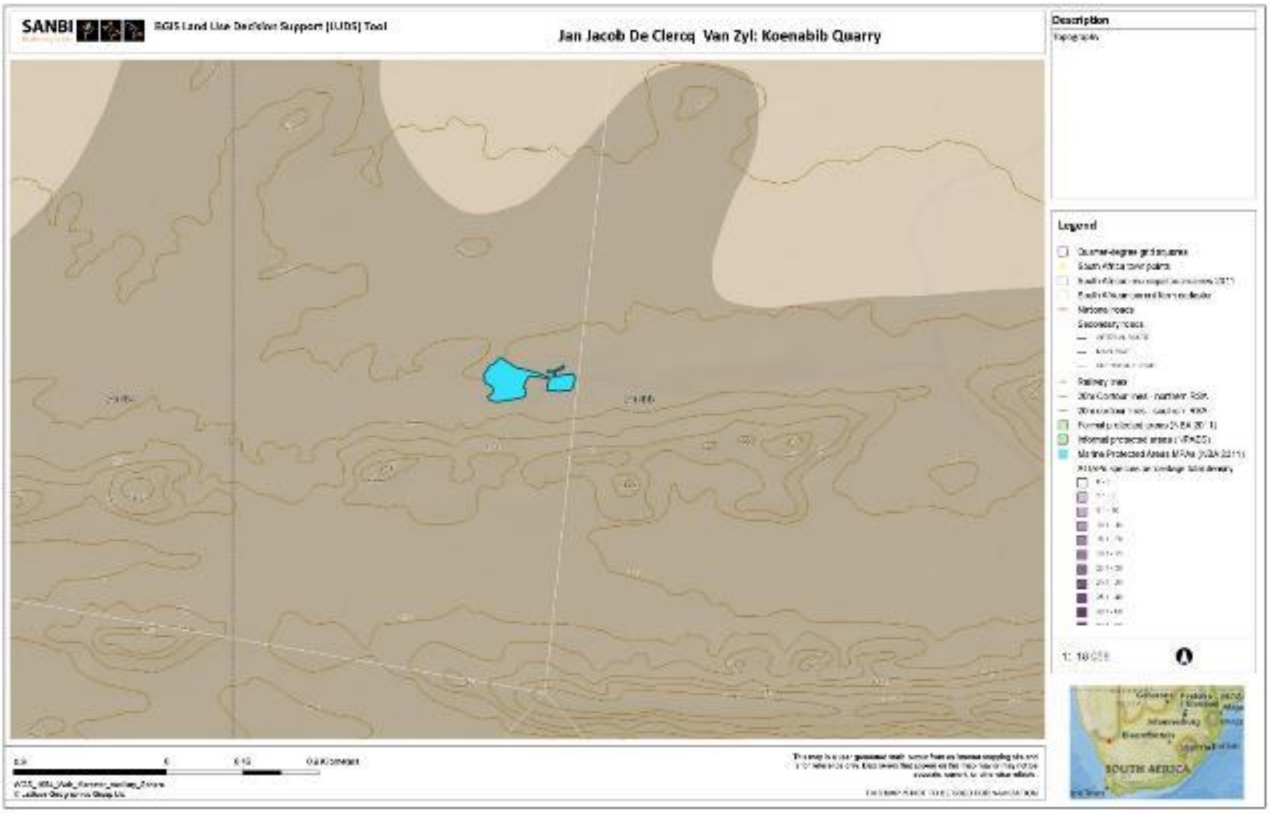


Figure 28: Contour Map (SANBI, 2019).

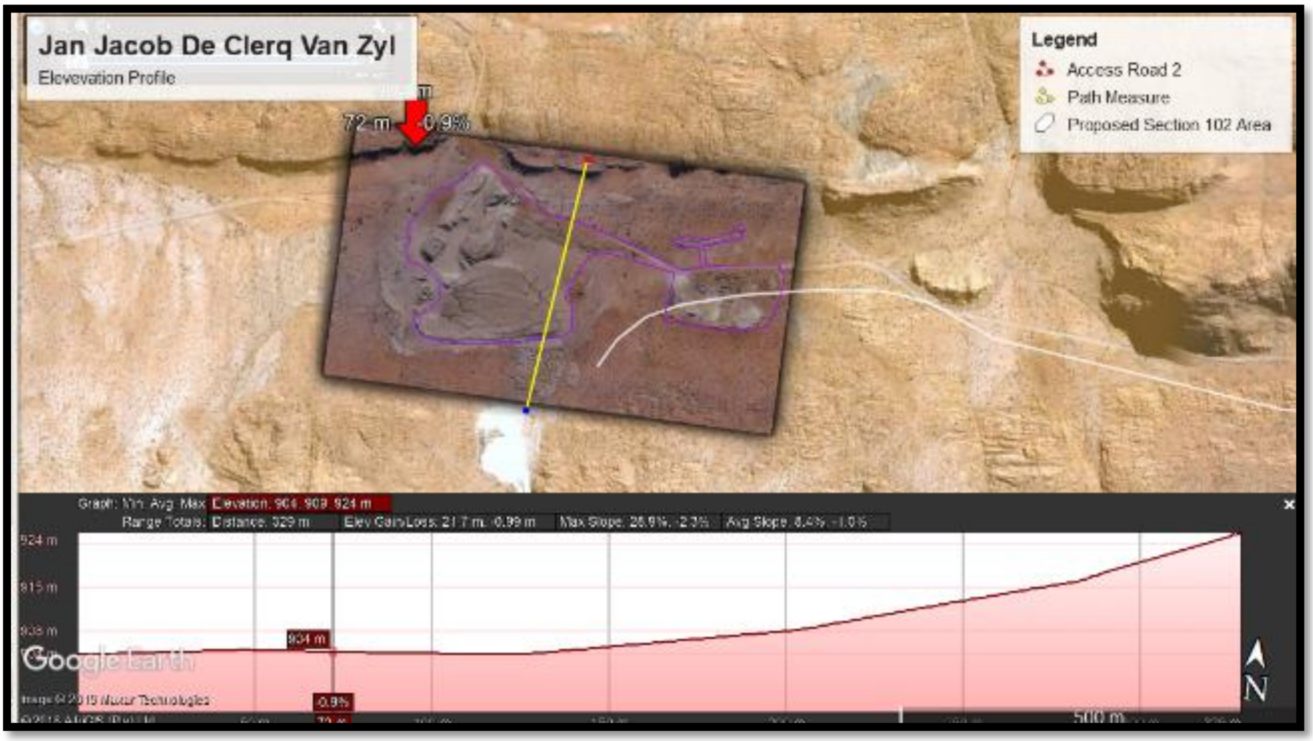


Figure 29: Elevation Profile

Site Specific Soil, Land Use and Land Capability

The soils of most of the area are red-yellow apedal soils, with a high base status and <300mm deep, typical of Ag and Ae land types. The soils are typically weakly structured with low organic content. These soils drain freely which results in a soil surface susceptible to erosion, especially wind erosion when the vegetation cover is sparse and gulley erosion in areas where storm-water is allowed to concentrate. The soils in the area are generally not suitable for dry land crop production therefore the pre-mining land capacity is categorized as Class III grazing land. The productivity of the area is very low at 8 – 10 ha/SSU.

Site Specific Flora

(Information extracted from the Botanical Study and Assessment, Nkurenkuru Ecology & Biodiversity January 2020 attached as Appendix M1)

The vegetation of the study site resembles a severely modified and transformed form of Eastern Gariep Rocky Desert surrounded by mostly natural vegetation. Disturbances and modifications are mainly due to historical mining activities and access roads. Although there were some smaller scale variations in the plant communities present on site, notably due to the site lying in between two elevated ridges running almost parallel in an east-west direction, the vegetation of the site has been classified as a single type and indeed the vegetation on site is relatively uniform overall. As mentioned, the main part of the site has already been heavily transformed and disturbed, and vegetation in the disturbed areas is very sparse. The south facing slope of the northern ridge is lower in altitude than the southern ridge, and has a slightly higher content of quartzite rocks, which form gritty / gravel patches along the foot slope section.

The dominant plants on both ridges is *Euphorbia gregaria*, with scattered individuals of *Aloidendron dichotomum* (previously known as *Aloe dichotoma*), *Boscia albitrunca, B. foetida, Portulacaria fruticulosa, P. namaquensis*, and *Commiphora capensis*. *Portulacaria namaquensis* and *Commiphora capensis* typically occupy the upper slopes of the ridges, especially within the southern ridge.

The quartzite gravel patches comprise of dwarf succulents and shrubs such as *Anacampseros namaquensis, A. papyracea*, *Eriocephalus microphyllus* and *Acanthopsis disperma*. A total of about 34 plant species were observed on site. There was little turnover across the site and the vegetation overall was relatively uniform.

The level of invasion by invasive alien plants (IAPs) are extremely low with no IAPs identified within the study site.

During the site survey no listed Red Data floral species were recorded within the surveyed site. A total of nine (9) species were however recorded which are protected within either National Forest Act or within the Northern Cape Nature Conservation Act (refer to the Botanical Study attached as Appendix M1).

The Botany Study concluded that it is highly unlikely that this development will have an impact on the status of the Ecosystem and Vegetation Types due to the limited extent of the mine as well as the presence of already disturbed areas within the footprint. Furthermore, this mine will not have a significant impact on the services and functions provided by the surrounding natural habitats and development within this area and is regarded as acceptable.

In terms of local-level biodiversity, the site is not exceptional and the site is not highly sensitive in this regard, as there are no unique, threatened of otherwise unique habitats present which are not widely available in the wider landscape. As a result, the majority of impacts associated with the development of the site are likely to be local in nature and not of wider significance. Although there are a number of nationally or provincially protected species at the site, none of these are rare and the loss of the affected individuals from the development footprint would not be of wider significance or compromise the viability of the local populations of these species.

In terms of the likely botanical impacts associated with the mine, impacts on vegetation during the operation phase are likely to be relatively moderate (rated mostly as medium significance prior to mitigation) and are difficult to mitigate as little can be done to avoid the large amounts of disturbance associated with this phase of the development. As the affected vegetation type is relatively widespread and the footprint area is regarded as limited in extent and placed within an already, largely transformed and disturbed area, the impact on vegetation, as already mentioned, is likely to be of locally high intensity but is not considered to be of broader significance. Potential cumulative impacts are also furthermore regarded limited and of low significance due to small footprint sizes of all the proposed borrow pits as well as the location of these borrow pits within largely transformed and disturbed habitats.

Subsequently the proposed development area is largely well located in terms of avoiding sensitive receptors and the development will not compromise the survival of any specific flora or terrestrial vertebrate species on the study area or beyond if mitigation measures are fully implemented.

"From a botanical perspective, no objective or motives (identification of impacts of high significance, etc.) were identified which would hinder the establishment of the proposed mine. Activities and Impacts are regarded as acceptable from a botanical perspective and will not cause detrimental impacts to the local flora, located within the affected area and surroundings. Therefore, it is the opinion of the specialist that the development may be authorised, subject to the implementation of the recommended mitigation measures". (Botha 2020.)

Site Specific Fauna

The site specific fauna of the study area represents the fauna of the surrounding environment, and no protected or red data species were identified to be resident within the proposed footprint area.

The fauna at the site will not be impacted on by the proposed extension activity as they will be able to move away or through the site, without being harmed. Workers must be educated and managed to ensure that no fauna at the site is harmed.

Site Specific Surface Water

As shown in the figure below, according to the BGIS: National Wetlands and NFEPA map there are no significant rivers, wetlands or wetland clusters within the proposed extension area.

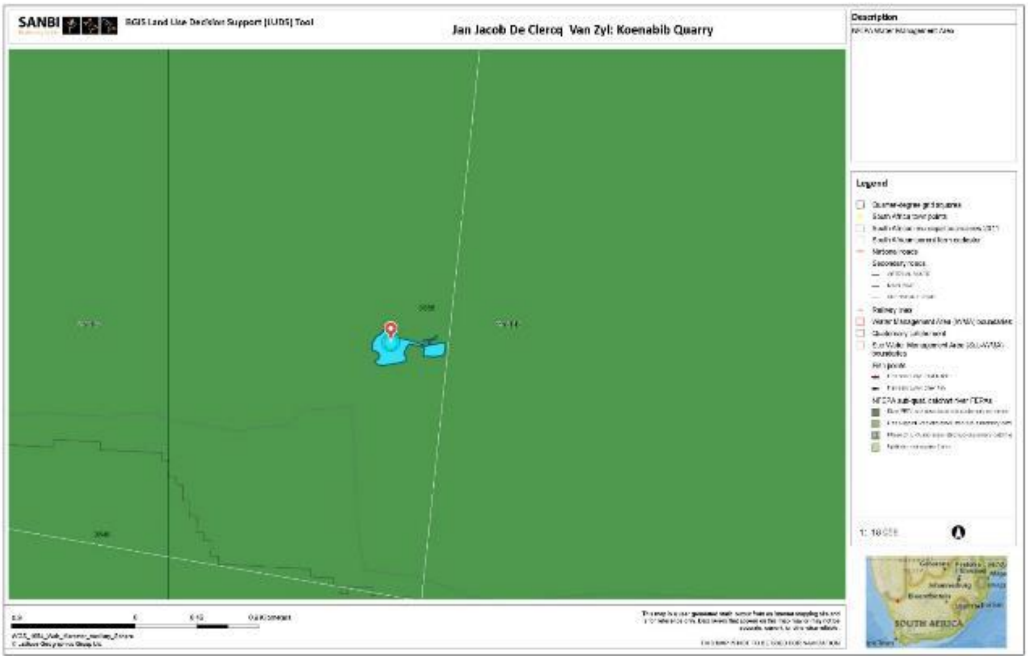


Figure 30: Location of the proposed extension area within a River NFEPA (dark green). (Image obtained from the SANBI BGIS: National Wetlands and NFEPA Map Viewer)

The area does fall within a River NFEPA (National Freshwater Ecosystem Priority Area) (dark green in the figure above). The River NFEPA is associated with the Orange River that passes the property to the North along the South African border. This application will not have an impact on the Orange River or the tributaries supporting the river and therefore should the applicant implement the management and mitigation measures proposed in this document no impact on the integrity of the NFEPA's could be identified.

Site Specific Ground water

Water in the area is a scarce commodity. A detailed groundwater study was not compiled for the S102 application, as the operation will not make use of groundwater, however numerous windmills in the area where observed showing the use and importance of groundwater in the area. Due to the location, nature and the geology of the site compared with the slope, the potential of the mining operation impacting the groundwater of the area is deemed of low possibility.

As mentioned earlier, JJD Van Zyl water will be bought from the local municipality that will be stored on site in Jo-Jo tanks.

Site Specific Air quality

Emission into the atmosphere is controlled by the National Environmental Management: Air Quality Act, 2004. The proposed mining activity does not trigger an application in terms of the said act, and emissions to be generated is expected to mainly entail dust due to the displacement of soil and transport of material on gravel roads.

The nearest residential dwelling to the proposed mining area is a farm house of the adjacent landowner approximately 6.2 m north-west of the mining area. As the prevalent wind direction is in a south-south-eastern direction. Should the Applicant however implement the mitigation measures proposed in this document and the EMPr the impact on the air quality of the surrounding environment is deemed to be of low-medium significance.

Figure 31: Proximity to neighbours

Site Specific Noise

The noise generated at the Koenabib mine already contributes to the daily noise levels of the farm as a result of the processing, loading, and transporting of material. The nuisance value of noise generated by heavy earthmoving equipment, to residence in the near vicinity is deemed to be of low significance.

Although the proposed activity will have a cumulative impact on the ambient noise levels, the development is not within close proximity to sensitive receptors and, and the impact is therefore deemed of low significance.

Site Specific Archaeology and Cultural Interest

(Information extracted from the Heritage Impact Assessment, HCAC 2020).

The HIA concluded that the study area has been impacted on by existing mining and the dumping of topsoil, clearing and levelling as well as evidence of previous mining trenches characterise the study area. All of these activities would have impacted on surface indicators of heritage resources if these ever existed in the study area. The likelihood of heritage resources ever occurring in the study area is doubtful as the site is located away from focal points that would have attracted humans in antiquity. The ridges in the surrounding area of mica-sillimanite schists do not seem to have been conducive to the formation of rock shelters, and no rock art or archaeological sites of significance were recorded in the study area.

The larger area is not void of archaeological material though and a single archaeological find spot was recorded **outside** of the study area. The find spot consist of two miscellaneous quartz flakes and fragments of ostrich egg shell that is located at the base of a small ridge approximately 50 meters to the north of the study area. The artefacts are rolled and probably washed down from a small overhang higher up on the ridge. A careful inspection of the overhang revealed a rocky floor with no deposit. Although no sites were recorded in the study area the recorded artefacts provide evidence of the use of the wider area by Later Stone Age communities. The artefacts are isolated, out of context, and are of no significant apart from recording it in this report.

The survey also did not reveal any historical farm steads, colonial era stone-walling (dwellings or kraals), graves or other sites of significance. Human impact (apart from the existing mining and dumps) is limited to isolated farming infrastructure like farm fences, wind pumps and tracks.

In terms of the paleontological component, the general study area is indicated as of insignificant or low significance on the SAHRIS Palaeontological sensitivity map, and no further studies are required for this aspect.

Site Specific Visual Exposure

The proposed extension area will mainly be visible within close proximity (±1 km radius) of the footprint towards the west as well as some of the higher laying areas to the north. The figure below shows the viewshed analysis for the footprint within a ±10 km radius. The green shaded areas shows the positions from where the mining area will be visible. From this analysis it is proposed that the visual impact of the proposed operation will be of very low significance, especially as no permanent structures will be constructed. Should the Applicant successfully rehabilitate the mining area (upon closure), no residual visual impact will remain.

Figure 32: View shed of the proposed extension area.

(d) Environmental and current land use map.

(Show all environmental and current land use features)

The environmental and current land use map is attached as Appendix D.

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

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

The following potential impacts were identified of each main activity in each phase. The significance rating was determined using the methodology as explained under *vi) Methodology Used in Determining and Ranking the Significance*. The impact rating listed below was determined for each impact **prior** to bringing the proposed mitigation measures into consideration. The degree of mitigation indicates the possibility of partial, full or no mitigation of the identified impact.

Table 25: Impact Assessment of JJD Van Zyl Section 102 Amendment Application

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
CONSTRUCTION / SITE ESTABLISHMENT PHASE												
ACTIVITY:	**DEMARCATION OF SITE WITH VISIBLE BEACONS.**											
Site Establishment	No impact could be identified other than the beacons being outside the boundaries of the approved mining area.	Neu										
ACTIVITY:	**ESTABLISHMENT OF TEMPORARY BUILDINGS AND INFRASTRUCTURE WITHIN BOUNDARIES OF SITE.**											
Site Establishment	If the infrastructure is established within the boundaries of the approved mining area, no impact could be identified.	Neu										
Social & Safety	Influx of unsuccessful job seekers which may informally settle in area. Potential danger to surrounding communities	Neg	Reversible	1	1	4	2	3	5	3	6	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Geology	Disturbance of geological strata	Neg	Irreversible	1	3	5	3	5	5	5	15	Med- High
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	2	4	2	3	5	4	9,33	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Topography	Alteration of topography	Pos	Irreversible	1	2	5	3	2	5	4	9.33	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	2	2	2	3	3	3	5	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	4	1	1	1	3,67	Low
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	4	3	4	5	5	12	Med
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	3	5	4	10,7	Med
SUB ACTIVITY: ABLUTION FACILITIES												
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med
Soils	Portable toilets Potential harm through sewage leaks	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
SUB ACTIVITY: ACCESS ROADS												

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	4	3	4	5	5	12	Med
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med
SUB ACTIVITY: SITE OFFICES												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
SUB ACTIVITY: VEHICLE SERVICE AREA												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med
SUB ACTIVITY: WASH BAY												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med
SUB ACTIVITY: WORKSHOP												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment. Potential loss of protected or red data plant species.	Neg	Reversible	1	2	4	2	3	5	4	9,33	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med
SUB ACTIVITY: SALVAGE YARD												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med
SUB ACTIVITY: BUNDED DIESEL AND OIL STORAGE FACILITIES												
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
SUB ACTIVITY: GENERATOR AREA (BUNDED)												
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
SUB ACTIVITY: WEIGH BRIDGE												

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	4	3	4	5	5	12	Med
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med
SUB ACTIVITY: PARKING AREA												
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med
SUB ACTIVITY: WASTE AREA												

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	3	5	4	10,7	Med
ACTIVITY:	**STRIPPING AND STOCKPILING OF TOPSOIL**											
Geology	Disturbance of geological strata	Neg	Irreversible	1	3	5	3	5	5	5	15	Med- High
Hazardous Waste	Contamination of area with hydrocarbons or hazardous waste materials	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment. Potential loss of protected or red data plant species.	Neg	Reversible	1	2	4	2	3	5	4	9,33	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Topography	Alteration of topography	Pos	Irreversible	1	2	5	3	2	5	4	9.33	Low-Med
Land Use	Veld fire might seriously impact on surrounding land-use (livestock / irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming.	Neg	Reversible	1	2	2	2	3	3	3	5	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	4	1	5	3	11	Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust generation.	Neg	Reversible	2	2	4	3	4	5	5	12	Med
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites, and refugia. Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	3	5	4	10,7	Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
OPERATIONAL PHASE												
ACTIVITY:	**RE-MINING OF OLD MINE DUMPS**											
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Hazardous Waste	Contamination of area with hydrocarbons or hazardous waste materials.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	2	4	2	3	5	4	9,33	Low-Med
Topography	Alteration of topography	Pos	Irreversible	1	2	5	3	2	5	4	9.33	Low-Med
Geology	Disturbance of geological strata	Neg	Irreversible	1	3	5	3	5	5	5	15	Med- High
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	2	2	2	3	3	3	5	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	4	1	5	3	11	Med
Air quality	Dust generation	Neg	Reversible	2	2	4	3	4	5	5	12	Med
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites, and refugia. Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	3	5	4	10,7	Med
Social & Safety	Potential danger to surrounding communities Unsafe working environment for the employees. Safety risk posed by unsloped areas.	Neg	Reversible	1	4	4	3	3	3	3	9	Low-Med
Geology	Disturbance of geological strata.	Neg	Irreversible	1	3	5	3	5	5	5	15	Med- High
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment.	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
ACTIVITY:	**CRUSHING AND SCREENING OF SILLIMANITE AND AGGREGATES**											
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med
Air quality	Dust generation	Neg	Reversible	2	2	4	3	4	5	5	12	Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites, and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	3	5	4	10,7	Med
Surface water	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
ACTIVITY:	**TRANSPORTATION OF SILLIMANITE AND AGGREGATES FROM STOCKPILE AREA TO CLIENTS**											
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	5	4	7	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust generation	Neg	Reversible	2	2	4	3	4	5	5	12	Med
Traffic and Safety	Road degradation. Increased potential for road incidences. Potential distraction to road users.	Neg	Reversible	2	2	4	3	3	2	3	6,67	Low-Med
Groundwater	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
DECOMMISSIONING PHASE												
ACTIVITY:	**SLOPING, LANDSCAPING AND REPLACEMENT OF TOPSOIL OVER DISTURBED AREA (FINAL REHABILITATION)**											
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	4	2	3	9	Low-Med
Soils	Soils replaced and ameliorated	Pos	Reversible	1	3	4	3	3	5	4	10,7	Med

Nature of Impact	**Impact**	**Positive/Negative/ Neutral Impact**	**Reversibility**	**Extent**	**Severity**	**Duration**	**Consequence**	**Probability**	**Frequency**	**Likelihood**	**Significance**	**Mitigation Rating**
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment. Potential loss of protected or red data plant species.	Neg	Reversible	1	2	4	2	3	5	4	9,33	Low-Med
Topography	Alteration of topography	Pos	Irreversible	1	2	5	3	2	5	4	9.33	Low-Med
Land Use	Veld fire might seriously impact on surrounding land-use (livestock / irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming.	Neg	Reversible	1	2	2	2	3	3	3	5	Low-Med
Visual aspect	Improved aesthetics through rehabilitation	Pos	Reversible	2	1	3	2	2	5	4	7	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	4	3	4	5	5	12	Med
Fauna	Reintroduction of fauna attracted to flora to the area	Pos	Reversible	2	2	4	3	3	5	4	10,7	Med
Fauna	Reintroduction of fauna attracted to flora to the area	Pos	Reversible	2	1	3	2	1	5	3	6	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Groundwater	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	2	3	5	3	4	2	3	10	Med
ACTIVITY: Application for Closure Certificate												

(1) Cumulative Impacts

Table 26: Cumulative Impact Assessment of JJD Van Zyl – Koenabib Mine

Nature of Impact	Impact	Positive/Negative / Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating	Mitigation
CONSTRUCTION, OPERATIONAL AND DECOMMISSIONING PHASES													
Traffic & Safety	Increased potential for road incidences	Neg	Reversible	2	3	1	2	3	1	2	4	Low	All intersections with main tarred roads will be clearly signposted. Drivers will be enforced to keep to set speed limits. Trucks will be in road-worthy condition with reflective strips.
Traffic & Safety	Road degradation	Neg	Reversible	1	3	1	1,6	2	1	1,5	2,5	Low	Storm water must be diverted around the access roads to prevent erosion. Erosion of access road: Vehicular movement must be restricted to existing access routes to prevent crisscrossing of tracks through undisturbed areas. Rutting and erosion of the access road caused as a result of the mining activity must be repaired by the applicant.
Noise	The noise impact must be contained within the boundaries of the property, and will represent the current noise levels of the farm.	Neg	Reversible	1	1	2	1,3	1	5	3	4	Low	**Noise Handling:** The applicant must ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. No loud music may be permitted at the mining area. All mining vehicles must be equipped with silencers and maintained in a road worthy condition in terms of the Road Transport Act.

Nature of Impact	Impact	Positive/Negative / Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating	Mitigation
Air quality	Increased dust generation will impact on the air quality of the receiving environment.	Neg	Reversible	2	2	4	2,6	4	5	4,5	12	Med	**Dust Handling:** • During periods of high wind spells, the stockpiles must be dampened to control dust emission. • The liberation of dust into the surrounding environment must be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. • The site manager must ensure continuous assessment of all dust suppression equipment to confirm its effectiveness in addressing dust suppression. • Speed on the access roads must be limited to 40km/h to prevent the generation of excess dust. • All roads will be sprayed with water or an environmental friendly dust-allaying agent that contained PCB's (e.g. DAS products/ Pro/base) at regular intervals to ensure that dust is adequately suppressed in the mining roads. • All disturbed or exposed areas will be re-vegetated as soon as possible during the operational phase to prevent any dust source from being created. • A fall out and nuisance dust monitoring programme could be submitted to the principle inspector of mines (DMR-Northern Cape) on an annual basis if required. If any complaint is received form the public or state department regarding dust levels, the fall-out and nuisance dust levels will again be monitored at prescribed monitoring points. The result will then be compiled into monthly reports and forwarded to the Director-Occupational Hygiene. • Fallout dust will be monitored via a fallout dust bucket system on the boundaries of the mining area.
Air quality	Emissions will be contained within the property boundaries and will therefore affect only the landowner.	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med	**Emission Handling:** • All vehicles will be regularly services to ensure they are in proper working condition and to reduce risk of excessive emissions.

Cumulative effects are caused by the accumulation and interaction of multiple stresses affecting the parts and the functions of ecosystems. Of particular concern is the knowledge that ecological system sometimes changes abruptly and unexpectedly in response to apparently small incremental stresses. For purposes of this report, cumulative impacts have been defined as **"the changes to the environment caused by an activity in combination with other past, present, and reasonably foreseeable human activities".**

Generally, as the sites are in non-existence and no major additional environmental impacts are expected, the cumulative impacts will generally be of medium significance.

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

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

A “significant impact” is defined as it is defined in the EIA Regulations (2014): “an impact that may have a notable effect on one or more aspects of the environment or may result non-compliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as by its duration, magnitude, intensity or probability of occurrence”. The objective of this EIA methodology is to serve as framework for accurately evaluating impacts associated with current or proposed activities in the biophysical, social and socio-economical spheres. It aims to ensure that all legal requirements and environmental considerations are met in order to have a complete and integrated environmental framework for impact evaluations.

The process of determining impacts to be assessed is one of the most important parts of the environmental impact assessment process. It is of such high importance because the environmental impacts identified can and are often linked to the same impact stream.

In this method all impacts on the biophysical environment are assessed in terms of the overall integrity of ecosystems, habitats, populations and individuals affected. The Environmental Impact Assessment (EIA) 2014 Regulations promulgated in terms of Sections 24 (5), 24M and 44 of the National Environmental Management Act (NEMA) (Act No. 107 of 1998) [as amended] requires that all identified potential impacts associated with the proposed project be assessed in terms of their overall potential significance on the natural, social and economic environments.

The criteria identified in the EIA Regulations (2014) include the following:

- Nature of the impact;
- Extent of the impact;
- Duration of the impact;
- Probability of the impact occurring;
- Degree to which impact can be reversed;
- Degree to which impact may cause irreplaceable loss of resources;
- Degree to which the impact can be mitigated; and
- Cumulative impacts.

Greenmined Environmental has developed an impact assessment methodology (as defined below) whereby the significance of a potential impact is determined through the assessment of the relevant temporal and spatial scales determined of the extent, magnitude and duration criteria associated with a particular impact.

This method does not explicitly define each of the criteria but rather combines them and results in an indication of the overall significance.

DEFINITIONS AND CONCEPTS:

Environmental significance:

The concept of significance is at the core of impact identification, evaluation and decision-making. The concept remains largely undefined and there is no international consensus on a single definition. The following common elements are recognised from the various interpretations:

- Environmental significance is a value judgement;
- The degree of environmental significance depends on the nature of the impact;
- The importance is rated in terms of both biophysical and socio-economic values; and
- Determining significance involves the amount of change to the environment perceived to be acceptable to affected communities.

Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of acceptability) (DEAT (2002) Impact Significance, Integrated Environmental Management, Information Series 5).

The concept of risk has two dimensions, namely the consequence of an event or set of circumstances, and the likelihood of particular consequences being realised (Environment Australia (1999) Environmental Risk Management).

(1) Methodology that will be used

(a) Nature of the impact

The nature of an impact can be defined as “a brief description of the impact being assessed, in terms of the proposed activity or project, including the socio-economic or environmental aspect affected by this impact”.

(b) Extent of the impact

The extent of an impact can be defined as “a brief description of the spatial influence of the impact or the area that will be affected by the impact”.

Table 27: Determining the extent of an impact

EXTENT Extent or spatial influence of impact	**Footprint**	Only as far as the activity, such as footprint occurring within the total site area
	Site	Only the site and/or 500m radius from the site will be affected
	Local	Local area / district (neighbouring properties, transport routes and adjacent towns) is affected
	Region	Entire region / province is affected
	National	Country is affected

(c) Severity of the impact

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment.

Table 28: Rating of Severity

TYPE OF CRITERIA	**RATING**				
	1	**2**	**3**	**4**	**5**
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small / Potentially harmful	Significant/ Harmful	Great/ Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance/ Easily reversible	Low cost to mitigate	Substantial cost to mitigate/ Potential to mitigate impacts/ Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate/ Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Moderate change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

(d) Duration of the impact

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Table 29: Rating of Duration

RATING		DESCRIPTION
1	Very Short Term	Up to three months (quarter) after construction
2	Short Term	Three months to one year after construction
3	Medium Term	One year to six years after construction
4	Long Term	Six to ten years after construction
5	Permanent	Beyond ten years after construction

(e) Probability of the impact occurring

The probability of an impact can be defined as "the estimated chance of the impact happening". Probability refers to how often the activity or aspect has an impact on the environment.

Table 30: Determining the probability of an impact

PROBABILITY	**1**	Almost never / almost impossible	Impossible to occur (0 – 20% probability of occurring)
	2	Very seldom / highly unlikely	Unlikely to occur (20 -40% probability of occurring)
	3	Infrequent / unlikely / seldom	May occur (40-60% chance of occurring)
	4	Often / regularly / likely / possible	Likely to occur (60-80% chance of occurring)
	5	Daily / highly likely / definitely	Will certainly occur (80-100% chance of occurring)

(f) Degree to which impact can be reversed

The reversibility of an impact can be defined as "the ability of an impact to be changed from a state of affecting aspects to a state of not affecting aspects".

Table 31: Determining the reversibility of an impact

REVERSIBILITY	**Reversible**	Impacts can be reversed through the implementation of mitigation measures
	Irreversible	Impacts are permanent and can't be reversed by the implementation of mitigation measures

(g) Determination of Likelihood

The irreplaceability (likelihood) of an impact can be defined as "the amount of resources that can/can't be replaced". The determination of likelihood is a combination of Duration and Probability. Each factor is assigned a rating of 1 to 5, as described below and in tables 6 and 7.

(h) Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2.

Table 32: Calculation of overall likelihood

CONSEQUENCE	RATING
Duration	Example 4
Probability	Example 2
SUBTOTAL	**6**
TOTAL LIKELIHOOD (Subtotal divided by 2)	**3**

(i) Determination of Overall Environmental Significance:

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence X Overall Likelihood

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of **LOW**, **LOW-MEDIUM**, **MEDIUM**, **MEDIUM-HIGH** or **HIGH**, as shown in the table below.

Table 33: Overall Environmental Significance

SIGNIFICANCE OR RISK	LOW	LOW-MEDIUM	MEDIUM	MEDIUM-HIGH	HIGH
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 – 19.9	20 - 25

Based on the above, the significance rating scale has been determined as follows:

High	Of the highest order possible within the bounds of impacts which could occur. In the case of negative impacts, there would be no possible mitigation and / or remedial activity to offset the impact at the spatial or time scale for which it was predicted. In the case of positive impacts, there is no real alternative to achieving the benefit.
Medium-High	Impacts of a substantial order. In the case of negative impacts, mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these. In the case of positive impacts, other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.
Medium	Impact would be real but not substantial within the bounds of those, which could occur. In the case of negative impacts, mitigation and / or remedial activity would be both feasible and fairly easily possible, in case of positive impacts; other means of achieving these benefits would be about equal in time, cost and effort.

Low-Medium	Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and / or remedial activity would be either easily achieved of little would be required, or both. In case of positive impacts alternative means for achieving this benefit would likely be easier, cheaper, more effective, less time-consuming, or some combination of these.
Low	Impact would be negligible. In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap and simple. In the case of positive impacts, alternative means would almost all likely be better, in one or a number of ways, than this means of achieving the benefit
Insignificant	There would be a no impact at all – not even a very low impact on the system or any of its parts.

(j) Determination of Overall Consequence

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: ***Severity/Intensity, and Extent/Spatial Scale***. Each factor is assigned a rating of 1 to 5, as described in the tables above.

(k) Degree to which the impact can be mitigated

The degree to which an impact can be mitigated can be defined as "the effect of mitigation measures on the impact and its degree of effectiveness".

Table 34: Determining the mitigation rating of an impact

MITIGATION RATING	**MITIGATED Degree impact can be mitigated**	High	Impact 100% mitigated
		Medium	Impact >50% mitigated
		Low	Impact <50% mitigated

(l) Cumulative Impacts

The effect of cumulative impacts can be described as "the effect the combination of past, present and "reasonably foreseeable" future actions have on aspects".

Table 35: Determining the confidence rating of an impact

CUMULATIVE RATING	**CUMULATIVE EFFECTS**	Low	Minor cumulative effects
		Medium	Moderate cumulative effects
		High	Significant cumulative effects

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

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

The proposed extension of the mining area was determined to have an overall medium to no negative impact, and will be planned taking the concerns of the consulted parties in consideration. Any alterations to the site layout or mining and mining related activities will not result in a lesser significant impact on the environment, but rather add to it. No alternative sites were investigated, as this is an amendment of the current EMPR. The current mining area was identified during the assessment phase of the environmental impact assessment (2016 assessment), by the applicant and project team, and was therefore selected as the preferred alternative due to the following:

<u>Positive Aspects:</u>

- The mining site offers the mineral sought after;
- The proposed sites were previously used for mining activities, thus minimal environmental damage will occur;
- The mining site is more than 20 km away for the town of Aggeneys, and will not affect the community with regards to dust and noise;
- The mining area can be reached by an existing farm road that connects to a provincial gravel road. No new road infrastructure need to be constructed;
- Due to the small size of the activity and the remote location of the mining area the potential impacts on the surrounding environment, associated with mining is deemed to be of low significance; and
- No residual waste as a result of the mining activity will be produced that needs to be treated on site. Any general waste that may be produced on-site will be contained in sealed refuse bins to be transported to the local municipal landfill site. The amount of hazardous waste to be produced at the site will be minimal and will mainly be as a result of accidental leakage. Contaminated soil (contained in sealed bins) will be collected from site by a hazardous waste handling removal company to be disposed of at a registered hazardous waste handling site.

<u>Negative Impacts:</u>

- Due to the remote location of the mining area very little negative impacts on the community could be identified that were deemed to be of significant importance. The dust and noise impacts, that may emanate from the mining area during the operational phase, could have a negative impact on the surrounding community if the mitigation measures proposed in this document are not implemented and managed on-site; and

- Negative impacts with regard to the environment include potential contamination of the area due to spillage of hydrocarbon products.

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

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

Visual Mitigation:

The risk of the proposed mining activity having a negative impact on the aesthetic quality of the surrounding environment can be reduced to a low – medium risk through the implementation of the mitigation measures listed below:

- The site needs to have a neat appearance and be kept in good condition at all times.
- Upon closure the site needs to be rehabilitated to insure that the visual impact on the aesthetic value of the area is kept to a minimum.

Dust Handling:

The risk of dust, generated from the proposed mining activity, having a negative impact on the surrounding environment can be reduced to being low through the implementation of the mitigation measures listed below:

- The liberation of dust into the surrounding environment must be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents.
- The site manager must ensure continuous assessment of all dust suppression equipment to confirm its effectiveness in addressing dust suppression.
- Speed on the access roads must be limited to 40km/h to prevent the generation of excess dust.
- All roads will be sprayed with water or an environmental friendly dust-allaying agent that contained PCB's (e.g. DAS products/ Pro/base) at regular intervals to ensure that dust is adequately suppressed in the mining roads.
- All disturbed or exposed areas will be re-vegetated as soon as possible during the operational phase to prevent any dust source from being created.
- A fall out and nuisance dust monitoring programme could be submitted to the principle inspector of mines (DMR-Northern Cape) on an annual basis if required. If any complaint is received form the public or state department regarding dust levels, the fall-out and nuisance dust levels will again be monitored at prescribed monitoring points. The result will then be compiled into monthly reports and forwarded to the Director-Occupational Hygiene.

- Fallout dust will be monitored via a fallout dust bucket system on the boundaries of the mining area.

Noise Handling:

The risk of noise, generated from the proposed mining activity, having a negative impact on the surrounding environment can be reduced to being low-medium through the implementation of the mitigation measures listed below:

- The applicant must ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours.
- No loud music may be permitted at the mining area.
- All mining vehicles must be equipped with silencers and maintained in a road worthy condition in terms of the Road Transport Act, 1996 (Act No 93 of 1996).
- Best practice measures shall be implemented in order to minimize potential noise impacts.
- A qualified occupational hygienist must be contracted to quarterly monitor and report on the personal noise exposure of the employees working at the mine. The monitoring must be done in accordance with the SANS 10083:2004 (Edition 5) sampling method as well as NEM:AQA, 2004, SANS 10103:2008.

Management of weed or invader plants:

The risk of weeds or invader plants invading the disturbed area can be reduced to being low through the implementation of the mitigation measures listed below:

- A weed and invader plant control management plan must be implemented at the site to ensure eradication of all listed invader plants in terms of the National Environmental Biodiversity Act [NEMBA] (Act No. 10 of 2004) Alien and Invasive Species Regulation GNR 598 and 599 of 2014 Species regarded as need to be eradicated from the site on final closure.
- Management must take responsibility to control declared invader or exotic species on the rehabilitated areas. The following control methods can be used:
  - "The plants can be uprooted, felled or cut off and can be destroyed completely."
  - "The plants can be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide."
  - The temporary topsoil stockpiles need to be kept free of weeds.

Storm water Handling:

The risk of contamination through dirty storm water escaping from work areas, or erosion or loss of stockpiled topsoil caused due to uncontrolled storm water flowing through the mining area can be reduced to being low through the implementation of the mitigation measures listed below:

- Storm water must be diverted around the topsoil heaps, and access roads to prevent erosion and loss of material.
- Mining must be conducted only in accordance with the Best Practice Guideline for small scale mining that relates to storm water management, erosion and sediment control and waste management, developed by the Department of Water and Sanitation (DWS), and any other conditions which that Department may impose:
- Runoff water must be diverted around the site areas with trenches and contour structures to prevent erosion of the work areas.
- Clean water (e.g. rainwater) must be kept clean and be routed to a natural watercourse by a system separate from the dirty water system. You must prevent clean water from running or spilling into dirty water systems.
- Dirty water must be collected and contained in a system separate from the clean water system.
- Dirty water must be prevented from spilling or seeping into clean water systems.
- The storm water management plan must apply for the entire life cycle of the mining activity and over different hydrological cycles (rainfall patterns).
- The statutory requirements of various regulatory agencies and the interests of stakeholders must be considered and incorporated into the management plan.
- Any erosion problems within the borrow pit area as a result of the mining activities observed should be rectified immediately and monitored thereafter to ensure that they do not re-occur.
- Mining within steep slopes will need to ensure that adequate slope protection is provided.
- All bare areas resulting from the development should be re-vegetated, post-operation, with locally occurring species, to bind the soil and limit erosion potential.
- Roads and other disturbed areas within the project area should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring to assess the success of the remediation.
- Silt/sediment traps/barriers should be used where there is a danger of topsoil or material stockpiles eroding and entering downstream drainage lines and other sensitive areas.
- These sediment/silt barriers should be regularly maintained and cleared so as to ensure effective drainage of the areas
- Topsoil should be removed and stored separately from subsoil. Topsoil should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.
- Stockpiles must be protected from erosion, stored on flat areas where possible, and be surrounded by appropriate berms.
- Any erosion points created during construction should be filled and stabilized immediately.

- Practical phased development and vegetation clearing should be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time.
- Construction of gabions and other stabilisation features must be undertaken to prevent erosion, where deemed necessary.

Handling of Hazardous Materials and Substances:

- All hazardous materials or substances must be stored in a closed storage facility with an impermeable floor.
- The storage area must meet the following conditions:
  - The storage area must be constructed on a level area to prevent offsite migration of any spilled product.
  - The floor of the storage area must be impermeable to prevent seepage of spilled products into the ground or ground water.
  - The storage area must be out of the 1:100-year flood line or further than 100m from the edge of a watercourse, whichever is greatest.
  - The facility must be such that access to the materials/substances can only take place with the prior notification of an appropriate staff member.
- All fuel storage tanks must have secondary containment in the form of an impermeable bund wall and base within which the tanks sits, raised above the floor, on plinths. This bund capacity must be sufficient to contain 110% of the tank's maximum capacity.
- The distance and height of the bund wall relative to that of the tank must also be taken into consideration to ensure that any spillage does not result in oil spouting beyond the confines of the bund.
- The site manager must establish a formal inspection routine to check all equipment in the bund area, as well as the bund area itself for malfunctions or leakages. The bund area must be inspected at least weekly and any accumulated rainwater removed. All valves and outlets must be checked to ensure that they are intact and closed securely.
- The bund base must slope towards a rainwater sump of sufficient size.
- Contaminated water may not be allowed to mix with clean water, and contained until it can be collected by a registered hazardous waste handling contractor or be disposed of at a registered hazardous waste handling facility.
- Drip trays must be available to be place underneath all stationary equipment or vehicles.
- The layer of material at the vehicle service area must be removed and if contaminated with hazardous substances such as hydrocarbons must be disposed of as hazardous waste by an appropriately qualified waste handling contractor. The compacted areas must be ripped and the topsoil returned over the area.
- The site must be cleared of all hazardous substances once decommissioning has been completed and must be disposed of by an appropriately qualified waste handling contractor.

Waste Management:

The risk of waste generation having a negative impact on the surrounding environment can be reduced to being low through the implementation of the mitigation measures listed below:

- No waste stockpile area may be established outside the boundaries of the mining area.
- Vehicle maintenance may only take place within the service bay area of the off-site workshop.
- The diesel bowser needs to be equipped with a drip tray at all times. Drip trays have to be used during each and every refuelling event.
- The nozzle of the bowser needs to rest in a sleeve to prevent dripping after refuelling.
- Site management must ensure drip trays are cleaned after each use. No dirty drip trays may be used on site.
- Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from the site, either for resale or for appropriate disposal at a recognised facility.
- Spills must be cleaned up immediately to the satisfaction of the Regional Manager by removing the spillage together with the polluted soil and by disposing it at a recognised facility. Proof must be filed.
- Suitable covered receptacles must be available at all times and conveniently placed for the disposal of waste.
- Non-biodegradable refuse such as glass bottles, plastic bags, metal scrap, etc., must be stored in a container with a closable lid at a collecting point and collected on a regular basis and disposed of at a recognised landfill site. Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the mine area.
- Biodegradable refuse generated must be handled as indicated above.
- Water from the wash bay must drain into the oil sump from where it must be removed by an approved contractor.
- Drip trays must be available to be place underneath all stationary equipment or vehicles.
- Waste material of any description, including receptacles, scrap, rubble and tyres, must be removed entirely from the mining area and disposed of at a recognized landfill facility once decommissioning has been completed. It will not be permitted to be buried or burned on the site.

Management of Health and Safety Risks:

The health and safety risk, posed by the proposed mining activity can be reduced to being low through the implementation of the mitigation measures listed below:

- Workers must have access to the correct personal protection equipment (PPE) as required by law.
- All operations must comply with the Mine Health and Safety Act, 1996 (Act No 29 of 1996).

Protection of fauna and flora:

The risk on the fauna and flora of the footprint area as well as the surrounding environment, as a result of the proposed mining activity, can be reduced to being low through the implementation of the mitigation measures listed below:

- The site manager must ensure that no fauna is caught, killed, harmed, sold or played with.
- Workers must be instructed to report any animals that may be trapped in the working area.
- No snares may be set or nests raided for eggs or young.
- Pre-construction walk-through of the final mining footprint, by a suitably qualified botanist, for species of conservation concern that would be affected (also to comply with the Northern Cape Nature Conservation Act and DENC/DAFF permit conditions).
- Pre-construction walk-through must also be conducted of the final access route with emphasis on the areas of the route that will traverse narrow twin tracks and areas that will have to be upgraded.
- Permits must be kept on-site and in the possession of the flora search and rescue team at all times.
- Pre-construction environmental induction for all staff on site must be provided to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas, etc.
- Contractor's EO must provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place.
- Blanket clearing of vegetation must be limited to the proposed mining footprint and associated infrastructure. No clearing outside of the minimum required footprint to take place.
- Topsoil must be stripped and stockpiled separately during site preparation and replaced over disturbed areas on completion.
- Ensure that laydown areas, construction camps, and other temporary use areas are located in areas of low sensitivity and are properly fenced or demarcated as appropriate and practically possible.
- All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas must be allowed.
- No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purposes without express permission from the Contractor's EO and without the relevant permits.
- No fires must be allowed on-site.

- After the operation, rehabilitate an acceptable vegetation layer according to rehabilitation recommendations as provided within a site-specific Rehabilitation Plan compiled by a suitably qualified botanist.
- Rehabilitation progress, erosion and I&AP monitoring must occur simultaneously post-operational phase and must occur biannual for a minimum of two years.

Management of Access Roads:

The risk on the condition of the roads, as a result of the proposed mining activities, can be reduced to being low-medium through the implementation of the mitigation measures listed below:

- Storm water must be diverted around the access roads to prevent erosion.
- Erosion of access road: Vehicular movement must be restricted to existing access routes to prevent crisscrossing of tracks through undisturbed areas. Rutting and erosion of the access road caused as a result of the mining activity must be repaired by the applicant.
- On completion of mining operations, the surface of these areas, if compacted due to hauling and dumping operations, must be scarified to a depth of at least 300 mm and graded to an even surface condition and the previously stored topsoil must be returned to its original depth over the area.

Topsoil Handling:

The risk of loss of topsoil can be reduced to being low through the implementation of the mitigation measures listed below:

- Where applicable the first 300 mm of topsoil must be removed in strips and stored along the boundary of the mining area. Stockpiling of topsoil must be done to protect it from erosion, mixing with overburden or other material. The topsoil must be used to cover the rehabilitated area and improve the establishment of natural vegetation.
- The temporary topsoil stockpiles must be kept free of weeds.
- Topsoil stockpiles must be placed on a levelled area and measures must be implemented to safeguard the piles from being washed away in the event of heavy rains/storm water.
- Topsoil heaps must not exceed 1.5 m in order to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen.
- Should natural vegetation not establish on the heaps within 6 months of stockpiling it must be planted with an indigenous grass species.
- Storm- and runoff water must be diverted around the topsoil stockpiles and access roads to prevent erosion.

Archaeology/Palaeontological/Cultural Aspects:

The impact on archaeological, heritage and palaeontological aspects, as a result of the proposed mining activities, can be reduced to being negligible through the implementation of the mitigation measures listed below:

- All mining must be confined to the development footprint area.
- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area.
- The senior on-site Manager must inform the ECO of the chance find and its immediate impact on operations. The ECO must then contact a professional archaeologist for an assessment of the finds who must notify the South African Heritage Resources Agency (SAHRA) and/or the McGregor Museum (Kimberley). The following information must be supplied:
  - A description of the nature of the find.
  - Detailed images of the finds (with scale included).
  - Position of the find (GPS) and depth.
  - Digital images of the context. (with scales).
- Work may only continue once the go-ahead was issued by SAHRA.

ix) Motivation where no alternative sites were considered.

As mentioned earlier, no other alternative sites needed to be investigated, as this is an amendment of the current EMPR. The current site was identified during the assessment phase of the environmental impact assessment (2016 assessment), by the applicant and project team, and was therefore selected as the preferred alternative.

x) Statement motivating the alternative development location within the overall site.

(Provide a statement motivating the final site layout that is proposed)

As mentioned earlier, JJD Van Zyl currently holds a mining permit over 0.7 ha of Portion 1 of the farm Koenabib 43. Site Alternative 1 entails the extension of the 0.7 ha area to 5 ha. Site Alternative 1 was identified as the **preferred option** due to the following:

- The mining site offers the mineral sought after;
- The identified minerals are already in loose sillimanite, aggregate and stone gravel form and therefore no blasting is needed;

- The proposed sites were previously used for mining activities, thus minimal environmental damage will occur;
- The mining area can be reached by an existing farm road that connects to a provincial gravel road. No new road infrastructure need to be constructed;
- Due to the small size of the activity and the remote location of the mining area the potential impacts on the surrounding environment, associated with mining is deemed to be of low significance; and
- No residual waste as a result of the mining activity will be produced that needs to be treated on site. Any general waste that may be produced on-site will be contained in sealed refuse bins to be transported to the local municipal landfill site. The amount of hazardous waste to be produced at the site will be minimal and will mainly be as a result of accidental leakage. Contaminated soil (contained in sealed bins) will be collected from site by a hazardous waste handling removal company to be disposed of at a registered hazardous waste handling site.
- The re-mining of the old mine dumps will have the following positive outcome:
  - An approximate area of 1.2 ha is expected to be processed over a period of 2 years. This will bring about the systematic reduction of the historically abandoned mining area.

i) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity.

(Including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures)

During the impact assessment process the following potential impacts were identified of each main activity in each phase. An initial significance rating (listed under v) Impacts and Risks Identified) was determined for each potential impact should the mitigation measures proposed in this document not be implemented on-site. The impact assessment process then continued in identifying mitigation measures to address the impact that the proposed mining activity may have on the surrounding environment.

The significance rating was again determined for each impact using the methodology as explained under *vi) Methodology Used in Determining and Ranking the Significance*. The impact ratings listed below was determined for each impact **after** bringing the proposed mitigation measures into consideration and therefore represents the final layout/activity proposal.

Table 36: Impact Assessment of the JJD Van Zyl Section 102 Amendment Application

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
CONSTRUCTION / SITE ESTABLISHMENT PHASE												
ACTIVITY:	**DEMARCATION OF SITE WITH VISIBLE BEACONS.**											
Site Establishment	No impact could be identified other than the beacons being outside the boundaries of the approved mining area.	Neu										
ACTIVITY:	**ESTABLISHMENT OF TEMPORARY BUILDINGS AND INFRASTRUCTURE WITHIN BOUNDARIES OF SITE.**											
Site Establishment	If the infrastructure is established within the boundaries of the approved mining area, no impact could be identified.	Neu										
Social & Safety	Influx of unsuccessful job seekers which may informally settle in area. Potential danger to surrounding communities	Neg	Reversible	1	1	4	2	2	5	3	6	Low-Med
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	4	2	2	2	3	3	5,83	Low-Med
Topography	Alteration of topography	Pos	Irreversible	1	1	5	2	1	5	5	11.7	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	1	2	1	2	3	3	3,33	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	4	1	1	1	3,67	Low
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	2	1	2	4	Low
SUB ACTIVITY: ABLUTION FACILITIES												
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Soils	Portable Toilets Potential harm through sewage leaks	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
SUB ACTIVITY: ACCESS ROADS												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: SITE OFFICES												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
SUB ACTIVITY: VEHICLE SERVICE AREA												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: WASH BAY												

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: WORKSHOP												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	4	2	2	2	3	3	5,83	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: SALVAGE YARD												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: BUNDED DIESEL AND OIL STORAGE FACILITIES												
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
SUB ACTIVITY: GENERATOR AREA (BUNDED)												
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4.5	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Noise	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3.33	Low
SUB ACTIVITY: WEIGH BRIDGE												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: PARKING AREA												
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: WASTE AREA												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	2	1	2	4	Low
ACTIVITY:	**STRIPPING AND STOCKPILING OF TOPSOIL**											
Hazardous Waste	Contamination of area with hydrocarbons or hazardous waste materials	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	4	2	2	2	3	3	5,83	Low-Med
Topography	Alteration of topography	Pos	Irreversible	1	1	5	2	1	5	3	7	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	1	2	1	2	3	3	3,33	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	4	1	3	2	7,33	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust generation	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	2	1	2	4	Low
OPERATIONAL PHASE												
ACTIVITY:	**RE-MINING OF OLD MINE DUMPS**											
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Hazardous Waste	Contamination of area with hydrocarbons or hazardous waste materials	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	4	2	2	2	3	3	5,83	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Topography	Alteration of topography	Pos	Irreversible	1	1	5	2	1	5	3	7	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	1	2	1	2	3	3	3,33	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	4	1	3	2	7,33	Low-Med
Air quality	Dust generation	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	2	1	2	4	Low
Social & Safety	Potential danger to surrounding communities Unsafe working environment for the employees. Safety risk posed by unsloped areas.	Neg	Reversible	1	4	1	2	2	1	2	3	Low
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment.	Neg	Reversible	2	2	1	2	2	3	3	4.17	Low
ACTIVITY:	**CRUSHING AND SCREENING OF SILLIMANITE AND SILLIMANITE AND AGGREGATE**											

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Air quality	Dust generation	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	2	1	2	4	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Surface water	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
ACTIVITY:	**TRANSPORTATION OF SILLIMANITE AND SILLIMANITE AND AGGREGATE FROM STOCKPILE AREA TO CLIENTS**											
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust generation	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Traffic and Safety	Road degradation. Increased potential for road incidences Potential distraction to road users	Neg	Reversible	2	1	4	2	2	2	2	4,67	Low
Groundwater	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
DECOMMISSIONING PHASE												
ACTIVITY:	**SLOPING, LANDSCAPING AND REPLACEMENT OF TOPSOIL OVER DISTURBED AREA (FINAL REHABILITATION)**											
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Soils	Soils replaced and ameliorated	Pos	Reversible	1	3	4	3	2	3	3	6,67	Low-Med
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	4	2	2	2	3	3	5,83	Low-Med
Topography	Alteration of topography	Pos	Irreversible	1	1	5	2	1	5	3	7	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	1	2	1	2	3	3	3,33	Low
Visual aspect	Improved aesthetics through rehabilitation	Pos	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Fauna	Reintroduction of fauna attracted to flora to the area	Pos	Reversible	2	2	4	3	2	5	4	9,33	Low-Med
Fauna	Reintroduction of fauna attracted to flora to the area	Pos	Reversible	2	1	3	2	1	3	2	4	Low
Groundwater	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
ACTIVITY: Application for Closure Certificate												

j) Assessment of each identified potentially significant impact and risk

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

Table 37: Assessment of each identified potentially significant impact and risk

NAME OF ACTIVITY Whether listed or not listed (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc... etc. Etc.)	**POTENTIAL IMPACT** (Including the potential impacts for cumulative impacts) (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc...etc..)	**ASPECTS AFFECTED**	**PHASE** In which impact is anticipated (e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)	**SIGNIFICANCE** If not mitigated	**MITIGATION TYPE** (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc...etc..) E.g. Modify through alternative method. Control through noise control. Control through management and monitoring. Remedy through rehabilitation	**SIGNIFICANCE** If mitigated
Demarcation of site with visible beacons.	No impact could be identified other than the beacons being outside the boundaries of the approved processing area.	N/A	Construction / Site Establishment phase	N/A	N/A	N/A
Establishment of temporary buildings and infrastructure within boundaries of site.	If the infrastructure is established within the boundaries of the approved mining area, no impact could be identified.	N/A	Construction / Site Establishment phase	N/A	N/A	N/A
Establishment of temporary buildings and infrastructure within boundaries of site.	Portable Toilets Potential harm through sewage leaks.	Loss of topsoil will affect the rehabilitation of the processing area and the future agricultural potential of the site.	Construction / Site Establishment phase	Low-Med	Control: - Storm water management. - Site Management. - Soil Management.	Low

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
		Social		Low-Med	Control through proper site management.	Low-Med
Establishment of temporary buildings and infrastructure within boundaries of site & Stripping and stockpiling of topsoil & Re-mining of old mine dumps & Crushing and screening of sillimanite and aggregate, stone gravel & Transporting of sillimanite and aggregate from stockpile area to clients & Sloping, landscaping and replacement of topsoil over disturbed area / final rehabilitation	Deterioration in visual aesthetics of the area.	The visual impact may affect the aesthetics of the landscape.	Operational & Decommissioning Phase	Low-Med	Control: Implementation of proper housekeeping.	Low-Med
	• Dust nuisance caused by the disturbance of soil. • Dust nuisance due to loading and vehicles transporting the material. • Dust nuisance due to landscaping activities.	Increased dust generation will impact on the air quality of the receiving environment.		Med	Control: Dust suppression methods. Proper housekeeping.	Low
	Emissions caused by vehicles and equipment.	Emissions will be contained within the property boundaries and will therefore affect only the landowner.		Low-Med	Control: Emissions	Low
	• Noise nuisance caused by machinery stripping and stockpiling the topsoil. • Noise nuisance generated by earthmoving machinery. • Noise nuisance generated during the landscaping phase.	The noise impact should be contained within the boundaries of the property, and will represent the current noise levels of the farm.		Low	Control: Noise control measures. Proper housekeeping methods.	Low
Establishment of temporary buildings and infrastructure within boundaries of site & Stripping and stockpiling of topsoil & Re-mining of old mine dumps &	• Loss of biodiversity. • Potential damage to vegetation in neighbouring areas. • Alien invasive encroachment. • Potential loss of protected or red data plant species.	This will impact on the biodiversity of the receiving environment.	Site Establishment & Operational phase	Low-Med	Control & Remedy: • Implementation of weed control and weed / invader plant. management plan	Low-Med

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
Crushing and screening of sillimanite and aggregate, stone gravel & Transporting of sillimanite and aggregate from stockpile area to clients & Sloping, landscaping and replacement of topsoil over disturbed area/ final rehabilitation					- Implement good housekeeping practices. - Adhere to the recommendations made by the botanist. Modify: - Consider use of a less sensitive area.	
	- Potential compaction of soils in neighbouring areas. - Potential contamination through littering. - Potential for loss of soil & damage to soil characteristics. - Initial increased potential for loss of soils and soil erosion. - Potential hydrocarbon contamination to soils.	Loss of topsoil will affect the rehabilitation of the processing area and the future agricultural potential of the site.	Operational phase	Low-Med	Control: - Storm water management. - Site Management. - Soil Management.	Low – Medium
	- Potential hydrocarbon contamination leeching into the water table. - Reduction of local groundwater. - Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies.	Groundwater pollution Surface water Bodies.	Operational phase	Med	Control: - Proper site management. - Surface water Management. - Implement storm water control measures. - Measures will be implemented as subscribed by DWS.	Low

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
	• Potential hydrocarbon contamination which may reach downstream surface water bodies. • Potential surface water contamination if leaks escape into the environment. • Potential impact of mining activities on the runoff and infiltration of storm water.					
Establishment of temporary buildings and infrastructure within boundaries of site & Stripping and stockpiling of topsoil & Re-mining of old mine dumps & Sloping, landscaping and replacement of topsoil over disturbed area/ final rehabilitation	Alteration of topography.	Topography.	Operational phase	Low-Med	N/A	Low-Med
Establishment of temporary buildings and infrastructure within boundaries of site & Stripping and stockpiling of topsoil & Re-mining of old mine dumps	Loss of and disturbance to surface archaeological sites.	Artefacts or graves.	Operational phase	Low	<u>Control:</u> Survey area before site clearance.	Low
Establishment of temporary buildings and infrastructure within boundaries of site & Stripping and stockpiling of topsoil & Re-mining of old mine dumps & Crushing and screening of sillimanite and aggregate, stone gravel	• Alienation of animals from the area. • Potential risk to avifauna. • Potential harm through littering. • Loss of food, nest sites, and refugia. • Hindrance to nocturnal animals and change in	The impact of the fauna of the area will not be significant as vibration and noise will drive the fauna away.	Operational phase	Med	<u>Control:</u> Implementation of fauna protection measures.	Low

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
& Transporting of sillimanite and aggregate from stockpile area to clients & Sloping, landscaping and replacement of topsoil over disturbed area/ final rehabilitation	behaviour of nocturnal prey and predators. - New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. - Impact to nocturnal insects and their predators and other nocturnal animals.					
Establishment of temporary buildings and infrastructure within boundaries of site & Stripping and stockpiling of topsoil & Re-mining of old mine dumps & Sloping, landscaping and replacement of topsoil over disturbed area/ final rehabilitation	- Veld fire might seriously impact on surrounding land-use (livestock / irrigation of neighbouring farmers). - Degrading of grazing potential for livestock farming.	Land use.	Operational phase	Low-Med	Control: Fire	Low
Establishment of temporary buildings and infrastructure within boundaries of site	Influx of unsuccessful job seekers which may informally settle in area. Potential danger to surrounding communities.	Social.	Construction / Site Establishment phase	Low-Med	Control through proper site management.	Low-Med
Transportation of sillimanite and sillimanite and aggregate from stockpile area to clients	Road degradation. Increased potential for road incidences. Potential distraction to road users.	All road users will be affected.	Operational phase	Low-Med	Control & Remedy: Road management.	Low
Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Soils replaced and ameliorated.	Loss of topsoil will affect the rehabilitation of the processing area and the future agricultural potential of the site.	Decommissioning phase	Med	Control: - Storm water management. - Site Management. - Soil Management.	Low-Med

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE
Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Reintroduction of fauna attracted to flora to the area.	Fauna returning to area.	Decommissioning phase	Low-Med	<u>Control:</u> Implementation of fauna protection measures	Low
Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Improved aesthetics through rehabilitation.	The visual impact may affect the aesthetics of the landscape.	Decommissioning phase.	Low-Med	<u>Control:</u> Implementation of proper housekeeping	Low-Med

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

k) Summary of specialist reports.

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

Table 38: Summary of specialist reports.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Heritage Impact Assessment Assessment for the proposed mining of sillimanite, aggregate and stone gravel on the farm Koenabib 43, a portion of Portion 2 (*should be 1*), Khai-Ma Local Municipality, Namakwa District Municipality, Namaqualand Magisterial District, Northern Cape Province. (See Appendix M2 for a full copy of the document)	**Recommendations:** The cultural landscape (marked by mining and farming activities) is generally modern without significant cultural landscape elements of concern and impacts are deemed to be of low significance. The impact of the proposed project on heritage resources is considered to be low, and it is recommended that the proposed project can commence on the condition that the following recommendations are implemented and based on approval from SAHRA. Implementation of a chance finds procedure as outlined below. Chance Find Procedure: This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.	All the recommendations proposed by the specialist were included in the BA report.	Please refer to: Part A h) iv) (1) (a); and Part A t) i)

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	• If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager. • It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area. • The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Botanical Study Botanical Study and Assessment – Koenabib mine near Aggeneys, Northern Cape Province. (See Appendix M1 for a full copy of the document)	**Recommendations:** Potential impacts on vegetation and listed and protected plant species: - Pre-construction walk-through of the final mining footprint, by a suitably qualified botanist, for species of conservation concern that would be affected (also to comply with the Northern Cape Nature Conservation Act and DENC/DAFF permit conditions). - Permits must be kept on-site and in the possession of the flora search and rescue team at all times. - Pre-construction environmental induction for all staff on site must be provided to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas, etc. - Contractor's EO must provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place.	All the recommendations proposed by the specialist were included in the BA report.	Please refer to: Part A h) iv) (1) (a); and Part A t) i)

	- Blanket clearing of vegetation must be limited to the proposed mining footprint and associated infrastructure. No clearing outside of the minimum required footprint to take place. - Topsoil must be stripped and stockpiled separately during site preparation and replaced over disturbed areas on completion - Ensure that laydown areas, construction camps, and other temporary use areas are located in areas of low sensitivity and are properly fenced or demarcated as appropriate and practically possible. - All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas may be allowed. - Regular dust suppression during operation. - No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purposes without express permission from the Contractor's EO and without the relevant permits. - No fires must be allowed on-site. - After the operation, rehabilitate an acceptable vegetation layer according to rehabilitation recommendations as provided within a site-specific Rehabilitation Plan compiled by a suitably qualified botanist. - Revegetation must occur naturally where topsoils were not severely altered. <u>Potential increased erosion risk during and post-operational phase:</u> - Any erosion problems within the borrow pit area as a result of the mining activities observed must be rectified immediately and monitored thereafter to ensure that they do not re-occur. - Mining within steep slopes will need to ensure that adequate slope protection is provided. - All bare areas resulting from the development must be re-vegetated, post-operation, with locally occurring species, to bind the soil and limit erosion potential. - Roads and other disturbed areas within the project area must be regularly monitored for erosion problems and problem areas		

	must receive follow-up monitoring to assess the success of the remediation. - Silt/sediment traps/barriers must be used where there is a danger of topsoil or material stockpiles eroding and entering downstream drainage lines and other sensitive areas. - These sediment/silt barriers must be regularly maintained and cleared so as to ensure effective drainage of the areas - Topsoil must be removed and stored separately from subsoil. Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas. - Stockpiles must be protected from erosion, stored on flat areas where possible, and be surrounded by appropriate berms. - Any erosion points created during construction must be filled and stabilized immediately. - Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time. - Construction of gabions and other stabilisation features must be undertaken to prevent erosion, where deemed necessary. <u>Increased alien plant invasion during the operational phase:</u> - Alien species must be removed from the site as per NEM:BA requirements. - A suitable weed management strategy to be implemented in the construction and operation phases. - Regular monitoring for alien plants at the site must occur and could be conducted simultaneously with erosion monitoring. - When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. - Clearing methods must aim to keep disturbance to a minimum and must be undertaken in accordance with relevant guidelines. - No planting or importing of any alien species to the site for landscaping, rehabilitation or any other purpose must be allowed.		

	Cumulative Impacts: - The activity footprints of various proposed mining locations in the area must be kept to a minimum and natural vegetation must be encouraged to return during the post-operational phase. - Reduce the footprint of mining areas within sensitive habitat types as much as possible.		

l) Environmental impact statement

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

The key findings of the environmental impact assessment entail the following:

Project Proposal:

- The project entails the re-mining of sillimanite, aggregate and stone gravel in an area previously used for mining. Due to the small area used for grazing and mining, mining of sillimanite, aggregate and stone gravel in the area was identified as a more viable use.
- The mining procedure will entail the transporting of the sillimanite, aggregate and stone gravel by means of a front-end loader to the mobile processing plant where it will be screened to various sized stockpiles upon which it will be loaded onto trucks, and transported from the mining site to the clients.
- The existing roads to the mine area can be used to gain access to the site. No new roads are needed.
- Mining activities will be contained within the boundaries of the permitted site. Proper storm water and waste management will be implemented on the site in order to minimise the potential of pollution.

Flora Assessment:

- The proposed extension area is located outside any listed CBA or ESA.
- The vegetation of the study site resembles a severely modified and transformed form of Eastern Gariep Rocky Desert surrounded by mostly natural vegetation.
- During the site survey no listed Red Data floral species were recorded within the surveyed site. A total of nine (9) species were however recorded which are protected within either National Forest Act or within the Northern Cape Nature Conservation Act (refer to the Botanical Study attached as Appendix M1).
- The Botany Study concluded that it is highly unlikely that this development will have an impact on the status of the Ecosystem and Vegetation Types due to the limited extent of the mine as well as the presence of already disturbed areas within the footprint. Furthermore, this mine will not have a significant impact on the services and functions provided by the surrounding natural habitats and development within this area and is regarded as acceptable.
- Subsequently the proposed development area is largely well located in terms of avoiding sensitive receptors and the development will not compromise the survival of any specific flora or terrestrial vertebrate species on the study area or beyond if mitigation measures are fully implemented.

Other Site Specific Environmental Aspects:

- No sites of archaeological or cultural importance were identified during the site inspection located in the mining footprint area.
- The fauna at the site will not be impacts on by the proposed mining activity as they will be able to move away or through the site, without being harmed.
- There are no rivers, streams or wetlands within close proximity of the mining area.
- Although the proposed activity will have a cumulative impact on the ambient noise levels, the impact is deemed compatible with the current operations and of low significance.
- The nearest residential dwelling to the proposed mining area is a farm house of the adjacent landowner approximately 6.2 m north-west of the mining area. Should the Applicant however implement the mitigation measures proposed in this document and the EMPr the impact on the air quality of the surrounding environment is deemed to be of low-medium significance.
- The viewshed analysis showed that the visual impact of the proposed extension will be of very low significance, especially as no permanent structures will be constructed. Should the Applicant successfully rehabilitate the mining area (upon closure), no residual visual impact will remain.
- The topography of the site will be positively altered in that the old mining dumps will be completely removed from the site.
- Upon closure the site will be rehabilitated and sloped to ensure that the visual impact on the aesthetic value of the area is kept to a minimum. The site will have a neat appearance and be kept in good condition at all times.

ii) Final Site Map

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

See the map indicating site activities attached as Appendix C.

iii) Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

Associated Positive Impacts – Temporary Infrastructure:

- Low intensity site establishment;
- Easy movement of infrastructure as mining progress;
- Containment of dirty water. Improve reposes to issues relating to deterioration of surface water quality or quantity.
- Reintroduction of fauna and flora to the area in the decommissioning phase;
- Improved aesthetics through rehabilitation;
- Re-contouring of area for free surface water drainage;
- Soils replaced and ameliorated; and
- Complete removal of infrastructure at closure of the mine.

The negative impacts associated with the project that was deemed to have a Low- Medium to High significance includes:

- Potential loss of/or disturbance of surface archaeological sites **Low-Med**
- Loss of biodiversity **Low-Med**
- Visual intrusion due to the proposed project **Low-Med**
- Influx of unsuccessful job seekers which may informally settle in the area **Low-Med**

m) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPR;

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

Table 39: Impact management objectives and the impact management outcomes for inclusion in the EMPR

MANAGEMENT OBJECTIVES	ROLE	MANAGEMENT OUTCOMES
Visual Aspect	Site Manager to ensure compliance with the guidelines as stipulated in the EMPr. Compliance to be monitored by the Environmental Control Officer.	- Ensure that the site have a neat appearance and is kept in good condition at all times. - Remove all infrastructure upon rehabilitation of the mining area and return the area to its prior status.
Dust Handling	Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. Compliance to be monitored by the Environmental Control Officer. Dust monitoring consultant to check dust results and provide guidelines.	- Control the liberation of dust into the surrounding environment by the use of; inter alia, water spraying and/or other dust-allaying agents. - Limit speed on the access roads to 40km/h to prevent the generation of excess dust. - Spray roads with water or an environmentally friendly dust-allaying agent that contains no PCB's (e.g. DAS products) if dust is generated above acceptable limits. - Assess effectiveness of dust suppression equipment. - Re-vegetate all disturbed or exposed areas as soon as possible to prevent any dust source from being created. - Thoroughly soak all stockpiles to ensure dust suppression on the site. - Conduct formal dust monitoring on a monthly basis.
Noise Handling	Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. Compliance to be monitored by the Environmental Control Officer. Compliance to be monitored by the Noise Monitoring Specialist.	- Ensure that employees and staff conduct themselves in an acceptable manner while on site. - No loud music may be permitted at the mining area. - Ensure that all mining vehicles are equipped with silencers and maintained in a road worthy condition in terms of the Road Transport Act, 1996. - Implement best practice measures in order to minimize potential noise impacts. - Contract a qualified occupational hygienist to quarterly monitor and report on the personal noise exposure of the employees working at the mine. The monitoring must be done in accordance with the SANS 10083:2004 (Edition 5) sampling method as well as NEM:AQA, 2004, SANS 10103:2008.
Management of weed/invader plants	Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. Compliance to be monitored by the Environmental Control Officer.	- Implement a weed and invader plant control management plan. - Control declared invader or exotic species on the rehabilitated areas. - Keep the temporary topsoil stockpiles free of weeds. - Do regular monitoring for alien plants at the site simultaneously with erosion monitoring. - When alien plants are detected, control and clear the plants using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. - Do not allow the planting or importing of any alien species to the site for landscaping, rehabilitation or any other purposes.

MANAGEMENT OBJECTIVES	ROLE	MANAGEMENT OUTCOMES
Surface and Storm water Handling	Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. Compliance to be monitored by the Environmental Control Officer.	- Divert storm water around the topsoil heaps and access roads to prevent erosion and loss of material. - Divert runoff water around the stockpile areas with trenches and contour structures to prevent erosion of the work areas. - Conduct mining in accordance with the Best Practice Guideline for small scale mining that relates to storm water management, erosion and sediment control and waste management, developed by the Department of Water and Sanitation. - Rectify any erosion problems within the borrow pit area as a result of the mining activities immediately and monitor it thereafter to ensure that it do not re-occur. - Ensure adequate slope protection is provided when mining within steep slopes. - Re-vegetate all bare areas resulting from the development, post-operation, with locally occurring species, to bind the soil and limit erosion potential. - Regularly monitor roads and other disturbed areas within the project area for erosion problems and ensure problem areas receive follow-up monitoring to assess the success of the remediation. - Use silt/sediment traps/barriers where there is a danger of topsoil or material stockpiles eroding and entering downstream drainage lines and other sensitive areas. - Regularly maintain and clean these sediment/silt barriers so as to ensure effective drainage of the areas. - Fill and stabilize any erosion points created during construction. - Practice practical phased development and vegetation clearing so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time. - Undertake the construction of gabions and other stabilisation features to prevent erosion, where necessary.
Topsoil management	Site Manager to ensure compliance with the guidelines as stipulated in the EMPr. Compliance to be monitored by the Environmental Control Officer.	- Strip and stockpile the upper 300 mm of the soil and protect as topsoil. - Remove topsoil at right angles to the slope to slow down surface runoff and prevent erosion. - Conduct topsoil stripping, stockpiling and re-spreading in a systematic way. Ensure topsoil is stockpiled for the minimum possible time. - Protect topsoil stockpiles against losses by water and wind erosion through the establishment of plants on the stockpiles. - Place topsoil stockpiles along the northern and western boundaries of the site. Topsoil heaps may not exceed 1.5 m in order to preserve microorganism within the topsoil.

MANAGEMENT OBJECTIVES	ROLE	MANAGEMENT OUTCOMES
Protection of fauna and flora.	Site Manager to ensure compliance with the guidelines as stipulated in the EMPr. Compliance to be monitored by the Environmental Control Officer.	• Ensure no fauna is caught, killed, harmed, sold or played with. • Instruct workers to report any animals that may be trapped in the working area. • Prevent the setting of snares, raiding of nests, eggs or young. • Arrange a pre-construction walk-through of the final mining footprint, by a suitably qualified botanist, for species of conservation concern that would be affected. • Keep permits on-site and in the possession of the flora search and rescue team at all times. • Arrange pre-construction environmental induction for all staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas, etc. • Arrange that the contractor's EO provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place. • Limit blanket clearing of vegetation to the proposed mining footprint and associated infrastructure. No clearing outside of the minimum required footprint to take place. • Strip and stockpile topsoil separately during site preparation and replaced over disturbed areas on completion. • Ensure that laydown areas, construction camps, and other temporary use areas are located in areas of low sensitivity and are properly fenced or demarcated as appropriate and practically possible. • Ensure all vehicles remain on demarcated roads and prevent unnecessary driving in the veld outside these areas. • Do not translocate or otherwise uprooted or disturbed plants for rehabilitation or other purposes without express permission from the Contractor's EO and without the relevant permits. • Prevent fires on-site. • After the operation, rehabilitate an acceptable vegetation layer according to rehabilitation recommendations as provided within a site-specific Rehabilitation Plan compiled by a suitably qualified botanist. • Ensure rehabilitation progress, erosion and I&AP monitoring occur simultaneously post-operational phase and biannual for a minimum of two years.
Management of health and safety risks	Site Manager to ensure compliance with the guidelines as stipulated in the EMP. Compliance to be monitored by the Environmental Control Officer.	• Ensure that workers have access to the correct PPE as required by law. • Ensure all operations comply with the Occupational Health and Safety Act, 1996.

MANAGEMENT OBJECTIVES	ROLE	MANAGEMENT OUTCOMES
Handling of Hazardous Materials and Substance	Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. Compliance to be monitored by the Environmental Control Officer	• Store all hazardous materials or substances in a closed storage facility with an impermeable floor. • Storage area to meet the following conditions: • Construct storage area on a level area. • Floor of the storage area must be impermeable. • Storage area must be outside the 1:100-year flood line or further than 100m from the edge of a watercourse, whichever is greatest. • Access to the materials/substances may only take place with the prior notification of the site manager. • Fuel storage tanks must have an impermeable bund wall and base within which the tanks sits, raised above the floor, on plinths. The bund capacity must be sufficient to contain 110% of the tank's maximum capacity. • Consider the distance and height of the bund wall relative to that of the tank to ensure that oil does not spout beyond the confines of the bund. • Establish a formal inspection routine to check all equipment in the bund area, as well as the bund area itself for malfunctions or leakages. Inspection must be at least weekly and any accumulated rainwater must be removed. • All valves and outlets must be checked to ensure that they are intact and closed securely. • Slope the bund base towards a rainwater sump of sufficient size. • Contain contaminated water until it can be collected by a registered hazardous waste handling contractor or be disposed of at a registered hazardous waste handling facility. • Ensure availability of drip trays underneath all stationary equipment or vehicles.

MANAGEMENT OBJECTIVES	ROLE	MANAGEMENT OUTCOMES
Waste management	Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. Compliance to be monitored by the Environmental Control Officer.	- Ensure no waste storage area is established outside the boundaries of the mining area. - Ensure vehicle maintenance only take place within the service bay area of the off-site workshop. If emergency repairs are needed on site, ensure drip trays is present. Ensure all waste products are disposed of in a 200 litre closed container/bin inside the emergency service area. - Ensure diesel bowser is equipped with a drip tray at all times. - Use drip trays during each and every refuelling event. - Ensure the nozzle of the bowser rests in a sleeve to prevent dripping after refuelling. - Keep drip trays clean. No dirty drip trays may be used on site. - Collect any effluents containing oil, grease or other industrial substances in a suitable receptacle and removed from the site, either for resale or for appropriate disposal at a recognised facility. - Clean spills immediately to the satisfaction of the Regional Manager by removing the spillage together with the polluted soil and by disposing of them at a recognised facility. File proof on site. - Ensure the availability of suitable covered receptacles at all times and conveniently placed for the disposal of waste. - Place all used oils, grease or hydraulic fluids therein and remove these receptacles from the site on a regular basis for disposal at a registered or licensed hazardous disposal facility. - Store non-biodegradable refuse such as glass bottles, plastic bags etc., in a container with a closable lid at a collecting point. Collection must take place on a regular basis and disposed of at the recognised landfill site. Prevent refuse from being dumped on or in the vicinity of the mining area. - Biodegradable refuse to be handled as indicated above.
Management of access roads	Site Manager to ensure compliance with the guidelines as stipulated in the EMP. Compliance to be monitored by the Environmental Control Officer.	- Maintain newly constructed access roads so as to minimise dust, erosion or undue surface damage. - Divert storm water around the access roads to prevent erosion. - Erosion of access road: Restrict vehicular movement to existing access routes to prevent crisscrossing of tracks through undisturbed areas. - Repair rutting and erosion of the access roads caused by the proposed activities.
Protection of Cultural or Heritage Artefacts	Site Manager to ensure compliance with the guidelines as stipulated in the EMPr. Compliance to be monitored by the Environmental Control Officer.	- Confine all mining to the development footprint area. - Implement the chance find procedure as described in this document when any discoveries are made.

MANAGEMENT OBJECTIVES	ROLE	MANAGEMENT OUTCOMES
After care on rehabilitated areas	Site Manager to ensure compliance with the guidelines as stipulated in the EMPr. Compliance to be monitored by the Environmental Control Officer.	• Control run-off water via temporary banks to ensure that accumulation of run-off does not cause down-slope erosion. • Only do topsoil spreading at a time of year when vegetation cover can be established as quickly as possible afterwards, so that erosion of returned topsoil by both rain and wind is minimized. The best time of year is at the end of the rainy season, when there is moisture in the soil for vegetation establishment and the risk of heavy rainfall events is minimal. • Plant a cover crop immediately after spreading of topsoil, to stabilize the soil and protect it from erosion. Fertilize the cover crop for optimum production. • Ensure rehabilitation be taken up to the point of cover crop stabilization. Rehabilitation must not be considered complete until the first cover crop is well established. • Monitor all rehabilitated areas for erosion, and appropriately stabilized if any erosion occurs.

n) Aspects for inclusion as conditions of Authorisation.

Any aspects which must be made conditions of the Environmental Authorisation

The management objectives listed in this report under Point M above should be considered for inclusion in the environmental authorisation.

o) Description of any assumptions, uncertainties and gaps in knowledge.

(Which relate to the assessment and mitigation measures proposed)

The assumptions made in this document which relate to the assessment and mitigation measures proposed, stem from site specific information gathered from the property owner, as well as site inspections, and background information gathering.

p) Reasoned opinion as to whether the proposed activity should or should not be authorised

i) Reasons why the activity should be authorised or not.

Should the mitigation measures and monitoring programmes proposed in this document be implemented on site, no fatal flaws could be identified that were deemed as severe as to prevent the activity continuing.

The proposed extension of the mining area should strongly be considered for authorisation as such development may result in the upliftment of local community economic growth of the surrounding towns, region and possibly the province.

ii) Conditions that must be included in the authorisation

The management objectives listed in this report under Point M should be considered for inclusion in the environmental authorisation.

q) Period for which the Environmental Authorisation is required.

The applicant requests the Environmental Authorisation to be valid for a five (5) year period to correspond with the maximum validity of the mining permit.

r) Undertaking

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

The undertaking required to meet the requirements of this section is provided at the end of the EMPR and is applicable to both the Basic Assessment Report and the Environmental Management Programme report.

s) Financial Provision

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

i) Explain how the aforesaid amount was derived

The annual amount required to manage and rehabilitate the environment was estimated to be R 882 854.21.

Please see the explanation as to how this amount was derived at attached as in Section B, f, i. A Bank Guarantee will be provided for the proposed site should this amount be approved by the DMR.

ii) Confirm that this amount can be provided from operating expenditure.

(Confirm that the amount is anticipated to be an operating cost and is provided for as such in the prospecting Work Programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be).

The mining operation will be self-funded through income generated at the Koenabib Mine. A bank guarantee will be ceded to the DMR for the required amount.

t) Specific Information required by the competent Authority

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

(1) Impact on the socio-economic conditions of any directly affected person.

(Provide the results of investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an Appendix)

The following potential impacts were identified that may impact on socio-economic conditions of directly affected persons:

Visual exposure:

The mining area was identified to constitute the lowest possible visual impact on the surrounding environment. The earmarked footprint has previously been disturbed by mining activities that was not rehabilitated. This application will allow the rehabilitation of the abandoned mine dumps on the property. The applicant will ensure that housekeeping is managed to standard, as this will mitigate the visual impacts during the operational phase of the mine.

Upon closure the site will be rehabilitated and sloped to ensure that the visual impact on the aesthetic value of the area is kept to a minimum. The site will have a neat appearance and be kept in good condition at all times.

Air Quality:

The background air quality of the surrounding area is relatively good due to low industrial activity. Dust will be generated by the movement of machinery and vehicles. Dust suppression measures will be implemented to prevent excessive dust on site. Due to the remote setting of the proposed mining area the potential impact of dust nuisance on the surrounding environment is deemed to be of low significance.

Noise:

The surrounding areas are characterised by an agricultural setting in which vehicles and farm equipment operate. The noise to be generated at the proposed operation will resemble the current noise generated at the mining permit area and will only be temporary. Loading and transportation of the material will generate noise daily. The significance of noise on the surrounding environment is deemed to be of low significance. Mitigation measures will be implemented to ensure employees conduct them in an acceptable manner while on site to lessen the noise impact of the proposed activity on the surrounding environment.

(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.

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

The Heritage Impact Assessment did not identify any sites or artefacts classified as national estate as referred to in section 3(2) of the NHRA, 1999 within the footprint of the proposed mining area.

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

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

As mentioned earlier, no other alternative sites were deemed applicable, as this is an amendment of the current EMPR. The site was identified during the assessment phase of the environmental impact assessment (2016 assessment), by the applicant and project team, and was therefore selected as the preferred alternative.

As discussed earlier the following alternatives were considered:

1. Site Alternative 1 – Expansion of the current 0.7 ha area to 5 ha; and
2. No-go Alternative.

PART B: ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft Environmental Management Programme.

a) Details of the EAP, (Confirm that the requirements for the provision of the details and expertise of the EAP are already included in Part A, section 1(a) herein as required).

The details and expertise of Yolandie Coetzee of Greenmined Environmental that acts as EAP on this project has been included in Part A Section 1(a) as well as Appendix J as required.

b) Description of the Aspects of the Activity

(Confirm that the requirements to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

The aspects of the activity that are covered by the draft environmental management programme has been described and included in Part A, section (1)(h).

c) Composite Map

(Provide a map (Attached as an Appendix) 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)

As mentioned under Part A, section (1) (L) (ii) this map has been compiled and is attached as Appendix C to this document.

d) Description of impact management objectives including management statements

i) Determination of closure objectives.

(Ensure that the closure objectives are informed by the type of environment described)

Mining activities are to be undertaken in a manner which facilitates site rehabilitation and the restoration of existing land capabilities. The primary objectives for rehabilitation includes:

- The facilitation of the re-establishment of the land use and capability to as close as reasonably to the original conditions;
- Removal of all infrastructure and material introduced to site;
- Removal of all wastes and their and their related disposal; and
- Promotion of the rapid re-establishment of natural vegetation and the restoration of site ecology.

The disturbed areas shall be rehabilitated to ensure that:

- The biodiversity habitat is encouraged by the new land use after the mining;
- Future public health and safety are not compromised;
- The site is reversed to almost its original state;

- Environmental and resources are not subject to physical and chemical deterioration;
- The after-use of the site is beneficial and sustainable in the long term;
- Any adverse socio-economic impacts are minimized; and
- All socio-economic benefits are maximized.

This will be done by complying with the conditions in the environmental management program below, and relevant statuary requirements. The contractor and employee will be made aware of their environmental responsibilities and will be empowered to execute the work program in compliance with the requirements of this EMPR.

The following closure objectives are proposed with regard to rehabilitation of the mining area:

- On completion of operations, all structures or objects shall be dealt with in accordance with section 44 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002):
  - Where sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped.
- Upon cessation of the mining activities, the area will be fully rehabilitated.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area be seeded with a vegetation seed mix to his or her specification.
- Photographs of the office sites and plant infrastructure before and during the mining operation and after rehabilitation, shall be taken at selected fixed points and kept on record for the information of the Regional Manager.
- All temporary infrastructures, equipment, plant, temporary housing and other items used during the mining period will be removed from the site.
- Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a recognized landfill facility, proof of this removal will be kept on file at the applicant’s office. It will not be permitted to be buried or burned on the site.
- Weed / Alien clearing will be done in a sporadic manner during the life of the Mining activities. Species regarded as the National Environmental Biodiversity Act [NEMBA] (Act No. 10 of 2004) Alien and Invasive Species Regulation GNR 598 and 599 of 2014 Species regarded as need to be eradicated from the site on final closure. Final rehabilitation shall be completed within a period specified by the Regional Manager.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.
- To prevent/minimise soil erosion though the action of water and wind, control measures must be put in place such as protection berms where needed. Procedures must be developed to minimise surface water run-off and soil erosion. As a mitigating measure soil properties could be improved by encouraging re-vegetation in bare areas by planting indigenous cuttings from the surrounding area.

- Monitoring and evaluation procedures must be put in place to determine if there is any improvement and to ascertain if more rehabilitation initiatives area needed or if the area must be left to spontaneously rehabilitated.
- The land owner/user must protect the cultivated land before/during /after cultivation of the proposed sites effectively against excessive soil loss as a result of erosion through the action of water and wind.
- According to Regulation 4, sub regulation 1(a) *"every land user shall by means of as many of the following measures as are necessary in his situation, protect the cultivated land on his farm unit effectively against eth excessive soil loss as a result of erosion through the action of water*"
- A suitable soil conservation work shall be construction and thereafter be marinated in order to divert run-off water from other land or to restrict the run-off speed of run-off water.
- According to Regulation 5, sun-regulation 1 (a) (j) "*every land use shall by means of as many of the following measure as are necessary in his situation, protect the cultivated land on his farm unit effect again excessive soil loss as a result of erosion through the action of wind*"
- The land covered shall be cultivate in accordance in accordance with such methods or be, laid out in such out in such manner that the surface movement of soil particles through the action of wind is restricted.
- Any rehabilitation and remedial action in relation to soil erosion in the event it does occur needs to be in accordance with regulation 14 of the CARA. According to regulation 14(1)
  - If any land user disturbed or denude any land on his farm unit for purposed other than prospecting or mining activities,
  - such land user shall by means of as many of the following measures as are necessary in this situation, effectively restore and reclaim that disturbed or denuded land.
  - Topsoil shall be removed and kept separated with a view or replacing it later on the disturbed or denuded land
  - Topsoil shall be used to stabilise the sides of a hollow that has been caused by the exploitation or removal of material and, where possible, or reclaim part of the disturbed or denuded land.
- The flow pattern of run-off water, the topography and the slope shall, depending on the volume of material exploited or removed, be restored as closely as possible to the original condition.

<u>Rehabilitation of plant, office and service areas:</u>

Stockpiles will be removed during the decommissioning phase, the area ripped and the topsoil returned to its original depth to provide a growth medium.

On completion of operations, all structures or objects shall be dealt with in accordance with section 44 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002):

- Where sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped.

- Areas containing French drains shall be compacted and covered with a final layer of topsoil to a height of 10 cm above the surrounding ground surface.
- The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora.

Photographs of the office sites and workshop, before and during the mining operation and after rehabilitation, shall be taken at selected fixed points and kept on record for the information of the Regional Manager.

On completion of mining operations, the surface of these areas, if compacted due to hauling and dumping operations, shall be scarified and graded to an even surface condition. Where applicable / possible topsoil needs to be returned to its original depth over the area.

Prior to replacing the topsoil, the material that was removed from these areas will be replaced in the same order as it originally occurred. The area shall then be fertilized if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local, adapted indigenous seed mix.

If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area be seeded with a seed mix to his or her specification.

Final rehabilitation:

Rehabilitation of the surface area shall entail reshaping, levelling, top dressing, land preparation, seeding and maintenance, and weed / alien clearing.

All infrastructures, equipment, plant, temporary housing and other items used during the mining period will be removed from the site.

Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a recognized landfill facility. It will not be permitted to be buried or burned on the site.

Weed / Alien clearing will be done in a sporadic manner during the life of the mining activities. Species regarded as the National Environmental Biodiversity Act [NEMBA] (Act No. 10 of 2004) Alien and Invasive Species Regulation GNR 598 and 599 of 2014 Species regarded as need to be eradicated from the site on final closure. Site management must implement an invasive plant species management plan (Appendix K) during the 12 months aftercare period to address germination or problem plants in the area.

Final rehabilitation shall be completed within a period specified by the Regional Manager.

Seeding of the area:

Once the area has been shaped and the soil replaced, the goal is to establish a good cover of a robust grass that will stabilise the soil and start the accumulation of soil organic carbon. This will be done using a combination of seeding and physical planting of runners to apply a mix of commercial and indigenous species that includes both tufted and creeping species.

ii) Volume and rate of water use required for the operation

Water will initially be bought from the local municipality that will be stored on site in Jo-Jo tanks. This water will be used in a closed system at the processing plant (continuously recycled), and for dust suppression purposes when needed. A water truck will be used to spray access roads to alleviate dust generation. It is proposed that the mining activities will require between 2 000 – 4 000 l of water per day.

iii) Has a water use licence has been applied for?

This project does not require a water use licence as the water will be bought and transported to site.

iv) Impacts to be mitigated in their respective phases

Table 40: Impacts to be mitigated in their respective phases

NAME OF ACTIVITY	**SIZE AND SCALE OF DISTURBANCE**	**PHASE**	**MITIGATION MEASURES**	**COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED**	**TIME PERIOD FOR IMPLEMENTATION**
whether listed or not listed (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc. Etc.)	(volumes, tonnages and hectares or m^2)	In which impact is anticipated (e.g. Construction, commissioning, operational Decommissioning, closure, post-closure))			
Demarcation of site with visible beacons.	5 ha	Construction / Site Establishment phase	Demarcation of the site will ensure that all employees are aware of the boundaries of the mining area and that work stay within approved area.	Mining of the sillimanite, aggregate and stone gravel is only allowed within the boundaries of the approved area: - MHSA, 1996 - OHSA, 1993 - MPRDA, 2008; - NEMA, 1998	Beacons need to be in place throughout the life of the activity.

NAME OF ACTIVITY	SIZE AND SCALE OF DISTURBANCE	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Establishment of temporary buildings and infrastructure within boundaries of site.	5 ha	Construction / Site Establishment phase	Portable toilets will be managed by reputable contractors and inspected daily for potential leaks	Not applicable as these are mobile and will be removed during rehabilitation and closure of the site.	Construction / Site Establishment, operational, decommissioning phases.
Establishment of temporary buildings and infrastructure within boundaries of site; & Stripping and stockpiling of topsoil; & Crushing and screening of sillimanite and aggregate; & Transportation of sillimanite, aggregate and stone gravel from stockpile area to clients; & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	5 ha	Operational phase	**Visual Mitigation:** - The site needs to have a neat appearance and be kept in good condition at all times. - Upon closure the site needs to be rehabilitated to insure that the visual impact on the aesthetic value of the area is kept to a minimum.	Management of the mining activities must be in accordance with the: MHSA, 1996 OHSA, 1993 MPRDA, 2008; NEMA, 1998	Throughout the site establishment- and operational phases.

NAME OF ACTIVITY	SIZE AND SCALE OF DISTURBANCE	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Establishment of temporary buildings and infrastructure within boundaries of site; & Stripping and stockpiling of topsoil; & Crushing and screening of sillimanite and aggregate; & Transportation of sillimanite, aggregate and stone gravel from stockpile area to clients; & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	5 ha	Operational phase	**Dust Handling:** - During periods of high wind spells, the stockpiles must be dampened to control dust emission. - The liberation of dust into the surrounding environment must be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. - The site manager must ensure continuous assessment of all dust suppression equipment to confirm its effectiveness in addressing dust suppression. - Speed on the access roads must be limited to 40km/h to prevent the generation of excess dust. - All roads will be sprayed with water or an environmental friendly dust-allaying agent that contained PCB's (e.g. DAS products/ Pro/base) at regular intervals to ensure that dust is adequately suppressed in the mining roads. - All disturbed or exposed areas will be re-vegetated as soon as possible during the operational phase to prevent any dust source from being created. - A fall out and nuisance dust monitoring programme could be submitted to the principle inspector of mines (DMR-Northern Cape) on an annual basis if required. If any complaint is received form the public or state department regarding dust levels, the fall-out and nuisance dust levels will again be monitored at prescribed monitoring points. The result will then be compiled into monthly reports and forwarded to the Director-Occupational Hygiene. - Fallout dust will be monitored via a fallout dust bucket system on the boundaries of the mining area.	Dust generation on site must be managed in accordance with the: NEM:AQA, 2004 Regulation 6(1) National Dust Control Regulations, GN No R827 ASTM D1739 (SANS 1137:2012)	Throughout operational and decommissioning phases
	5 ha	Operational phase & Decommissioning Phase	**Emission Handling:** - All vehicles will be regularly services to ensure they are in proper working condition and to reduce risk of excessive emissions.	Emission Control: NEM:AQA, 2004 Regulation 6(1)	Throughout operational and decommissioning phases

NAME OF ACTIVITY	SIZE AND SCALE OF DISTURBANCE	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
	5 ha	Operational & Decommissioning Phase	**Noise Handling:** • The applicant must ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. • No loud music may be permitted at the mining area. • All mining vehicles must be equipped with silencers and maintained in a road worthy condition in terms of the Road Transport Act. • Best practice measures will be implemented in order to minimise potential noise impacts. • A qualified occupational hygienist must be contracted to quarterly monitor and report on the personal noise exposure of the employees working at the mine. The monitoring must be done in accordance with the SANS 10083:2004 (Edition 5) sampling method as well as NEM: AQA, 2004, SANS 10103:2008.	Noise generation on site must be managed in accordance with the: NEM:AQA, 2004 Regulation 6(1) NRTA, 1996	Throughout operational and decommissioning phases

Establishment of temporary buildings and infrastructure within boundaries of site; & Stripping and stockpiling of topsoil; & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	5 ha	Site Establishment & Operational phase	**Flora:** • Pre-construction walk-through of the final mining footprint, by a suitably qualified botanist, for species of conservation concern that would be affected (also to comply with the Northern Cape Nature Conservation Act and DENC/DAFF permit conditions). • Permits must be kept on-site and in the possession of the flora search and rescue team at all times. • Pre-construction environmental induction for all staff on site must be provided to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas, etc. • Contractor's EO must provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place. • Blanket clearing of vegetation must be limited to the proposed mining footprint and associated infrastructure. No clearing outside of the minimum required footprint to take place. • Topsoil must be stripped and stockpiled separately during site preparation and replaced over disturbed areas on completion. • Ensure that laydown areas, construction camps, and other temporary use areas are located in areas of low sensitivity and are properly fenced or demarcated as appropriate and practically possible. • All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas must be allowed. • No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purposes without express permission from the Contractor's EO and without the relevant permits. • No fires must be allowed on-site. • After the operation, rehabilitate an acceptable vegetation layer according to rehabilitation recommendations as provided within a site-specific Rehabilitation Plan compiled by a suitably qualified botanist. • Rehabilitation progress, erosion and I&AP monitoring must occur simultaneously post-operational phase and must occur biannual for a minimum of two years.	Management of weed- or invader plants: NEMBA (Act No. 10 of 2004). Alien and Invasive Species Regulation GNR 598 and 599 of 2014. Negative impact on biodiversity of the area: NEM:BA, 2004	Throughout operational and decommissioning phases

NAME OF ACTIVITY	SIZE AND SCALE OF DISTURBANCE	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
			Management of weed- or invader plants: - A weed and invader plant control management plan must be implemented at the site to ensure eradication of all listed invader plants in terms of the National Environmental Biodiversity Act [NEMBA] (Act No. 10 of 2004) Alien and Invasive Species Regulation GNR 598 and 599 of 2014 Species regarded as need to be eradicated from the site on final closure. - Management must take responsibility to control declared invader or exotic species on the rehabilitated areas. - Regular monitoring for alien plants at the site must occur and could be conducted simultaneously with erosion monitoring. - When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. - No planting or importing of any alien species to the site for landscaping, rehabilitation or any other purpose may be allowed.		

NAME OF ACTIVITY	SIZE AND SCALE OF DISTURBANCE	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Establishment of temporary buildings and infrastructure within boundaries of site; & Stripping and stockpiling of topsoil; & Crushing and screening of sillimanite and aggregate; & Transportation of sillimanite, aggregate and stone gravel from stockpile area to clients; & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	5 ha	Operational phase	**Soil:** - Where applicable the first 300 mm of topsoil must be removed in strips and stored along the boundary of the mining area. Stockpiling of topsoil must be done to protect it from erosion, mixing with overburden or other material. The topsoil must be used to cover the rehabilitated area and improve the establishment of natural vegetation. - The temporary topsoil stockpiles must be kept free of weeds. - Topsoil stockpiles must be placed on a levelled area and measures must be implemented to safeguard the piles from being washed away in the event of heavy rains/storm water. - Topsoil heaps must not exceed 1.5 m in order to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen. - Should natural vegetation not establish on the heaps within 6 months of stockpiling it must be planted with an indigenous grass species. - Storm- and runoff water must be diverted around the topsoil stockpiles and access roads to prevent erosion.	Loss of topsoil due to incorrect storm water management: NEMA, 1998 NWA, 1998 NEMBA, 2004 GNR 598 and 599 of 2014 The replacement of the topsoil is of utmost importance to ensure the effective future use of the area for agricultural purposes. Loss of soil due to un-vegetated areas: NEMBA (Act No. 10 of 2004). NEMA, 1998 Bare areas need to be re-vegetation to prevent soil erosion.	Throughout operational phases

Establishment of temporary buildings and infrastructure within boundaries of site; & Stripping and stockpiling of topsoil; & Crushing and screening of sillimanite and aggregate; & Transportation of sillimanite, aggregate and stone gravel from stockpile area to clients; & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	5 ha	Operational phase	**Surface and Groundwater:** Contamination of surface or groundwater due to improper waste handling: • No waste stockpile area may be established outside the boundaries of the mining area. • Vehicle maintenance may only take place within the service bay area of the off-site workshop. • The diesel bowser needs to be equipped with a drip tray at all times. Drip trays have to be used during each and every refuelling event. • The nozzle of the bowser needs to rest in a sleeve to prevent dripping after refuelling. • Site management must ensure drip trays are cleaned after each use. No dirty drip trays may be used on site. • Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from the site, either for resale or for appropriate disposal at a recognised facility. • Spills must be cleaned up immediately to the satisfaction of the Regional Manager by removing the spillage together with the polluted soil and by disposing it at a recognised facility. Proof must be filed. • Suitable covered receptacles must be available at all times and conveniently placed for the disposal of waste. • Non-biodegradable refuse such as glass bottles, plastic bags, metal scrap, etc., must be stored in a container with a closable lid at a collecting point and collected on a regular basis and disposed of at a recognised landfill site. Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the mine area. • Biodegradable refuse generated must be handled as indicated above. • Water from the wash bay must drain into the oil sump from where it must be removed by an approved contractor. • Drip trays must be available to be place underneath all stationary equipment or vehicles. • Waste material of any description, including receptacles, scrap, rubble and tyres, must be removed entirely from the mining area and disposed of at a recognized landfill facility once decommissioning has been completed. It will not be permitted to be buried or burned on the site.	Contamination of surface or groundwater due to hazardous spills not cleaned: NWA, 1998	Throughout operational and decommissioning phases

NAME OF ACTIVITY	SIZE AND SCALE OF DISTURBANCE	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Establishment of temporary buildings and infrastructure within boundaries of site; & Stripping and stockpiling of topsoil; & Crushing and screening of sillimanite and aggregate.	5 ha	Operational phase	**Archaeological, Heritage and Paleontological Aspects:** - All mining must be confined to the development footprint area. - If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager. - It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area. - The senior on-site Manager must inform the ECO of the chance find and its immediate impact on operations. The ECO must then contact a professional archaeologist for an assessment of the finds who must notify the South African Heritage Resources Agency (SAHRA) and/or the McGregor Museum (Kimberley). The following information must be supplied: • A description of the nature of the find. • Detailed images of the finds (with scale included). • Position of the find (GPS) and depth. • Digital images of the context. (with scales). - Work may only continue once the go-ahead was issued by SAHRA.	Loss of Artefacts and Graves: National Heritage Resources Act No. 25 of 1999	Throughout operational and decommissioning phases

Establishment of temporary buildings and infrastructure within boundaries of site; & Stripping and stockpiling of topsoil; & Crushing and screening of sillimanite and aggregate; & Transportation of sillimanite, aggregate and stone gravel from stockpile area to clients; & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	5 ha	Operational phase	**<u>Hydrocarbon Management:</u>** - All hazardous materials or substances must be stored in a closed storage facility with an impermeable floor. - The storage area must meet the following conditions: • The storage area must be constructed on a level area to prevent offsite migration of any spilled product. • The floor of the storage area must be impermeable to prevent seepage of spilled products into the ground or ground water. • The storage area must be out of the 1:100-year flood line or further than 100m from the edge of a watercourse, whichever is greatest. • The facility must be such that access to the materials/substances can only take place with the prior notification of an appropriate staff member. - All fuel storage tanks must have secondary containment in the form of an impermeable bund wall and base within which the tanks sits, raised above the floor, on plinths. This bund capacity must be sufficient to contain 110% of the tank's maximum capacity. - The distance and height of the bund wall relative to that of the tank must also be taken into consideration to ensure that any spillage does not result in oil spouting beyond the confines of the bund. - The site manager must establish a formal inspection routine to check all equipment in the bund area, as well as the bund area itself for malfunctions or leakages. The bund area must be inspected at least weekly and any accumulated rainwater removed. All valves and outlets must be checked to ensure that they are intact and closed securely. - The bund base must slope towards a rainwater sump of sufficient size. - Contaminated water may not be allowed to mix with clean water, and contained until it can be collected by a registered hazardous waste handling contractor or be disposed of at a registered hazardous waste handling facility. - Drip trays must be available to be place underneath all stationary equipment or vehicles. - The layer of material at the vehicle service area must be removed and if contaminated with hazardous substances such as hydrocarbons must be disposed of as hazardous waste by an appropriately qualified waste handling contractor. The compacted areas must be ripped and the topsoil returned over the area.	Contamination of surface or groundwater due to hazardous spills not cleaned: NWA, 1998	Throughout operational and decommissioning phases

NAME OF ACTIVITY	SIZE AND SCALE OF DISTURBANCE	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
			• The site must be cleared of all hazardous substances once decommissioning has been completed and must be disposed of by an appropriately qualified waste handling contractor.		
	5 ha	Operational phase	**Erosion Control and Storm Water Handling:** • Storm water must be diverted around the topsoil heaps, and access roads to prevent erosion and loss of material. • Mining must be conducted only in accordance with the Best Practice Guideline for small scale mining that relates to storm water management, erosion and sediment control and waste management, developed by the Department of Water and Sanitation (DWS), and any other conditions which that Department may impose: • Runoff water must be diverted around the site areas with trenches and contour structures to prevent erosion of the work areas. • Clean water (e.g. rainwater) must be kept clean and be routed to a natural watercourse by a system separate from the dirty water system. You must prevent clean water from running or spilling into dirty water systems. • Dirty water must be collected and contained in a system separate from the clean water system. • Dirty water must be prevented from spilling or seeping into clean water systems. • The storm water management plan must apply for the entire life cycle of the mining activity and over different hydrological cycles (rainfall patterns). • The statutory requirements of various regulatory agencies and the interests of stakeholders must be considered and incorporated into the management plan. • Any erosion problems within the borrow pit area as a result of the mining activities observed must be rectified immediately and monitored thereafter to ensure that they do not re-occur.	Contamination of surface or groundwater due to hazardous spills not cleaned: NWA, 1998	Throughout operational and decommissioning phases

NAME OF ACTIVITY	SIZE AND SCALE OF DISTURBANCE	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
			- Mining within steep slopes will need to ensure that adequate slope protection is provided. - All bare areas resulting from the development must be re-vegetated, post-operation, with locally occurring species, to bind the soil and limit erosion potential. - Roads and other disturbed areas within the project area must regularly be monitored for erosion problems and problem areas must receive follow-up monitoring to assess the success of the remediation. - Silt/sediment traps/barriers must be used where there is a danger of topsoil or material stockpiles eroding and entering downstream drainage lines and other sensitive areas. - These sediment/silt barriers must regularly be maintained and cleared so as to ensure effective drainage of the areas - Any erosion points created during construction must be filled and stabilized immediately. - Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time. - Construction of gabions and other stabilisation features must be undertaken to prevent erosion, where deemed necessary.		

NAME OF ACTIVITY	SIZE AND SCALE OF DISTURBANCE	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Establishment of temporary buildings and infrastructure within boundaries of site; & Stripping and stockpiling of topsoil; & Crushing and screening of sillimanite and aggregate; & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	5 ha	Operational phase	**Protection of Fauna:** - The site manager must ensure that no fauna is caught, killed, harmed, sold or played with. - Workers must be instructed to report any animals that may be trapped in the working area. - No snares may be set or nests raided for eggs or young.	Negative impact on fauna that may enter the area: NEM:BA, 2004 Site management has to strive to eliminate the impact on fauna in the surrounding environment for the duration of the mining activities.	Throughout operational phases
Crushing and screening of sillimanite and aggregate.	5 ha	Operational phase	**Employee Safety:** - Workers must have access to the correct personal protection equipment (PPE) as required by law. - All operations must comply with the Mine Health and Safety Act, 1996 (Act No 29 of 1996).	The Occupational Health and safety act in conjunction with the Mine Health and Safety act as mitigation measure. MHSA, 1996 OHSA, 1993	Throughout operational and decommissioning phases

NAME OF ACTIVITY	SIZE AND SCALE OF DISTURBANCE	PHASE	MITIGATION MEASURES	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Transportation of sillimanite, aggregate and stone gravel from stockpile area to clients.	±14 km farm roads	Operational phase	**Access Roads:** - Storm water must be diverted around the access roads to prevent erosion. - Erosion of access road: Vehicular movement must be restricted to existing access routes to prevent crisscrossing of tracks through undisturbed areas. Rutting and erosion of the access road caused as a result of the mining activity must be repaired by the applicant. - On completion of mining operations, the surface of these areas, if compacted due to hauling and dumping operations, must be scarified to a depth of at least 300 mm and graded to an even surface condition and the previously stored topsoil must be returned to its original depth over the area.	Degradation of the gravel access road: NRTA, 1996 The gravel access road needs to be monitored for signs of degradation. Should any signs become apparent immediate rectification actions must be implemented.	Throughout operational and decommissioning phases

e) Impact Management Outcomes

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph () ;

Table 41: Impact Management Outcomes

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED
whether listed or not listed	(Including the potential impacts for cumulative impacts)		In which impact is anticipated	(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc...Etc.)	
(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...Etc. Etc.)	(E.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc...Etc.)		(e.g. Construction, commissioning, operational Decommissioning, closure, post-closure))	E.g. Modify through alternative method. Control through noise control. Control through management and monitoring. Remedy through rehabilitation.	
Demarcation of site with visible beacons.	No impact could be identified other than the beacons being outside the boundaries of the approved mining area.	N/A	Construction / Site Establishment phase	N/A	Mining of the sillimanite is only allowed within the boundaries of the approved area: MHSA, 1996 OHSA, 1993 MPRDA, 2008; NEMA, 1998

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED
Establishment of temporary buildings and infrastructure within boundaries of site.	If the infrastructure is established within the boundaries of the approved mining area, no impact could be identified.	N/A	Construction / Site Establishment phase	N/A	Not applicable as these are mobile and will be removed during rehabilitation and closure of the site.
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	- Potential hydrocarbon contamination leeching into the water table. - Reduction of local groundwater. - Potential contamination through littering leeching into the groundwater table - Potential silt-loading of drainage lines, downstream and surrounding water bodies. - Potential hydrocarbon contamination which may reach downstream surface water bodies. - Potential surface water contamination if leaks escape into the environment. - Potential impact of mining activities on the runoff and infiltration of storm water.	- Groundwater pollution - Surface water Bodies	Construction / Site Establishment phase	Control: Proper site management. Surface water Management Implement storm water control measures. Measures will be implemented as prescribed by DWS.	Contamination of surface or groundwater due to hazardous spills not cleaned: - NWA, 1998

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	- Potential compaction of soils in neighbouring areas. - Potential contamination through littering. - Potential for loss of soil & damage to soil characteristics. - Initial increased potential for loss of soils and soil erosion. - Potential hydrocarbon contamination to soils.	Loss of topsoil will affect the rehabilitation of the mining area and the future agricultural potential of the site.	Construction / Site Establishment phase	Control: Storm water management. Site Management. Soil Management.	Loss of topsoil due to incorrect storm water management: - NEMA, 1998 - NWA, 1998 - NEMBA, 2004 - GNR 598 and 599 of 2014 The replacement of the topsoil is of utmost importance to ensure the effective future use of the area for agricultural purposes. Loss of soil due to un-vegetated areas: - NEMBA (Act No. 10 of 2004). - NEMA, 1998 Bare areas need to be re-vegetation to prevent soil erosion.
Establishment of temporary buildings and infrastructure within boundaries of site.	Portable Toilets Potential harm through sewage leaks	Social	Construction / Site Establishment phase	Control through proper site management.	Not applicable as these are mobile and will be removed during rehabilitation and closure of the site.
	Deterioration in visual aesthetics of the area	The visual impact may affect the aesthetics of the landscape.	Operational phase	Control: Implementation of proper housekeeping	Management of the mining activities must be in accordance with the: MHSA, 1996 OHSA, 1993 MPRDA, 2008; NEMA, 1998

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Increased dust generation will impact on the air quality of the receiving environment.	Operational phase	Control: Dust suppression methods Proper housekeeping	Dust generation on site must be managed in accordance with the: NEM:AQA, 2004 Regulation 6(1) National Dust Control Regulations, GN No R827 ASTM D1739 (SANS 1137:2012)
	Emissions caused by vehicles and equipment	Emissions will be contained within the property boundaries and will therefore affect only the landowner.	Operational phase & Decommissioning Phase	Control: Emissions	Dust Handling: NEM:AQA, 2004 Regulation 6(1)
	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	The noise impact must be contained within the boundaries of the property, and will represent the current noise levels of the farm.	Operational & Decommissioning Phase	Control: Noise control measures Proper housekeeping methods	Noise generation on site must be managed in accordance with the: NEM:AQA, 2004 Regulation 6(1) NRTA, 1996

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	<u>Loss of biodiversity.</u> Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	This will impact on the biodiversity of the receiving environment	Site Establishment & Operational phase	<u>Control & Remedy:</u> Implementation of weed control and weed/invader plant management plan Implement good housekeeping practices. Adhere to the recommendations made by the botanist. <u>Modify:</u> Consider use of a less sensitive area	Management of weed- or invader plants: NEMBA (Act No. 10 of 2004). Alien and Invasive Species Regulation GNR 598 and 599 of 2014. Negative impact on biodiversity of the area: NEM:BA, 2004
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Alteration of topography	Topography	Operational phase	N/A	N/A

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, &	Loss of and disturbance to surface archaeological sites	Artefacts or graves	Operational phase	Control: Survey area before site clearance	Loss of Artefacts and Graves: National Heritage Resources Act No. 25 of 1999
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	The impact of the fauna of the area will not be significant as vibration and noise will drive the fauna away	Operational phase	Control: Implementation of fauna protection measures	Negative impact on fauna that may enter the area: NEM:BA, 2004 Site management has to strive to eliminate the impact on fauna in the surrounding environment for the duration of the mining activities.
	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Land use	Operational phase	Fire Control	Every precaution must be taken to prevent contamination. The precautionary principal must apply.
Crushing and screening of sillimanite, aggregate and stone gravel.	Potential danger to surrounding community's Unsafe working environment for the employees. Safety risk posed by unsloped areas.	The Unsafe working conditions should only impact the applicant. Safety measures will be implemented	Operational phase	Control: Implementation of safety control measures	The Occupational Health and safety act in conjunction with the Mine Health and Safety act as mitigation measure. MHSA, 1996 OHSA, 1993 OHSAS 18001

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED
Transportation of sillimanite from stockpile area to clients.	• Road degradation. • Increased potential for road incidences. • Potential distraction to road users.	All road users will be affected.	Operational phase.	<u>Control & Remedy:</u> Road management.	<u>Degradation of the gravel access road:</u> • NRTA, 1996 The gravel access road needs to be monitored for signs of degradation. Should any signs become apparent immediate rectification actions must be implemented.

f) Impact Management Actions

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes in paragraph (c) and (d) will be achieved)

Table 42: Impact Management Actions

NAME OF ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
whether listed or not listed (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, mining plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...Etc. Etc.)	(Including the potential impacts for cumulative impacts) (E.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc...Etc.)	(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc...Etc...) E.g. Modify through alternative method. Control through noise control. Control through management and monitoring. Remedy through rehabilitation.		
Demarcation of site with visible beacons.	No impact could be identified other than the beacons being outside the boundaries of the approved mining area.	N/A	Mining of the sillimanite is only allowed within the boundaries of the approved area: MHSA, 1996 OHSA, 1993 MPRDA, 2008; NEMA, 1998	Beacons need to be in place throughout the life of the activity.

NAME OF ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Establishment of temporary buildings and infrastructure within boundaries of site.	If the infrastructure is established within the boundaries of the approved mining area, no impact could be identified.	N/A	Not applicable as these are mobile and will be removed during rehabilitation and closure of the site.	Construction / Site Establishment phase
	Portable Toilets Potential harm through sewage leaks	Control: Storm water management Site Management Soil Management	Not applicable as these are mobile and will be removed during rehabilitation and closure of the site.	Construction / Site Establishment phase
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Deterioration in visual aesthetics of the area	Control: Implementation of proper housekeeping	Management of the mining activities must be in accordance with the: MHSA, 1996 OHSA, 1993 MPRDA, 2008; NEMA, 1998	Throughout the site establishment- and operational phases.
	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Control: Dust suppression methods Proper housekeeping	Dust generation on site must be managed in accordance with the: NEM:AQA, 2004 Regulation 6(1) National Dust Control Regulations, GN No R827 ASTM D1739 (SANS 1137:2012)	Throughout operational and decommissioning phases
	Emissions caused by vehicles and equipment	Control: Emissions	Dust Handling: NEM:AQA, 2004 Regulation 6(1)	Throughout operational and decommissioning phases

NAME OF ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery.. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	<u>Control:</u> Noise control measures Proper housekeeping methods	<u>Noise generation on site must be managed in accordance with the:</u> NEM:AQA, 2004 Regulation 6(1) NRTA, 1996	Throughout operational and decommissioning phases
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	<u>Control:</u> Storm water management Site Management Soil Management	Loss of topsoil due to incorrect storm water management: NEMA, 1998 NWA, 1998 NEMBA, 2004 GNR 598 and 599 of 2014 The replacement of the topsoil is of utmost importance to ensure the effective future use of the area for agricultural purposes. Loss of soil due to un- vegetated areas: NEMBA (Act No. 10 of 2004). NEMA, 1998 Bare areas need to be re-vegetation to prevent soil erosion.	Throughout operational phases

NAME OF ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Control: Proper site management. Surface water Management Implement storm water control measures. Measures will be implemented as subscribed by DWS.	Contamination of surface or groundwater due to hazardous spills not cleaned: NWA, 1998	Throughout operational and decommissioning phases
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Alteration of topography	N/A	N/A	Throughout operational and decommissioning phases

NAME OF ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel.	Loss of and disturbance to surface archaeological sites	**Control:** Survey area before site clearance	Loss of Artefacts and Graves: National Heritage Resources Act No. 25 of 1999	Throughout operational and decommissioning phases
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel.	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Control: Implementation of fauna protection measures	Negative impact on fauna that may enter the area: NEM:BA, 2004 Site management has to strive to eliminate the impact on fauna in the surrounding environment for the duration of the mining activities.	Throughout operational phases
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Fire Control	Every precaution must be taken to prevent contamination. The precautionary principal must apply.	Throughout operational and decommissioning phases
Establishment of temporary buildings and infrastructure within boundaries of site.	Influx of unsuccessful job seekers which may informally settle in area. Potential danger to surrounding communities	Control through proper site management	N/A	Construction / Site Establishment phase

NAME OF ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment. Potential loss of protected or red data plant species.	Control & Remedy: Implementation of weed control and weed / invader plant management plan. Implement good housekeeping practices. Adhere to the recommendations made by the botanist. Modify: Consider use of a less sensitive area.	Management of weed- or invader plants: NEMBA (Act No. 10 of 2004). Alien and Invasive Species Regulation GNR 598 and 599 of 2014. Negative impact on biodiversity of the area (Site Alternative 1): NEM:BA, 2004.	Throughout operational and decommissioning phases.
Transportation of sillimanite from stockpile area to clients	Road degradation. Increased potential for road incidences Potential distraction to road users	Control & Remedy: Road management	Degradation of the gravel access road: NRTA, 1996 The gravel access road needs to be monitored for signs of degradation. Should any signs become apparent immediate rectification actions must be implemented.	Throughout operational and decommissioning phases
Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Soils replaced and ameliorated	Control: Storm water management Site Management Soil Management	Loss of topsoil due to incorrect storm water management: NEMA, 1998 NWA, 1998 NEM:BA, 2004 GNR 598 and 599 of 2014 The replacement of the topsoil is of utmost importance to ensure the effective future use of the area for agricultural purposes. Loss of soil due to un- vegetated areas: NEM:BA (Act No. 10 of 2004). NEMA, 1998 Bare areas need to be re-vegetation to prevent soil erosion.	Throughout operational phases

NAME OF ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	COMPLIANCE WITH STANDARD / STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
	Reintroduction of fauna attracted to flora to the area	Control: Implementation of fauna protection measures	Negative impact on fauna that may enter the area: NEM:BA, 2004 Site management has to strive to eliminate the impact on fauna in the surrounding environment for the duration of the mining activities.	Throughout operational phases
	Improved aesthetics through rehabilitation	Control: Implementation of proper housekeeping	Management of the mining activities must be in accordance with the: MPRDA, 2008 NEMA, 1998	Throughout the site establishment- and operational phases.

i) Financial Provision

(1) Determination of the amount of Financial Provision.

(a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.

The primary objective is to obtain a closure certificate at the end of the life of the mining permit at minimum cost and in as short a time period as possible whilst still complying with the requirements of the Minerals and Petroleum Resources Development Act, 2002. To realise this, the following objectives must be achieved:

- Remove all temporary infrastructure and waste from the site as per the requirements of this EMPR and of the Provincial Department of Mineral Regulation;
- Demolish / rehabilitate all roads with no post-mining use potential;
- Clear all stockpiled material from site;
- Clear boulders from site;
- Remove all waste from site;
- Ensure future public health and safety are not compromised;
- Ensure that no threat to surface and underground water quality remains;
- Ensure that all permanent changes in topography are sustainable and do not cause erosion or the damming up of runoff;
- Shape and contour all disturbed areas in compliance with the EMPR;
- Spread the stockpiled topsoil (that is available) over the disturbed area to a depth of at least 300 mm;
- Control of weeds and alien invasive plant species is an important aspect after topsoil replacement and seeding has been done in an area;
- Any adverse socio-economic impacts are minimised; and
- All socio-economic benefits are maximised.

(b) Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.

This report, the Final Basic Assessment Report, includes all the environmental objectives in relation to closure and were available for perusal of I&AP's and stakeholders over a 30-days commenting period. No additional comments were received during the commenting period that could be added to the Final Basic Assessment Report.

(c) Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main prospecting activities, including the anticipated prospecting area at the time of closure.

The requested rehabilitation plan is attached in Appendix E. Upon closure of the mining activity all infrastructure will be removed. The compacted areas will be ripped and levelled upon which the topsoil will be replaced. No permanent structures will remain upon closure of the site. The rehabilitation plan shall entail removal of all generated waste, infrastructures and materials, re-vegetation of disturbed and cleared areas, rehabilitation of access roads, ensuring the growth of the existing grasses and plants species and cleaning of spillages etc.

(d) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The rehabilitation of the mining area as indicated on the rehabilitation plan attached as Appendix E will comply with the minimum closure objectives as prescribed by DMR and detailed below, and therefore is deemed to be compatible:

Rehabilitation of plant, office and service areas:

- Stockpiles will be removed during the decommissioning phase, the area ripped and the topsoil returned to its original depth to provide a growth medium.
- On completion of operations, all structures or objects shall be dealt with in accordance with section 44 of the Mineral and Petroleum Resources Development Act [MPRDA], 2002 (Act No. 28 of 2002):
  - Where sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped.
  - Areas containing French drains shall be compacted and covered with a final layer of topsoil to a height of 10cm above the surrounding ground surface.
  - The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora.
- Photographs of the workshop and office sites, before and during the mining operation and after rehabilitation, shall be taken at selected fixed points and kept on record for the information of the Regional Manager.
- On completion of mining operations, the surface of these areas, if compacted due to hauling and dumping operations, shall be scarified and graded to an even surface condition. Where applicable / possible topsoil needs to be returned to its original depth over the area.

- Prior to replacing the topsoil, the material that was removed from these areas will be replaced in the same order as it originally occurred.
- The area shall then be fertilized if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local, adapted indigenous seed mix.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area be seeded with a seed mix to his or her specification.

Final rehabilitation:

- Rehabilitation of the surface area shall entail reshaping, levelling, top dressing, land preparation, seeding and maintenance, and weed / alien clearing.
- All Infrastructures, equipment, plant, and other items used during the mining permit period will be removed from the site.
- Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining permit area and disposed of at a recognized landfill facility; proof of this removal will be kept on file at the applicant's office. It will not be permitted to be buried or burned on the site.
- Weed / Alien clearing will be done in a sporadic manner during the life of the Mining activities. Species regarded as the National Environmental Biodiversity Act [NEMBA] (Act No. 10 of 2004) Alien and Invasive Species Regulation GNR 598 and 599 of 2014 Species regarded as need to be eradicated from the site on final closure. Final rehabilitation shall be completed within a period specified by the Regional Manager.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.
- Seeding of the area:
    - The initial goal is to establish a good cover of a robust grass that will stabilise the soil and start the accumulation of soil organic carbon. This will be done using a combination of hydro seeding and physical planting of runners to apply a mix of commercial and indigenous species that includes both tufted and creeping species. The plants that were collected during the establishment and operational phases and kept in the designated area will be replanted.

The closure plan will be reviewed annually and updated every two years or as significant changes to the mine plan occur, as nearing closure. Please refer to the closure plan as attached in Appendix E.

(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.

The calculation of the quantum for financial provision was according to Section B of the working manual.

Mine type and saleable mineral by-product

According to Tables B.12, B.13 and B.14

Mine type	Sillimanite Aggregate Stone Gravel
Saleable mineral by-product	N/A

Primary Risk Class

According to Tables B.12 or B.13

Primary risk ranking	Class C – No additional Impact
Revised risk ranking	N/A

Environmental sensitivity of the mine area

According to Table B.4

Environmental sensitivity of the mine	Low

Level of information

According to Step 4.1

Level of information available	Extensive

Identification of closure components

According to Table B.5 and site-specific conditions.

COMPONENT NO.	MAIN DESCRIPTION	APPLICABILITY OF CLOSURE COMPONENTS (CIRCLE YES OR NO)	
1	Dismantling of processing plant and related structures (including overland conveyors and power lines)	**-**	**NO**
2(A)	Demolition of steel buildings and structures	**-**	**NO**
2(B)	Demolition of reinforced concrete buildings and structures	**-**	**NO**
3	Rehabilitation of access roads	**-**	**NO**
4(A)	Demolition and rehabilitation of electrified railway lines	**-**	**NO**
4(B)	Demolition and rehabilitation of non-electrified railway lines	**-**	**NO**
5	Demolition of housing and facilities	**-**	**NO**
6	Opencast rehabilitation including final voids and ramps	**-**	**NO**
7	Sealing of shafts, adits and inclines	**-**	**NO**
8(A)	Rehabilitation of overburden and spoils	**-**	**NO**
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing)	**-**	**NO**
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich)	**-**	**NO**
9	Rehabilitation of subsided areas	**-**	**NO**
10	General surface rehabilitation, including grassing of all denuded areas	**YES**	**-**
11	River diversions	**-**	**NO**
12	Fencing	**-**	**NO**
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater)	**-**	**NO**
14	2 to 3 years of maintenance and aftercare	**-**	**NO**

Unit rates for closure components

According to Table B.6 master rates and multiplication factors for applicable closure components. The master rate from the DMR Master Rates table for financial provision of 2019 has been used (*project initiated in 2019*).

COMPONENT NO.	MAIN DESCRIPTION	MASTER RATE	MULTIPLICATION FACTOR
1	Dismantling of processing plant and related structures (including overland conveyors and power lines)	-	-
2(A)	Demolition of steel buildings and structures	-	-
2(B)	Demolition of reinforced concrete buildings and structures	-	-
3	Rehabilitation of access roads	-	-
4(A)	Demolition and rehabilitation of electrified railway lines	-	-
4(B)	Demolition and rehabilitation of non-electrified railway lines	-	-
5	Demolition of housing and facilities	-	-
6	Opencast rehabilitation including final voids and ramps	-	-
7	Sealing of shafts, adits and inclines	-	-
8(A)	Rehabilitation of overburden and spoils	-	-
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing)	-	-
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich)	-	-
9	Rehabilitation of subsided areas	-	-
10	General surface rehabilitation, including grassing of all denuded areas	R 126 059	1.00
11	River diversions	-	-
12	Fencing	-	-
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater)	-	-
14	2 to 3 years of maintenance and aftercare	-	-

<u>Determine weighting factors</u>

According to Tables B.7 and B.8

Weighting factor 1: Nature of terrain/accessibility	1.00 (Flat)
Weighting factor 2: Proximity to urban area where goods and services are to be supplied	1.05 (Peri-Urban)

Table B.10 Template for Level 2: "Rules-based" assessment of the quantum for financial provision							
CALCULATION OF THE QUANTUM							
Mine:	Koenabib Mine			**Location:**	Pella		
Evaluator:	Yolandie Coetzee			**Date:**	21 November 2019		
No	**Description**	**Unit**	**A Quantity**	**B Master rate**	**C Multiplication factor**	**D Weighting factor 1**	**E=A *B*C*D Amount (rands)**
			Step 4.5	**Step 4.3**	**Step 4.3**	**Step 4.4**	
1	Dismantling of processing plant and related structures (including overland conveyors and power lines)	m^3	0	16	1	1	R 0,00
2a	Demolition of steel buildings and structures	m^2	0	228	1	1	R 0,00
2b	Demolition of reinforced concrete buildings and structures	m^2	0	336	1	1	R 0,00
3	Rehabilitation of access roads	m^2	0	41	1	1	R 0,00
4a	Demolition and rehabilitation of electrified railway lines	m	0	395	1	1	R 0,00
4b	Demolition and rehabilitations of non-electrified railway lines	m	0	216	1	1	R 0,00
5	Demolition of housing and/or administration facilities	m^2	0	455	1	1	R 0,00
6	Opencast rehabilitation including final voids and ramps	ha	0	238 697	0.04	1	R 0,00
7	Sealing of shaft, audits and inclines	m^3	0	122	1	1	R 0,00
8a	Rehabilitation of overburden and spoils	ha	0	159 131	1	1	R 0,00
8b	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	0	198 195	1	1	R 0,00
8c	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	0	575 653	0.51	1	R 0,00
9	Rehabilitation of subsided areas	ha	0	133 249	1	1	R 0,00
10	General surface rehabilitation	ha	5	126 059	1	1	R 630 295.00
11	River diversions	ha	0	126 059	1	1	R 0,00
12	Fencing	m	0	144	1	1	R 0,00
13	Water Management	ha	0	47 931	0.17	1	R 0,00
14	2 to 3 years of maintenance and aftercare	ha	0	16 776	1	1	R 0,00
15a	Specialists study	Sum			1	1	R 0,00
15b	Specialists study	Sum			1	1	R 0,00
							R 630 295.00
	Multiply Sum of 1-15 by Weighting factor 2 (Step 4.4)			1,05	R 630 295.00	**Sub Total 1**	R 661 809.75
	General and preliminary			6% of subtotal 1			R 39 708.59
	Contingency			10.0% of Subtotal 1			R 66 180.98

	(Subtotal 1 plus management and contingency)					**Sub Total 2**	R 767 699.31
	Vat (15%)					**Sub Total 3**	R 115 154.90
	(Subtotal 3 plus VAT)					**GRAND TOTAL**	R 882 854.21

Calculation of closure costs

The amount that will be necessary for the rehabilitation of damages caused by the operation, both sudden closures during the normal operation of the project and at final, planned closure gives a sum total of R 882 854.21.

(f) Confirm that the financial provision will be provided as determined.

Herewith I, the person, whose name is stated below confirm that I am the person authorised to act as representative of the applicant in terms of the resolution submitted with the application. I herewith confirm that the company will provide the amount that will be determined by the Regional Manager in accordance with the prescribed guidelines.

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

- **(g) Monitoring of Impact Management Actions**
- **(h) Monitoring and reporting frequency**
- **(i) Responsible persons**
- **(j) Time period for implementing impact management actions**
- **(k) Mechanisms for monitoring compliance**

Table 43: Mechanism for monitoring compliance

NAME OF ACTIVITY	**IMPACTS REQUIRING MONITORING PROGRAMME**	**FUNCTIONAL REQUIREMENTS FOR MONITORING**	**ROLES AND RESPONSIBILITIES**	**MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS**
whether listed or not listed			(FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	
Demarcation of site with visible beacons	Maintenance of beacons	• Visible beacons need to be placed at the corners of the mining area.	Responsibility: • Site Manager to ensure day-to-day compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the independent Environmental Control Officer during the annual environmental audit. Role: Ensure beacons are in place throughout the life of the mine.	Applicable throughout site establishment-, operational-, and decommissioning phases. Daily compliance monitoring by site management. Annual compliance monitoring of site by an Environmental Control Officer.

NAME OF ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMME	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Soils	Soil contamination	<u>Responsibility:</u> • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the Environmental Control Officer. <u>Role:</u> • Strip and stockpile the upper 300 mm of the soil before mining. • Carefully manage and conserve the topsoil throughout the stockpiling and rehabilitation process. • Ensure topsoil stripping, stockpiling and re-spreading is done in a systematic way. Plan mining in such a way that topsoil is stockpiled for the minimum possible time. • Consider stockpiling the topsoil at the existing topsoil storage area (Existing stockpile area), alternatively place topsoil heaps on a levelled area within the mining footprint area and implement measures to safeguard the piles from being washed away. Do not stockpile topsoil in undisturbed areas.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Monthly compliance monitoring of site by fallout dust monitoring consultant. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental

			- Ensure that topsoil heaps do not exceed 1.5 m in order to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen. - Divert storm- and runoff water around the stockpile area to prevent erosion. - Vegetate the topsoil heaps to be stored longer than 6 months with an indigenous grass seed mix if vegetation does not naturally germinate within the first growth season. - Spread the topsoil evenly over the rehabilitated area upon closure of the site. - Strive to re-instate topsoil at a time of the year when vegetation cover can be established as quickly as possible afterwards, to that erosion of returned topsoil is minimized. The best time of year is at the end of the rainy season. - Plant a cover crop immediately after spreading topsoil to stabilise the soil and protect it from erosion. Fertilise the cover crop for optimum production. Rehabilitation extends until the first cover crop is well established. - Control run-off water with temporary banks, where necessary, to prevent accumulation of run-off causing down-slope erosion. - Monitor the rehabilitated area for erosion, and appropriately stabilize if erosion do occur, for at least 12 months after reinstatement. - Remove topsoil at right angles to the slope to slow down surface runoff and prevent erosion. - Conduct topsoil stripping, stockpiling and re-spreading in a systematic way. Ensure topsoil is stockpiled for the minimum possible time. - Protect topsoil stockpiles against losses by water and wind erosion through the establishment of plants on the stockpiles. - Conduct the activity in accordance with the Best Practice Guideline for small-scale mining as stipulated by DWS.	

Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Visual intrusion as a result of site establishment. Monitoring of visual impacts. Inspect area for illegal littering and dumping	Minimize the visual impact of the activity on the surrounding environment through proper site management and implementing good housekeeping practices.	<u>Responsibility:</u> • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the Environmental Control Officer. <u>Role:</u> • Ensure that the site have a neat appearance and is kept in good condition at all times. • Remove all infrastructure upon rehabilitation of the mining area and return the area to its prior status.	
Establishment of temporary buildings and infrastructure within boundaries of site.	Inspect area for illegal littering and dumping	Oil spill kit. Sealed drip trays. Formal waste disposal system with waste registers, or access to waste registers.	<u>Responsibility:</u> • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. Compliance to be monitored by the Environmental Control Officer. <u>Role:</u> • Ensure no waste storage area is established outside the boundaries of the mining area. • Ensure vehicle maintenance only take place within the service bay area of the off-site workshop. If emergency repairs are needed on site, ensure drip trays is present. Ensure all waste products are disposed of in a 200 litre closed container/bin inside the emergency service area.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Monthly compliance monitoring of site by fallout dust monitoring consultant. Quarterly compliance monitoring of site by an Environmental Control

NAME OF ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMME	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Soils	Soil contamination	Responsibility: • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the Environmental Control Officer. Role: • Strip and stockpile the upper 300 mm of the soil before mining. • Carefully manage and conserve the topsoil throughout the stockpiling and rehabilitation process. • Ensure topsoil stripping, stockpiling and re-spreading is done in a systematic way. Plan mining in such a way that topsoil is stockpiled for the minimum possible time. • Consider stockpiling the topsoil at the existing topsoil storage area (Existing stockpile area), alternatively place topsoil heaps on a levelled area within the mining footprint area and implement measures to safeguard the piles from being washed away. Do not stockpile topsoil in undisturbed areas.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Monthly compliance monitoring of site by fallout dust monitoring consultant. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental
			• Ensure diesel bowser is equipped with a drip tray at all times. • Use drip trays during each and every refuelling event. • Ensure the nozzle of the bowser rests in a sleeve to prevent dripping after refuelling. • Keep drip trays clean. No dirty drip trays may be used on site. • Collect any effluents containing oil, grease or other industrial substances in a suitable receptacle and	Officer. Annual compliance monitoring of site by an Independent Environmental

NAME OF ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMME	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Soils	Soil contamination	Responsibility: • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the Environmental Control Officer. Role: • Strip and stockpile the upper 300 mm of the soil before mining. • Carefully manage and conserve the topsoil throughout the stockpiling and rehabilitation process. • Ensure topsoil stripping, stockpiling and re-spreading is done in a systematic way. Plan mining in such a way that topsoil is stockpiled for the minimum possible time. • Consider stockpiling the topsoil at the existing topsoil storage area (Existing stockpile area), alternatively place topsoil heaps on a levelled area within the mining footprint area and implement measures to safeguard the piles from being washed away. Do not stockpile topsoil in undisturbed areas.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Monthly compliance monitoring of site by fallout dust monitoring consultant. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental
			removed from the site, either for resale or for appropriate disposal at a recognised facility. • Clean spills immediately to the satisfaction of the Regional Manager by removing the spillage together with the polluted soil and by disposing of them at a recognised facility. File proof on site. • Ensure the availability of suitable covered receptacles at all times and conveniently placed for the disposal of waste.	

NAME OF ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMME	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Soils	Soil contamination	Responsibility: • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the Environmental Control Officer. Role: • Strip and stockpile the upper 300 mm of the soil before mining. • Carefully manage and conserve the topsoil throughout the stockpiling and rehabilitation process. • Ensure topsoil stripping, stockpiling and re-spreading is done in a systematic way. Plan mining in such a way that topsoil is stockpiled for the minimum possible time. • Consider stockpiling the topsoil at the existing topsoil storage area (Existing stockpile area), alternatively place topsoil heaps on a levelled area within the mining footprint area and implement measures to safeguard the piles from being washed away. Do not stockpile topsoil in undisturbed areas.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Monthly compliance monitoring of site by fallout dust monitoring consultant. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental
			• Place all used oils, grease or hydraulic fluids therein and remove these receptacles from the site on a regular basis for disposal at a registered or licensed hazardous disposal facility. • Store non-biodegradable refuse such as glass bottles, plastic bags etc., in a container with a closable lid at a collecting point. Collection must take place on a regular basis and disposed of at the recognised landfill site.	

NAME OF ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMME	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Soils	Soil contamination	Responsibility: • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the Environmental Control Officer. Role: • Strip and stockpile the upper 300 mm of the soil before mining. • Carefully manage and conserve the topsoil throughout the stockpiling and rehabilitation process. • Ensure topsoil stripping, stockpiling and re-spreading is done in a systematic way. Plan mining in such a way that topsoil is stockpiled for the minimum possible time. • Consider stockpiling the topsoil at the existing topsoil storage area (Existing stockpile area), alternatively place topsoil heaps on a levelled area within the mining footprint area and implement measures to safeguard the piles from being washed away. Do not stockpile topsoil in undisturbed areas.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Monthly compliance monitoring of site by fallout dust monitoring consultant. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental
			Prevent refuse from being dumped on or in the vicinity of the mining area. • Biodegradable refuse to be handled as indicated above.	

Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	<u>Noise Monitoring</u> The noise impact must be contained within the boundaries of the property, as it will represent the current activities.	Personal noise exposure monitoring equipment. Signage indicating noise zones. Silencers fitted to all project related vehicles, and the use of vehicles that are in road worthy condition in terms of the National Road Traffic Act, 1996.	<u>Responsibility:</u> - Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. - Compliance to be monitored by the Environmental Control Officer. <u>Role:</u> - Ensure that employees and staff conduct themselves in an acceptable manner while on site. - No loud music may be permitted at the mining area. - Ensure that all mining vehicles are equipped with silencers and maintained in a road worthy condition in terms of the Road Transport Act, 1996. - Implement best practice measures in order to minimize potential noise impacts. - Contract a qualified occupational hygienist to quarterly monitor and report on the personal noise exposure of the employees working at the mine. The monitoring must be done in accordance with the SANS 10083:2004 (Edition 5) sampling method as well as NEM:AQA, 2004, SANS 10103:2008.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental Control Officer.
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from	Management of weed or invader plants The presence of weed and/or invader plants must be continuously monitored, and any unwanted plants must be removed. Loss of natural vegetation. Groundcover: Potential loss of protected or red data	Designated team to cut or pull out invasive plant species that germinated on site. Herbicide application equipment.	<u>Responsibility:</u> - Site Manager to ensure day-to-day compliance with the guidelines as stipulated in the EMPr. - Compliance to be monitored by the independent Environmental Control Officer during the annual environmental audit. - Botanist to identify plants of importance. <u>Role:</u> - Implement a weed and invader plant control management plan. - Control declared invader or exotic species on the rehabilitated areas. - Keep the temporary topsoil stockpiles free of weeds.	Throughout Operational and Decommissioning Phase Daily compliance monitoring by site management. Quarterly compliance monitoring of site by an Environmental Control Officer

stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	plant species.		- Do regular monitoring for alien plants at the site simultaneously with erosion monitoring. - When alien plants are detected, control and clear the plants using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. - Do not allow the planting or importing of any alien species to the site for landscaping, rehabilitation or any other purposes.	
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over	Soil Management Topsoil Management <u>Soil erosion:</u> Loss of reinstated topsoil after rehabilitation.	Storm water management structures such as berms to direct storm- and runoff water around the stockpiled topsoil area.	<u>Responsibility:</u> - Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. - Compliance to be monitored by the Environmental Control Officer. <u>Role:</u> - Strip and stockpile the upper 300 mm of the soil and protect as topsoil. - Remove topsoil at right angles to the slope to slow down surface runoff and prevent erosion. - Conduct topsoil stripping, stockpiling and re-spreading in a systematic way. Ensure topsoil is stockpiled for the minimum possible time. - Protect topsoil stockpiles against losses by water and wind erosion through the establishment of plants on the stockpiles. - Place topsoil stockpiles along the northern and western boundaries of the site. Topsoil heaps may not exceed 1.5m in order to preserve microorganism within the topsoil.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental Control Officer

disturbed area (final rehabilitation)	<u>Waste Management:</u> Management of waste must be a daily monitoring activity. Hydrocarbon spills need to be cleaned immediately and the site manager must check compliance daily. Contamination of area with hydrocarbon or hazardous waste material. Potential contamination of environment as a result of improper waste disposal	Oil spill kit. Sealed drip trays. Formal waste disposal system with waste registers.	<u>Responsibility:</u> - Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. - Compliance to be monitored by the Environmental Control Officer. <u>Role:</u> - Ensure no waste storage area is established outside the boundaries of the mining area. - Ensure vehicle maintenance only take place within the service bay area of the off-site workshop. If emergency repairs are needed on site, ensure drip trays is present. Ensure all waste products are disposed of in a 200 litre closed container/bin inside the emergency service area. - Ensure diesel bowser is equipped with a drip tray at all times. - Use drip trays during each and every refuelling event. - Ensure the nozzle of the bowser rests in a sleeve to prevent dripping after refuelling. - Keep drip trays clean. No dirty drip trays may be used on site. - Collect any effluents containing oil, grease or other industrial substances in a suitable receptacle and removed from the site, either for resale or for appropriate disposal at a recognised facility. - Clean spills immediately to the satisfaction of the Regional Manager by removing the spillage together with the polluted soil and by disposing of them at a recognised facility. File proof on site. - Ensure the availability of suitable covered receptacles at all times and conveniently placed for the disposal of waste. - Place all used oils, grease or hydraulic fluids therein and remove these receptacles from the site on a regular basis for disposal at a registered or licensed hazardous disposal facility.	

			• Store non-biodegradable refuse such as glass bottles, plastic bags etc., in a container with a closable lid at a collecting point. Collection must take place on a regular basis and disposed of at the recognised landfill site. Prevent refuse from being dumped on or in the vicinity of the mining area. • Biodegradable refuse to be handled as indicated above.	
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel.	Protection of Cultural and Heritage Artefacts	Number of an archaeologist that can be called once a discovery is made.	<u>Responsibility:</u> • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the Environmental Control Officer. <u>Role:</u> • Confine all mining to the development footprint area. • Implement the chance find procedure as described in this document when any discoveries are made.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental Control Officer.
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, &	Protection of fauna	Toolbox talks to educate employees how to handle fauna that enter the work areas.	<u>Responsibility:</u> • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the Environmental Control Officer. <u>Role:</u> • Ensure no fauna is caught, killed, harmed, sold or played with.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Quarterly compliance

NAME OF ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMME	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Soils	Soil contamination	Responsibility: • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the Environmental Control Officer. Role: • Strip and stockpile the upper 300 mm of the soil before mining. • Carefully manage and conserve the topsoil throughout the stockpiling and rehabilitation process. • Ensure topsoil stripping, stockpiling and re-spreading is done in a systematic way. Plan mining in such a way that topsoil is stockpiled for the minimum possible time. • Consider stockpiling the topsoil at the existing topsoil storage area (Existing stockpile area), alternatively place topsoil heaps on a levelled area within the mining footprint area and implement measures to safeguard the piles from being washed away. Do not stockpile topsoil in undisturbed areas.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Monthly compliance monitoring of site by fallout dust monitoring consultant. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental
			• Instruct workers to report any animals that may be trapped in the working area. • Prevent the setting of snares, raiding of nests, eggs or young.	

Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	Fire Management	Firefighting equipment	Responsibility: - Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. - Compliance to be monitored by the Environmental Control Officer. Role: - No fires allowed on site - All employees to know the location of the fire extinguishers. - Only smoke in designated smoking areas.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental Control
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from	Social	Complaints register	Responsibility: - Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. - Compliance to be monitored by the Environmental Control Officer. Role: - Inspect all complaints received and compare against photographic evidence. Inspect areas and ensue fences haven't been tampered with and no illegal connections have been added to lines	Throughout Operational Phase Daily compliance monitoring by site management. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental Control Officer.

stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)				
Establishment of temporary buildings and infrastructure within boundaries of site, & Stripping and stockpiling of topsoil, & Crushing and screening of sillimanite, aggregate and stone gravel, & Transportation of sillimanite from stockpile area to clients, & Sloping, landscaping and replacement of topsoil over disturbed area (final rehabilitation)	<u>Air Quality</u>: The dust generated by the mining activities must be continuously monitored, and addressed by the implementation of dust suppression methods. Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Fallout dust monitoring equipment. Gravimetric dust monitoring equipment. Dust suppression equipment such as a water car, water dispenser and sprayers on the crusher plant. Signage that clearly reduce the speed on the access roads.	<u>Responsibility:</u> - Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. - Compliance to be monitored by the Environmental Control Officer. <u>Role:</u> - Control the liberation of dust into the surrounding environment by the use of; inter alia, water spraying and/or other dust-allaying agents. - Limit speed on the access roads to 40km/h to prevent the generation of excess dust. - Spray roads with water or an environmentally friendly dust-allaying agent that contains no PCB's (e.g. DAS products) if dust is generated above acceptable limits. - Assess effectiveness of dust suppression equipment. - Re-vegetate all disturbed or exposed areas as soon as possible to prevent any dust source from being created. - Thoroughly soak all stockpiles to ensure dust suppression on the site. - Conduct formal dust monitoring on a monthly basis	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental Control Officer.

Transportation of sillimanite from stockpile area to clients.	Road degradation. Increased potential for road incidences. Potential distraction to road users.	Monitoring schedule to determine road condition.	Responsibility: • Site Manager to ensure compliance with the guidelines as stipulated in the EMPR. • Compliance to be monitored by the Environmental Control Officer. Role: • Maintain newly constructed access roads so as to minimise dust, erosion or undue surface damage. • Divert storm water around the access roads to prevent erosion. • Erosion of access road: Restrict vehicular movement to existing access routes to prevent crisscrossing of tracks through undisturbed areas. • Repair rutting and erosion of the access roads caused by the proposed activities.	Throughout Construction, Operational and Decommissioning Phase Daily compliance monitoring by site management. Quarterly compliance monitoring of site by an Environmental Control Officer. Annual compliance monitoring of site by an Independent Environmental Control Officer.

(l) Indicate the frequency of the submission of the performance assessment/environmental audit report.

The Environmental Audit Report in accordance with Appendix 7 as prescribed in Regulation 34 of the EIA Regulation, 2014 (as amended) will annually be submitted to the DMR for compliance monitoring purposes or in accordance with the time period stipulated by the Environmental Authorisation.

(m) Environmental Awareness Plan

1) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

The purpose of this section is to outline the methodology that will be used to educate the mine's employees and contractors of any environmental risks associated with their work and the manner in which these risks must be dealt with so as to avoid pollution and minimize the degradation of the environment.

Once mining of the extension area starts a copy of the Basic Assessment Report and amended Environmental Management Programme report will be handed to the site manager during the site establishment meeting. Issues such as topsoil handling, site clearance, fire principals and hazardous waste handling will be discussed. An induction meeting will be held with all the site workers to inform them of the Basic Rules of Conduct with regard to the environment.

The operations manager must ensure that he/she understands the EMPR document and its requirement and commitments. An Environmental Control Officer needs to check compliance of the mining activities to the management programmes described in the EMPR.

Training Needs

A training needs analysis will be performed through all levels of the organization including those within the administration, plant and mining worker sectors. Each of the categories / levels of the organization have different responsibilities and roles, accordingly different knowledge requirements are applicable.

After the training needs have been identified, it is the responsibility of the SHE Office to ensure that personnel attend the relevant identified training.

Training will also address the specific measures and actions as listed in the EMPR. This Environmental Awareness Plan (EAP) is intended to supplement the Safety, Health and Environmental (SHE) training and awareness requirements. Issues such as topsoil handling, site clearance, fire principals and waste handling will be discussed with the manager to ensure that he understands the goals as set out in the EMPR. An induction meeting will also be held with all the site workers to inform them of the basic steps towards environmental awareness with regard to the environment.

Table 44: Environmental Awareness Plan

OCCUPATION CATEGORY	ENVIRONMENTAL MANAGEMENT RESPONSIBILITY / ROLE	REQUIRED KNOWLEDGE AND INPUT	TRAINING REQUIRED	INTERVAL
Senior Management including Process Managers and Head of Department	Managing the Social & Environmental Assessment & Management System (SEAMS), and the Safety, Health & Environmental (SHE) Management System	Understanding the purpose of the SEAMS and SHE Management System	General in-house, management training	Once off
		Knowledge of the significant impacts as described in the EIA/EMP during the various phases		
		Knowledge of the commitments made in the EMP relevant to the various phases		
		Setting and reviewing the mine's Environmental objectives		
		Directing the SEAMS and SHE management system, and monitoring their progress		
		Accessing the legal register and searching for details	Training on the legal register	

OCCUPATION CATEGORY	ENVIRONMENTAL MANAGEMENT RESPONSIBILITY / ROLE	REQUIRED KNOWLEDGE AND INPUT	TRAINING REQUIRED	INTERVAL
Environmental Management Representative, SHE Officer & Internal Auditor	Managing the SEAMS and the SHE Management System Monitoring and auditing	Understanding the purpose of the SEAMS and SHE Management System	General in-house, management training	
		Knowledge of the significant impacts as described in the EIA/EMP during the various phases		
		Knowledge of the commitments made in the EMP relevant to the various phases		
		Directing the SEAMS and SHE management system, and monitoring their progress		
		Current knowledge of South African regulatory requirements, best practice guidelines and applicable legislation	Training on the legal register	On going
		Emergency preparedness and response		
		Knowledge in spill management, stockpile management, discard management, water management and waste management	Meetings and Talk Topics	Continuous
		Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting		
		Knowledge of the SABS standards and other relevant legislation regarding the correct storage of chemicals	Training on the SABS standards and other legislation	Annual
		Knowledge of auditing techniques and report writing	Auditor training	Annual
Section Managers & Section Engineers	Implementation and daily management of the SEAMS and the SHE Management System	Understanding the purpose of the SEAMS and SHE Management System	General in-house, management training	Once off
		Knowledge of the relevant department's significant impacts as described in the EIA/EMP during the construction and operational phases		
		Actively implementing actions to achieve SEAMS Management Plans and Environmental Objectives.	Meetings and talk topics	Continuous
		Knowledge in stockpile management, discard management, water management and waste management		
		Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting		
		Knowledge in the correct storage of chemicals		
Engine		Understanding the purpose of the SEAMS and SHE Management System		

OCCUPATION CATEGORY	ENVIRONMENTAL MANAGEMENT RESPONSIBILITY / ROLE	REQUIRED KNOWLEDGE AND INPUT	TRAINING REQUIRED	INTERVAL
	Implementation and daily management of the SEAMS and the SHE Management System	Knowledge of the relevant department's significant impacts as described in the EIA/EMP during the construction and operational phases	General in-house, management training	Once off
		Actively implementing actions to achieve SEAMS Management Plans and Environmental Objectives.		
		Knowledge in spill management and waste management	Meetings and talk topics	Continuous
		Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting		
		Knowledge in the correct storage of chemicals		
Mine Captain & General Engineering Supervisors	Implementation and daily management of the SEAMS and the SHE Management System	Understanding the purpose of the SEAMS and SHE Management System Knowledge of the relevant department's significant impacts as described in the EIA/EMP during the construction and operational phases Actively implementing actions to achieve SEAMS Management Plans and Environmental Objectives.	General in-house, management training	Once off
		Knowledge in spill management and waste management Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting Knowledge in the correct storage and handling of chemicals Understanding the requirements for not polluting the environment	Meetings and talk topics	Continuous
Supervisors, Shift Boss & Forman	General Environmental Awareness and job specific impacts	Understanding the purpose of the SEAMS and SHE Management System Knowledge of the relevant department's significant impacts as described in the EIA/EMP during the construction and operational phases Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting Knowledge in spill management and waste management Understanding the requirements for not polluting the environment	General in-house, management training	Once off

OCCUPATION CATEGORY	ENVIRONMENTAL MANAGEMENT RESPONSIBILITY / ROLE	REQUIRED KNOWLEDGE AND INPUT	TRAINING REQUIRED	INTERVAL
Operators, tradespersons & Floor Employees	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SEAMS and SHE Management System Understanding the SEAMS Management Plan relevant to their operations Understanding the requirements for not polluting the environment General understanding of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Environmental Awareness Training	Annual
General Administration Staff	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SEAMS and SHE Management System Understanding the SEAMS Management Plan relevant to their operations Understanding the requirements for not polluting the environment General understanding of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Environmental Awareness Training	Annual
Security	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SEAMS and SHE Management System Understanding the requirements for not polluting the environment General understanding of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Environmental Awareness Training	Annual
Senior Management including Process Managers and Head of Department	Managing the Social & Environmental Assessment & Management System (SEAMS), and the Safety, Health & Environmental (SHE) Management System	Understanding the purpose of the SEAMS and SHE Management System	General in-house, management training	Once off
		Knowledge of the significant impacts as described in the BAR/EMP during the various phases		
		Knowledge of the commitments made in the EMP relevant to the various phases		
		Setting and reviewing the mine's Environmental objectives		
		Directing the SEAMS and SHE management system, and monitoring their progress		
		Accessing the legal register and searching for details	Training on the legal register	Once off
		Emergency preparedness and response		
Environmental Management	Managing the SEAMS and the SHE Management System Monitoring and auditing	Understanding the purpose of the SEAMS and SHE Management System	General in-house, management training	Once off
		Knowledge of the significant impacts as described in the EIA/EMP during the various phases		

OCCUPATION CATEGORY	ENVIRONMENTAL MANAGEMENT RESPONSIBILITY / ROLE	REQUIRED KNOWLEDGE AND INPUT	TRAINING REQUIRED	INTERVAL
		Knowledge of the commitments made in the EMP relevant to the various phases		
		Directing the SEAMS and SHE management system, and monitoring their progress		
		Current knowledge of South African regulatory requirements, best practice guidelines and applicable legislation	Training on the legal register	On going
		Emergency preparedness and response		
		Knowledge in spill management, stockpile management, discard management, water management and waste management	Meetings and Talk Topics	Continuous
		Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting		
		Knowledge of the SABS standards and other relevant legislation regarding the correct storage of chemicals	Training on the SABS standards and other legislation	Annual
		Knowledge of auditing techniques and report writing	Auditor training	Annual
Section Managers & Section Engineers	Implementation and daily management of the SEAMS and the SHE Management System	Understanding the purpose of the SEAMS and SHE Management System	General in-house, management training	Once off
		Knowledge of the relevant department's significant impacts as described in the EIA/EMP during the construction and operational phases		
		Actively implementing actions to achieve SEAMS Management Plans and Environmental Objectives.	Meetings and talk topics	Continuous
		Knowledge in stockpile management, discard management, water management and waste management		
		Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting		
		Knowledge in the correct storage of chemicals		
Engineering HOD & General Engineering Supervisor	Implementation and daily management of the SEAMS and the SHE Management System	Understanding the purpose of the SEAMS and SHE Management System	General in-house, management training	Once off
		Knowledge of the relevant department's significant impacts as described in the EIA/EMP during the construction and operational phases		
		Actively implementing actions to achieve SEAMS Management Plans and Environmental Objectives.		

OCCUPATION CATEGORY	ENVIRONMENTAL MANAGEMENT RESPONSIBILITY / ROLE	REQUIRED KNOWLEDGE AND INPUT	TRAINING REQUIRED	INTERVAL
		Knowledge in spill management and waste management	Meetings and talk topics	Continuous
		Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting		
		Knowledge in the correct storage of chemicals		
Mine Captain & General Engineering Supervisors	Implementation and daily management of the SEAMS and the SHE Management System	Understanding the purpose of the SEAMS and SHE Management System. Knowledge of the relevant department's significant impacts as described in the BAR/EMP during the construction and operational phases Actively implementing actions to achieve SEAMS Management Plans and Environmental Objectives. Knowledge in spill management and waste management Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting Knowledge in the correct storage and handling of chemicals Understanding the requirements for not polluting the environment	General in-house, management training	Once off
			Meetings and talk topics	Continuous
Supervisors, Shift Boss & Forman	General Environmental Awareness and job specific impacts		General in-house, management training	Once off
Operators, tradespersons & Floor Employees		General Awareness of aim and purpose of the SEAMS and SHE Management System Understanding the SEAMS Management Plan relevant to their operations Understanding the requirements for not polluting the environment	Environmental Awareness Training	Annual
General Administration Staff				
Security				

Specialized Skills

The Training Department in conjunction with the SHE Officer are responsible for ensuring job specific training for personnel performing tasks, which can cause significant environmental and social impacts (e.g. receipt of bulk hazardous chemicals/fuel, hazardous materials handling, responding to emergency situations etc.). The Mining permit Manager with the assistance of the SHE Officer must identify relevant personnel and training courses.

On the job training is an essential tool in environmental awareness. Employees must be given details of the expected environmental issues and concerns specifically related to their occupation. Employees must be trained on how to respond if an environmental problem or source of environmental pollution arises. The training will be on-going, and all new employees will be provided with the same standard of training as existing employees.

Review of Training Material

Effectiveness of the environmental management training will be done by the management through task observations and during internal and external audits.

All training material for presentation to personnel and contractors will be reviewed annually to ensure consistency with organizational requirements and best practice guidelines. In addition to this, annual monitoring reports, audit results and all incident reports will be reviewed, any short comings and non-compliancy will be highlighted and management measures incorporated or improved upon within the training material.

Records

Records from the implementation of this EAP will be kept and controlled in accordance with the SHE Management System Control of Records Procedure, which is required to be implemented so as to provide evidence of conformity and effective operation of the relevant requirements of the SHE management system.

2) Manner in which risk will be dealt with in order to avoid pollution or the degradation of the environment.

The operations manager must ensure that he/she understands the EMPR document and its requirement and commitments before any mining takes place. An Environmental Control Officer needs to check compliance of the mining activity to the management programmes described in the EMPR.

EMERGENCY RESPONSE PLAN AND PROCEDURES

As part of its management tools, a mine must have an Emergency Response Plan. These plans will be disseminated to all employees and contractors in the event of an emergency. In the case of a medical accident or problem, the mine has first aid kits available at various points and an emergency room. A First Aid officer will be on duty at all times. In the event of an emergency the checklist of emergency response units must be consulted and the relevant units notified.

Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radios, pagers or telephones, must be placed around the mine. Should the emergency have the potential to affect the surrounding communities, they will be alerted via alarm signals or contacted in person.

Emergency services will be sourced from the nearest main town, Pofadder wherever possible. Contact details for the emergency services and local authorities are listed below; these will be displayed on site and made available to all employees and contractors.

Police Station (Aggeneys):	054 983 2437
Police Department (Pofadder):	054 933 1100
Ambulance:	082 749 7412
Fire Department:	054 332 4254
Hospital:	053 712 8100
Department of Water and Sanitation:	056 811 5834
Department of Mineral Resources:	053 807 1700
Department of Environment and Nature Conservation:	053 807 7300
Department of Roads and Public Works:	053 839 2100
Department of Economic Development and Tourism:	053839 4000
Department of Agriculture, land reform and rural development:	053 838 9100

The following list represents the basic steps towards environmental awareness, which all participants in this project must consider whilst carrying out their tasks.

Site Management

- Stay within boundaries of site – do not enter adjacent properties;
- Keep tools and material properly stored;
- Smoke only in designated areas; and
- Use toilets provided – report full or leaking toilets.

Water Management and Erosion

- Check that rainwater flows around work areas and are not contaminated;
- Report any erosion;
- Check that dirty water is kept from clean water;
- Do not drink from streams;
- After a heavy rainstorm or at least every 3 months, all water pollution control structures like storm water berms and trenches will be checked for signs of damage or change in its capacity;
- Any damage to any water pollution structures will be repaired immediately; and
- Any of the above actions will be included in the performance assessment report to the Department of Mineral Resources (DMR).
- Maintenance activities shall not lead to undue damage, blockages or disruption of the drainage lines or storm water channels on site or concentrate storm water sheet flow into erosive channels.
- Sediment to be removed on a need basis from all drainage channels, culverts and pipes under roads to prevent blocked pipes and erosion damage to road sides due to disrupted flow.
- Significant erosion in the drainage lines or storm water channels or swales shall be addressed by implementing water slowing measures e.g. temporary straw bales or sand bags or permanent gabion weirs and stabilised overflows and crossings to prevent recurrence.
- All erosion channels anywhere on site shall be repaired immediately through backfilling with appropriate material and stabilising to prevent recurrence.
- Where vegetation has been washed away or damaged as a result of the erosion this shall be reinstated once the area has been stabilised.
- Stabilisation measures e.g. grass blocks shall be maintained in good repair.
- No materials or wastes shall be dumped into storm water channels, in the drainage lines or their buffer zones. Any litter or foreign material blown or washed into these areas inadvertently is to be removed regularly (minimum monthly) without undue disturbance to the vegetation and stability of the area.

- Fuel or oil or other chemical spills anywhere on site must be treated immediately with an appropriate mop-up or bio-remedial product as directed by manufacturers to prevent contamination of runoff.

Flooding

There is potential for flooding during the rainy season. This could result in a large volume of water flowing downstream or accumulating in a water containment facility and could cause major damage to equipment and endanger the lives of employees on site. Procedures must be put in place to ensure that there is a quick response to flood events and damage is kept to a minimum.

The procedure for flooding is as follows:

- DWS's flood warning system will be reviewed annually;
- Mine management will be made aware of any such event so they can take appropriate action to ensure production losses are kept to a minimum;
- All contaminated water will be contained on site, as far as possible and discharges to the environment will only occur if absolutely necessary in an extreme flood event.
- Check that rainwater flows around work areas and are not contaminated;
- Report any erosion;
- Check that dirty water is kept from clean water; and
- Do not swim in or drink from streams.

Waste Management

- Take care of your own waste;
- Keep waste separate into labelled containers – report full bins;
- Place waste in containers and always close lid;
- Don't burn waste; and
- Pick-up any litter laying around.

Hazardous Waste Management (Petrol, Oil, Diesel, Grease)

Hydrocarbons such as diesel, petrol, and oil which are used as fuel for mine machinery which is kept on site, increases the possibility that spillage may occur. As this is a product mine there is also the possibility of a product spillage occurring. In the event of a spillage, procedures must be put into place to ensure that there are minimal impacts to the surrounding environment.

Diesel, engine oil and hydraulic oil are the most likely hydrocarbons identified during impact assessments that can result in an emergency situation.

The following procedure applies to a hydrocarbon spill:

- If any spills take place the contaminant together with the soil will be removed and placed in acceptable container to be removed with industrial waste to a recognised licence facility or licenced company.
- Bioremediation will be done on site to the satisfaction of DEA
- A spill clean-up kit is available at the storage yard
- All personnel will be trained n spill clean-up methodologies.
- Every precaution will be taken to prevent the spill from entering the surface water environment;
- In the event of a large spillage, adequate emergency equipment for spill containment or collection, such as additional supplies of booms and absorbent materials, will be made available and if required, a specialised clean-up crew will be called in to decontaminate the area. The soil will be removed and treated at a special soil rehabilitation facility;
- If the spill is larger than 100 litres the Department of Environmental Affairs and Tourism (DEAT) will be notified by fax and or phone within 24-hour of the event.
- Reasonable measures must be taken to stop the spread of hydrocarbons and secure the area to limit access;
- Dispatch necessary services;
- The incident must be reported to the Environmental coordinator immediately;
- The Environmental Coordinator will assess the situation from the information provided, and set up an investigation team or relevant personnel. Included in this team could be the Mine Manager, Chief Safety Officer, the employee who reported the incident and any individual responsible for the incident;
- When investigating the incident, priority must be given to safety;
- Once the situation has been assessed, the Environmental Coordinator must report back to the Mine Manager;
- The Mine Manager and the investigation team must make a decision on what measures can be taken to limit the damage caused by the incident, and if possible any remediation measures that can be taken;
- The source / reason of the spill or leak will be addressed immediately;
- Never mix general waste with hazardous waste;
- Use only sealed, non-leaking containers;
- Keep all containers closed and store only in approved areas;
- Always put drip trays under vehicles and machinery;
- Empty drip trays after rain;
- Stop leaks and spills, if safe;
- Keep spilled liquids moving away;
- Immediately report the spill to the site manager/supervision;
- Locate spill kit/supplies and use to clean-up, if safe;

- Place spill clean-up wastes in proper containers; and
- Label containers and move to approved storage area.

Breakdown of vehicles or equipment outside vehicle maintenance yard:

If any equipment of vehicles breaks down inside the pit or outside the storage yard the following emergency procedure will be followed:

- Drip pans will be placed at all point s where diesel, oil or any hydraulic fluid can rip and contaminate the oil;
- All efforts will be made to remove the vehicle or equipment to the storage area;
- If the vehicle or equipment cannot be removed the broken part will be drained of all fluid and the specific part remove to the service area;
- No repairs will be allowed to take place outside the maintenance yard or service area; and
- Any spills will be managed as described in the hydrocarbon section above.

Explosions

Explosions can occur in the plant and workshop areas when working with gas cylinders and chemicals. These could result in large numbers of employees being injured and requiring medical assistance.

The procedure to be followed is:

- Alternative evacuation routes will be devised, should a rock fall occur as a result of the explosion; and
- All relevant emergency response units must be notified and hospitals informed of incoming patients.

Discoveries:

- Stop work immediately;
- Notify site manager/supervisor; and
- Includes – Archaeological finds, Cultural artefacts, contaminated water, Pipes, Containers, Tanks and drums, any buried structures.

Air Quality:

- Wear protection when working in very dusty areas;
- Implement dust control measures:
- Sweep paved roads;
- Water all roads and work areas;
- Minimize handling of material; and
- Obey speed limit and cover trucks.

Driving and Noise

- Use only approved access roads;
- Respect speed limits;
- Only use turn-around areas – no crisscrossing through undisturbed areas;
- Avoid unnecessary loud noises; and
- Report or repair noisy vehicles.

Flora and Fauna

- Do not remove any plants or trees without approval of the site manager;
- Do not collect fire wood;
- Do not catch, kill, harm, sell or play with any animal, reptile, bird or amphibian on site;
- Report any animal trapped in the work area; and
- Do not set snares or raid nests for eggs or young.

Fire Management

Veld fires and fires resulting from other sources must be handled with extreme caution. Fire extinguishers will be placed around the mine.

The following procedures apply to fires:

- In the event of a fire an alarm will be activated to alert all employees and contractors;
- Identify the type of fire and the appropriate extinguishing material. For example, water for a grass fire, and mono ammonium phosphate based fire extinguisher for chemical and electrical fires;
- In the event of a small fire the fire extinguishers placed around the mine will be used to contain and extinguish the fire;
- In the event of a large fire, the fire department will be notified and must react timeously;
- All staff will receive training in response to a fire emergency on site;
- A Fire Protection Association will be set up with the mine and surrounding land owners to facilitate communication during fire events and assist in fighting fires, where necessary;
- Fire breaks has been established and will be maintained around the mining area for the duration of the project;
- If possible all surrounding drains, such as storm water drains need to be covered and or protected to prevent any contaminated water from entering the drains
- In case of a chemical or petroleum fire, run-off from the area will be contained as far as possible using the most appropriate measures e.g. spill absorbent cushions, sand or a physical barrier;
- Contaminated run-off must be diverted into an oil sump, or cleaned up;

- All firefighting equipment will be inspected at least monthly to ensure that these are functioning;
- Do not light any fires on site, unless contained in a drum at demarcated area;
- Put cigarette butts in a rubbish bin;
- Do not smoke near gas, paints or petrol;
- Know the position of firefighting equipment;
- Report all fires; and
- Don't burn waste or vegetation.

In addition to the induction meeting to be held with the site employees to inform them of the basic steps towards environmental awareness, the operators of earth moving equipment should be informed of the following requirements:

- Mine within demarcated areas;
- No-go areas;
- Establishment of access roads;
- Handling of hazardous waste and their storage facilities;
- Handling of biodegradable and non-degradable waste;
- Vehicle maintenance;
- Mining methods to be followed;
- Handling and storing of topsoil;
- Capping of drill holes;
- Speed control in order to reduce dust;
- Emergency procedure awareness;
- Labourers must be informed of the following during "toolbox talks":
- Reporting of unusual observations to management (e.g. fossils, graves, etc.);
- Reporting of spills to management;
- Felling or damaging trees for firewood not allowed;
- Making fires not allowed;
- Hunting and killing of animals not allowed;
- Demarcated areas for mining;
- Establishing of access roads and erection of gates in fence lines;
- Toilet facilities and hygiene measures;
- Handling of waste;
- Vehicle maintenance and vehicle maintenance yard;
- Handling of topsoil; and
- Emergency procedures awareness.

Flora and Fauna including alien invasive species

- Do not remove any plants or trees without approval of the site manager;
- Do not collect fire wood;

- Do not catch, kill, harm, sell or play with any animal, reptile, bird or amphibian on site;
- Report any animal trapped in the work area; and
- Do not set snares or raid nests for eggs or young.

Maintenance and Infrastructure Management

- Infrastructure visibly in good repair and operational areas kept tidy.
- The footprint of the operations and vehicular circulation is clearly defined with no "spill over" into other areas of the site.
- Roads are stable and in good repair and
- Fences and gates are in good repair.

g) Specific information required by the Competent Authority

(Among others, confirm that the financial provision will be reviewed annually)

The applicant undertakes to annually review and update the financial provision calculation, upon which it will be submitted to DMR for review and approved as being sufficient to cover the environmental liability at the time and for closure of the mine at that time.

Effectiveness of the environmental management training will be done by the management through task observations and during internal and external audits. All training material for presentation to personnel and contractors will be reviewed annually to ensure consistency with organizational requirements and best practice guidelines. In addition to this, annual monitoring reports, audit results and all incident reports will be reviewed, any short comings and non-compliancy will be highlighted and management measures incorporated or improved upon within the training material.

2) Undertaking

The EAP herewith confirms

a) the correctness of the information provided in the reports **X**

b) the inclusion of comments and inputs from stakeholders and I&AP's **X**

c) the inclusion of inputs and recommendations from the specialist reports where relevant, and **X**

d) that the information provided by the EAP to interested and affected parties and any response by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein **X**

Signature of the Environmental Assessment Practitioner:

Greenmined Environmental

Name of Company:

31 January 2020

Date:

-END-

APPENDIX A

REGULATION 2(2) MINE PLAN

APPENDIX B

LOCALITY MAP

APPENDIX C

SITE ACTIVITIES PLAN

APPENDIX D

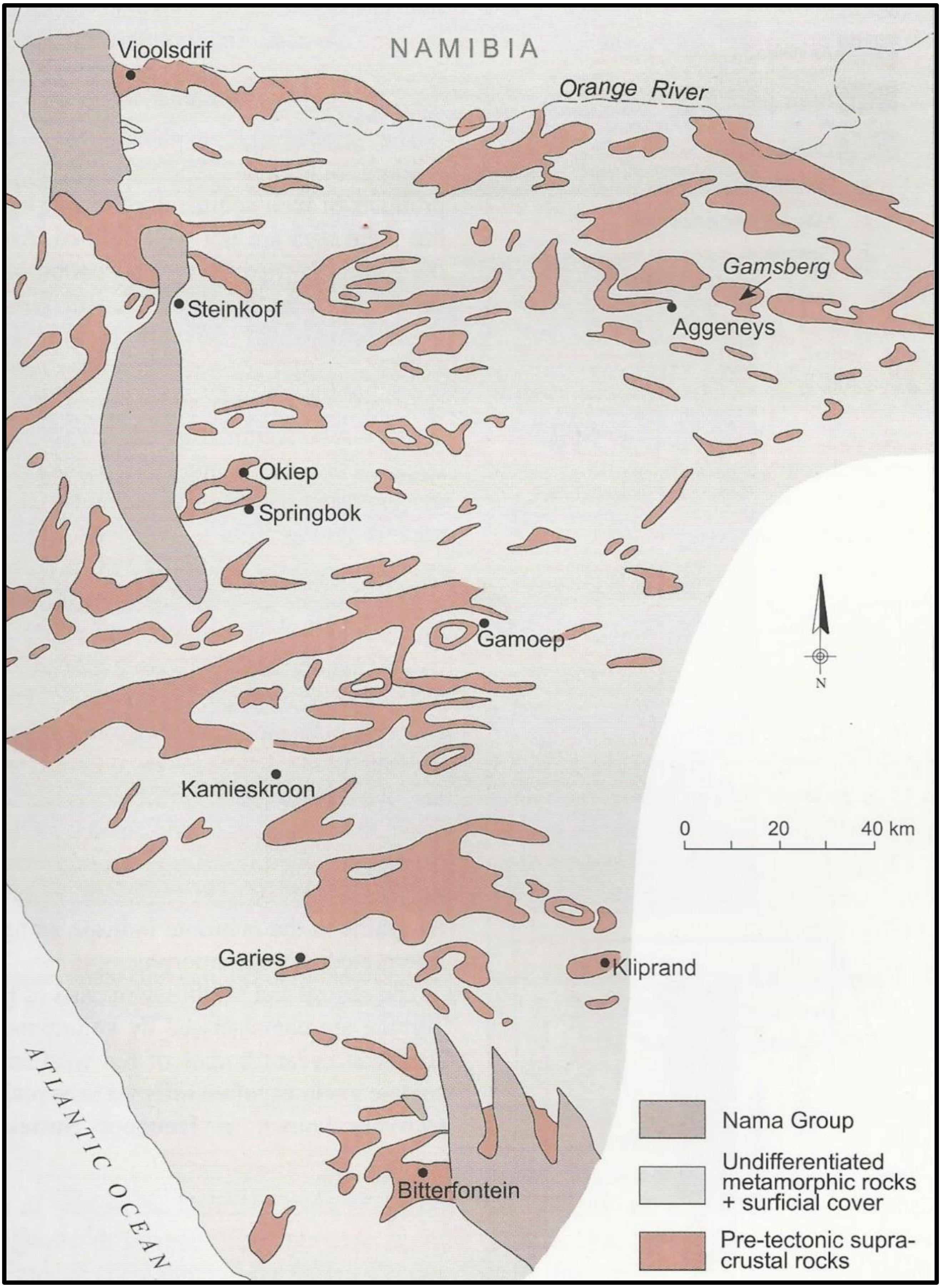
LAND USE PLAN

APPENDIX E

REHABILITATION MAP

APPENDIX F

GEOLOGY MAP


NAMIBIA
Vioolsdrif
Orange River
Gamsberg
Steinkopf
Aggeneys
Okiep
Springbok
Gamoep
N
Kamieskroon
0 20 40 km
Garies
Kliprand
ATLANTIC OCEAN
Bitterfontein
Nama Group
Undifferentiated metamorphic rocks + surficial cover
Pre-tectonic supra-crustal rocks

APPENDIX G

PROOF OF PUBLIC PARTICIPATION

APPENDIX H

SUPPORTING IMPACT ASSESSMENT

SUPPORTING IMPACT ASSESSMENT

A "significant impact" is defined as it is defined in the EIA Regulations (2014): "an impact that may have a notable effect on one or more aspects of the environment or may result non-compliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as by its duration, magnitude, intensity or probability of occurrence". The objective of this EIA methodology is to serve as framework for accurately evaluating impacts associated with current or proposed activities in the biophysical, social and socio-economical spheres. It aims to ensure that all legal requirements and environmental considerations are met in order to have a complete and integrated environmental framework for impact evaluations.

1. IMPACT ASSESSMENT METHODOLOGY

The process of determining impacts to be assessed is one of the most important parts of the environmental impact assessment process. It is of such high importance because the environmental impacts identified can and are often linked to the same impact stream.

In this method all impacts on the biophysical environment are assessed in terms of the overall integrity of ecosystems, habitats, populations and individuals affected. The Environmental Impact Assessment (EIA) 2014 Regulations promulgated in terms of Sections 24 (5), 24M and 44 of the National Environmental Management Act (NEMA) (Act No. 107 of 1998) [as amended] requires that all identified potential impacts associated with the proposed project be assessed in terms of their overall potential significance on the natural, social and economic environments.

The criteria identified in the EIA Regulations (2014) include the following:

- Nature of the impact;
- Extent of the impact;
- Duration of the impact;
- Frequency of the Impact;
- Probability of the impact occurring;
- Degree to which impact can be reversed;
- Degree to which impact may cause irreplaceable loss of resources;
- Degree to which the impact can be mitigated; and
- Cumulative impacts.

Greenmined Environmental has developed an impact assessment methodology (as defined below) whereby the significance of a potential impact is determined through the assessment of the relevant temporal and spatial scales determined of the extent, magnitude and duration criteria associated with a particular impact.

This method does not explicitly define each of the criteria but rather combines them and results in an indication of the overall significance.

DEFINITIONS AND CONCEPTS:

Environmental significance:

The concept of significance is at the core of impact identification, evaluation and decision-making. The concept remains largely undefined and there is no international consensus on a single definition. The following common elements are recognised from the various interpretations:

- Environmental significance is a value judgement;
- The degree of environmental significance depends on the nature of the impact;
- The importance is rated in terms of both biophysical and socio-economic values; and
- Determining significance involves the amount of change to the environment perceived to be acceptable to affected communities.

Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of acceptability) (DEAT (2002) Impact Significance, Integrated Environmental Management, Information Series 5).
The concept of risk has two dimensions, namely the consequence of an event or set of circumstances, and the likelihood of particular consequences being realised (Environment Australia (1999) Environmental Risk Management).

1.1. Nature of the impact

The nature of an impact can be defined as “a brief description of the impact being assessed, in terms of the proposed activity or project, including the socio-economic or environmental aspect affected by this impact”.

1.2. Extent of the impact

The extent of an impact can be defined as “a brief description of the spatial influence of the impact or the area that will be affected by the impact”.

Table 45: Determining the extent of an impact

EXTENT Extent or spatial influence of impact	**Footprint**	Only as far as the activity, such as footprint occurring within the total site area
	Site	Only the site and/or 500m radius from the site will be affected
	Local	Local area / district (neighbouring properties, transport routes and adjacent towns) is affected
	Region	Entire region / province is affected
	National	Country is affected

1.3. Severity of the impact

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment.

Table 46: Rating of Severity

Type of criteria	**Rating**				
	1	**2**	**3**	**4**	**5**
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small / Potentially harmful	Significant/ Harmful	Great/ Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance/ Easily reversible	Low cost to mitigate	Substantial cost to mitigate/ Potential to mitigate impacts/ Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate/ Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Moderate change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

1.4. Duration of the impact

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Table 47: Rating of Duration

Rating		**Description**
1	Very Short Term	Up to three months (quarter) after construction
2	Short Term	Three months to one year after construction
3	Medium Term	One year to six years after construction
4	Long Term	Six to ten years after construction
5	Permanent	Beyond ten years after construction

1.5. Probability of the impact occurring

The probability of an impact can be defined as “the estimated chance of the impact happening”. Probability refers to how often the activity or aspect has an impact on the environment.

Table 48: Determining the probability of an impact

PROBABILITY	**1**	Almost never / almost impossible	*Impossible* to occur (0 – 20% probability of occurring)
	2	Very seldom / highly unlikely	*Unlikely* to occur (20 -40% probability of occurring)
	3	Infrequent / unlikely / seldom	*May* occur (40-60% chance of occurring)
	4	Often / regularly / likely / possible	*Likely* to occur (60-80% chance of occurring)
	5	Daily / highly likely / definitely	Will *certainly* occur (80-100% chance of occurring)

1.6. Degree to which impact can be reversed

The reversibility of an impact can be defined as "the ability of an impact to be changed from a state of affecting aspects to a state of not affecting aspects".

Table 49: Determining the reversibility of an impact

REVERSIBILITY	**Reversible**	Impacts can be reversed through the implementation of mitigation measures
	Irreversible	Impacts are permanent and can't be reversed by the implementation of mitigation measures

1.7. Determination of Likelihood:

The irreplaceability (likelihood) of an impact can be defined as "the amount of resources that can/can't be replaced". The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described below and in tables 6 and 7.

1.8. Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2.

Example of calculating Overall Likelihood

Consequence	**Rating**
Duration	Example 4
Probability	Example 2
SUBTOTAL	**6**
TOTAL LIKELIHOOD **(**Subtotal divided by 2)	**3**

1.9. Determination of Likelihood:

The irreplaceability (likelihood) of an impact can be defined as "the amount of resources that can/can't be replaced". The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described below and in tables 6 and 7.

1.10. Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2.

Example of calculating Overall Likelihood

Consequence	Rating
Duration	Example 4
Probability	Example 2
SUBTOTAL	**6**
TOTAL LIKELIHOOD (Subtotal divided by 2)	**3**

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken.

Rating of Frequency:

Rating	Description
1	Once a year or once/more during operation
2	Once/more in 6 Months
3	Once/more a Month
4	Once/more a Week
5	Daily

1.11. Determination of Overall Environmental Significance:

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence X Overall Likelihood

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of **LOW**, **LOW-MEDIUM**, **MEDIUM**, **MEDIUM-HIGH** or **HIGH**, as shown in the table below.

Significance or Risk	**Low**	**Low-Medium**	**Medium**	**Medium-High**	**High**
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 – 19.9	20 - 25

Based on the above, the significance rating scale has been determined as follows:

High Of the highest order possible within the bounds of impacts which could occur. In the case of negative impacts, there would be no possible mitigation and / or remedial activity to offset the impact at the spatial or time scale for which it was predicted. In the case of positive impacts, there is no real alternative to achieving the benefit.

Medium-High Impacts of a substantial order. In the case of negative impacts, mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these. In the case of positive impacts, other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.

Medium	Impact would be real but not substantial within the bounds of those, which could occur. In the case of negative impacts, mitigation and / or remedial activity would be both feasible and fairly easily possible, in case of positive impacts; other means of achieving these benefits would be about equal in time, cost and effort.
Low-Medium	Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and / or remedial activity would be either easily achieved of little would be required, or both. In case of positive impacts alternative means for achieving this benefit would likely be easier, cheaper, more effective, less time-consuming, or some combination of these.
Low	Impact would be negligible. In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap and simple. In the case of positive impacts, alternative means would almost all likely be better, in one or a number of ways, than this means of achieving the benefit
Insignificant	There would be a no impact at all – not even a very low impact on the system or any of its parts.

1.12. Determination of Overall Consequence

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: ***Severity/Intensity, Duration and Extent/Spatial Scale***. Each factor is assigned a rating of 1 to 5, as described in the tables above.

1.13. Degree to which the impact can be mitigated

The degree to which an impact can be mitigated can be defined as “the effect of mitigation measures on the impact and its degree of effectiveness”.

Table 50: Determining the mitigation rating of an impact

MITIGATION RATING	**MITIGATED Degree impact can be mitigated**	High	*Impact 100% mitigated*
		Medium	*Impact >50% mitigated*
		Low	*Impact <50% mitigated*

1.14. Cumulative Impacts

The effect of cumulative impacts can be described as “the effect the combination of past, present and “reasonably foreseeable” future actions have on aspects”.

Table 51: Determining the confidence rating of an impact

CUMULATIVE RATING	**CUMULATIVE EFFECTS**	Low	*Minor* cumulative effects
		Medium	*Moderate* cumulative effects
		High	*Significant* cumulative effects

2. The positive and negative impacts that the proposed activity will have on the environment and the community that may be affected.

The proposed extension of the mining area was determined to have an overall medium to no negative impact, and will be planned taking the concerns of the consulted parties in consideration. Any alterations to the site layout or mining and mining related activities will not result in a lesser significant impact on the environment, but rather add to it. No alternative sites were investigated, as this is an amendment of the current EMPR. The current mining area was identified during the assessment phase of the environmental impact assessment (2016 assessment), by the applicant and project team, and was therefore selected as the preferred alternative due to the following:

Positive Aspects:

- The mining site offers the mineral sought after;
- The proposed sites were previously used for mining activities, thus minimal environmental damage will occur;
- The mining site is more than 20 km away for the town of Aggeneys, and will not affect the community with regards to dust and noise;
- The mining area can be reached by an existing farm road that connects to a provincial gravel road. No new road infrastructure need to be constructed;
- Due to the small size of the activity and the remote location of the mining area the potential impacts on the surrounding environment, associated with mining is deemed to be of low significance; and
- No residual waste as a result of the mining activity will be produced that needs to be treated on site. Any general waste that may be produced on-site will be contained in sealed refuse bins to be transported to the local municipal landfill site. The amount of hazardous waste to be produced at the site will be minimal and will mainly be as a result of accidental leakage. Contaminated soil (contained in sealed bins) will be collected from site by a hazardous waste handling removal company to be disposed of at a registered hazardous waste handling site.

Negative Impacts:

- Due to the remote location of the mining area very little negative impacts on the community could be identified that were deemed to be of significant importance. The dust and noise impacts, that may emanate from the mining area during the operational phase, could have a negative impact on the surrounding community if the mitigation measures proposed in this document are not implemented and managed on-site; and
- Negative impacts with regard to the environment include potential contamination of the area due to spillage of hydrocarbon products.

Table 52: Impact Assessment of JJD Van Zyl S102 Amendment Application

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
CONSTRUCTION / SITE ESTABLISHMENT PHASE												
ACTIVITY:	**DEMARCATION OF SITE WITH VISIBLE BEACONS.**											
Site Establishment	No impact could be identified other than the beacons being outside the boundaries of the approved mining area.	Neu										
ACTIVITY:	**ESTABLISHMENT OF TEMPORARY BUILDINGS AND INFRASTRUCTURE WITHIN BOUNDARIES OF SITE.**											
Site Establishment	If the infrastructure is established within the boundaries of the approved mining area, no impact could be identified.	Neu										
Social & Safety	Influx of unsuccessful job seekers which may informally settle in area. Potential danger to surrounding communities	Neg	Reversible	1	1	4	2	2	5	3	6	Low-Med
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	4	2	2	2	3	3	5,83	Low-Med
Topography	Alteration of topography	Pos	Irreversible	1	1	5	2	1	5	5	11.7	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	1	2	1	2	3	3	3,33	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	4	1	1	1	3,67	Low
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	2	1	2	4	Low
SUB ACTIVITY: ABLUTION FACILITIES												
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Soils	Portable Toilets Potential harm through sewage leaks	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
SUB ACTIVITY: ACCESS ROADS												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: SITE OFFICES												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
SUB ACTIVITY: VEHICLE SERVICE AREA												

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: WASH BAY												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: WORKSHOP												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	4	2	2	2	3	3	5,83	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: SALVAGE YARD												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: BUNDED DIESEL AND OIL STORAGE FACILITIES												
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
SUB ACTIVITY: GENERATOR AREA (BUNDED)												
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4.5	Low
Noise	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table. Potential silt-loading of drainage lines, downstream, and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3.33	Low
SUB ACTIVITY: WEIGH BRIDGE												
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: PARKING AREA												
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
SUB ACTIVITY: WASTE AREA												

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	2	1	2	4	Low
ACTIVITY:	**STRIPPING AND STOCKPILING OF TOPSOIL**											
Hazardous Waste	Contamination of area with hydrocarbons or hazardous waste materials	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	4	2	2	2	3	3	5,83	Low-Med
Topography	Alteration of topography	Pos	Irreversible	1	1	5	2	1	5	3	7	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	1	2	1	2	3	3	3,33	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	4	1	3	2	7,33	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust generation	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	2	1	2	4	Low
OPERATIONAL PHASE												
ACTIVITY:	**RE-MINING OF OLD MINE DUMPS**											

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Hazardous Waste	Contamination of area with hydrocarbons or hazardous waste materials	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	4	2	2	2	3	3	5,83	Low-Med
Topography	Alteration of topography	Pos	Irreversible	1	1	5	2	1	5	3	7	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	1	2	1	2	3	3	3,33	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	4	1	3	2	7,33	Low-Med
Air quality	Dust generation	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	2	1	2	4	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Social & Safety	Potential danger to surrounding communities Unsafe working environment for the employees. Safety risk posed by unsloped areas.	Neg	Reversible	1	4	1	2	2	1	2	3	Low
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Emissions caused by vehicles and equipment.	Neg	Reversible	2	2	1	2	2	3	3	4.17	Low
ACTIVITY:	**CRUSHING AND SCREENING OF SILLIMANITE AND SILLIMANITE AND AGGREGATE**											
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Air quality	Dust generation	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	3	2	1	2	4	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Surface water	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
ACTIVITY:	**TRANSPORTATION OF SILLIMANITE AND SILLIMANITE AND AGGREGATE FROM STOCKPILE AREA TO CLIENTS**											
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Hazardous Waste	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low
Air quality	Dust generation	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Traffic and Safety	Road degradation. Increased potential for road incidences Potential distraction to road users	Neg	Reversible	2	1	4	2	2	2	2	4,67	Low
Groundwater	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
DECOMMISSIONING PHASE												
ACTIVITY:	**SLOPING, LANDSCAPING AND REPLACEMENT OF TOPSOIL OVER DISTURBED AREA (FINAL REHABILITATION)**											
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	5	3	2	1	2	4,5	Low
Soils	Soils replaced and ameliorated	Pos	Reversible	1	3	4	3	2	3	3	6,67	Low-Med
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment Potential loss of protected or red data plant species.	Neg	Reversible	1	4	2	2	2	3	3	5,83	Low-Med
Topography	Alteration of topography	Pos	Irreversible	1	1	5	2	1	5	3	7	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	1	2	1	2	3	3	3,33	Low
Visual aspect	Improved aesthetics through rehabilitation	Pos	Reversible	2	1	3	2	2	3	3	5	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Noise nuisance generated by earthmoving machinery. Noise nuisance generated during the landscaping phase.	Neg	Reversible	1	1	2	1	1	5	3	4	Low

Nature of Impact	Impact	Positive/Negative/ Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating
Air quality	Dust nuisance caused by the disturbance of soil. Dust nuisance due to loading and vehicles transporting the material. Dust nuisance due to landscaping activities.	Neg	Reversible	2	2	1	2	2	3	3	4,17	Low
Fauna	Reintroduction of fauna attracted to flora to the area	Pos	Reversible	2	2	4	3	2	5	4	9,33	Low-Med
Fauna	Reintroduction of fauna attracted to flora to the area	Pos	Reversible	2	1	3	2	1	3	2	4	Low
Groundwater	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of mining activities on the runoff and infiltration of storm water.	Neg	Reversible	1	3	1	2	2	2	2	3,33	Low
ACTIVITY: Application for Closure Certificate												

h) Cumulative Impacts

Table 53: Cumulative Impact Assessment of JJD Van Zyl Section 102 Amendment Application

Nature of Impact	Impact	Positive/Negative / Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating	Mitigation
CONSTRUCTION, OPERATIONAL AND DECOMMISSIONING PHASES													
Traffic & Safety	Increased potential for road incidences	Neg	Reversible	2	3	1	2	3	1	2	4	Low	• All intersections with main tarred roads will be clearly signposted. Drivers will be enforced to keep to set speed limits. Trucks will be in road-worthy condition with reflective strips.
Traffic & Safety	Road degradation	Neg	Reversible	1	3	1	1,6	2	1	1,5	2,5	Low	• Storm water must be diverted around the access roads to prevent erosion. • Erosion of access road: Vehicular movement must be restricted to existing access routes to prevent crisscrossing of tracks through undisturbed areas. Rutting and erosion of the access road caused as a result of the mining activity must be repaired by the applicant.
Noise	The noise impact must be contained within the boundaries of the property, and will represent the current noise levels of the farm.	Neg	Reversible	1	1	2	1,3	1	5	3	4	Low	**<u>Noise Handling:</u>** • The applicant must ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. • No loud music may be permitted at the mining area. • All mining vehicles must be equipped with silencers and maintained in a road worthy condition in terms of the Road Transport Act.

Nature of Impact	Impact	Positive/Negative / Neutral Impact	Reversibility	Extent	Severity	Duration	Consequence	Probability	Frequency	Likelihood	Significance	Mitigation Rating	Mitigation
Air quality	Increased dust generation will impact on the air quality of the receiving environment.	Neg	Reversible	2	2	4	2,6	4	5	4,5	12	Med	**<u>Dust Handling:</u>** - The liberation of dust into the surrounding environment must be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. - The site manager must ensure continuous assessment of all dust suppression equipment to confirm its effectiveness in addressing dust suppression. - Speed on the access roads must be limited to 40km/h to prevent the generation of excess dust. - All roads will be sprayed with water or an environmental friendly dust-allaying agent that contained PCB's (e.g. DAS products/ Pro/base) at regular intervals to ensure that dust is adequately suppressed in the mining roads. - All disturbed or exposed areas will be re-vegetated as soon as possible during the operational phase to prevent any dust source from being created. - A fall out and nuisance dust monitoring programme could be submitted to the principle inspector of mines (DMR-Northern Cape) on an annual basis if required. If any complaint is received form the public or state department regarding dust levels, the fall-out and nuisance dust levels will again be monitored at prescribed monitoring points. The result will then be compiled into monthly reports and forwarded to the Director-Occupational Hygiene. - Fallout dust will be monitored via a fallout dust bucket system on the boundaries of the mining area.
Air quality	Emissions will be contained within the property boundaries and will therefore affect only the landowner.	Neg	Reversible	2	2	2	2	4	2	3	6	Low-Med	**<u>Emission Handling:</u>** - All vehicles will be regularly services to ensure they are in proper working condition and to reduce risk of excessive emissions.

APPENDIX I

PHOTOGRAPHS OF THE SITE

JAN JACOB DE CLERCQ VAN ZYL – SECTION 102 AMENDMENT APPLICATION

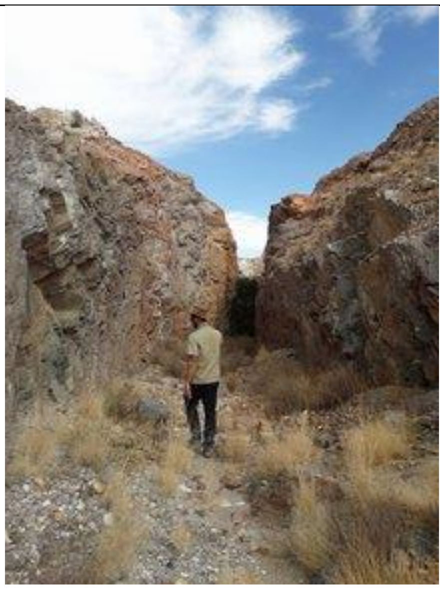
ADJACENT LANDOWNERS AND I&AP'S

ROADS

SITE PHOTOGRAPHS






V Z
M
VAN ZYL MINING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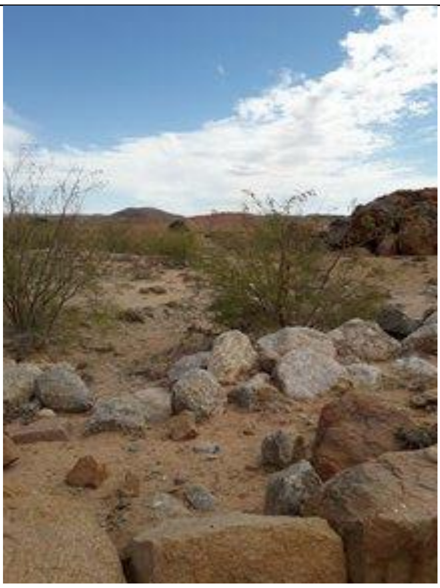




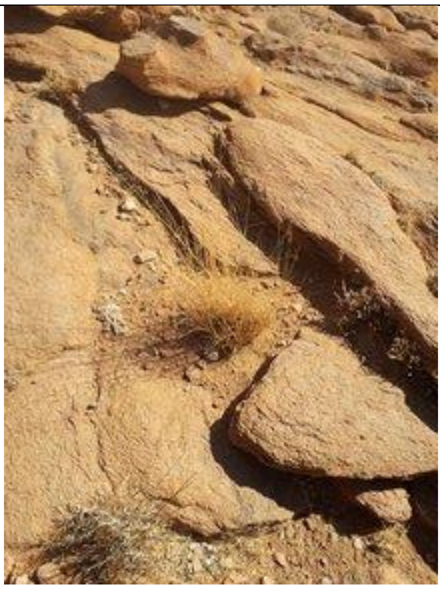

	
	
	

	
PLANTS IN THE AREA	
	
	

	
Euphorbia Sp.	*Prosopis glandulosa*
	
	
Prosopis glandulosa	*Oscularia spp.*

 *Boscia albitrunca*	
	 *Oscularia spp.*

Euphorbia Sp.

APPENDIX J

CV AND EXPERTISE OF THE EAP

YOLANDIE COETZEE

OCCUPATION	Environmental Consultant
TOTAL YEARS WORK EXPERIENCE	10
AGE	31

PERSONAL DETAILS

GENDER	Female
NATIONALITY	South African
SOUTH AFRICAN ID NO	8709020094080
LANGUAGE	English, Afrikaans (read, write, speak)
MARITAL STATUS	Married

PROFILE

Yolandie Coetzee is an Environmental Consultant with 10 years' experience in the environmental sector. She specialized the last 5 years in the rehabilitation of mines where she conducted the conceptual rehabilitation and management designs and the closure plans and programs. She has also been involved in a number of other environmental projects including railway sidings, filling stations, abattoir's, logistics hub and mining sites where she compiled environmental management plans, environmental impact assessments, environmental audits, due diligences, IWULA's/IWWMP's and alien invasive encroachment programs. She studied at the University of Potchefstroom where she has successfully completed her undergraduate degree in microbiology and biochemistry and her Honours degree in environmental sciences.

I am an administrative person who is adaptive to change confident in what I do and try to be creative as I can in what I do. I am enthusiastic about environmental issues and try to implement my people skills where I can and motivate those around me about the issues in South Africa. I am results driven, a quick learner and can work as a team with others. My passions are to campaign for causes that I belief in and working with people solving environmental issues.
My interest is creating things, reading about history and spending time with friends and family and travelling.

EDUCATION

2010 North-West University, Potchefstroom **BSc. Honours (Ecological Remediation and Rehabilitation)** *Honours Project: Du Preez Y, Claasens S (2009)*
2005-2008 North-West University, Potchefstroom **BSc. (Environmental Sciences) Majors: Microbiology and Biochemistry**

PROFESSIONAL COURSES / TRAINING

2003	Secretarial Training Course	Waterberg FET college
2008	Soil Classification and Morphology	Agriculture Resource Council (ARC)
2009	Polymerase chain reaction (PCR)	North-West University
2009	Freeze Drying (Genetics)	North-West University
2010	Model Maker Introduction and Advanced Course	Model maker (Centurion)
2012	Road Maker Advanced Course	Model maker (Centurion)
2013	Lead Auditor Course (ISO14001)	WTH
2017	Fallout Dust Monitoring Course	Dustwatch
2017	SAGIC Invasive Species Training	SAGIC
2019	Mine Closure and Recent Case Law Workshop	IMBEWU

PROFESSIONAL AFFILIATIONS

SACNASP	South African Council for Natural Scientific Professions	400324/13
SASM	South African Society for Microbiology	2011

SKILLS & EXPERIENCE

Proficient in Microsoft Office.

Competent with 3D spatial modelling programme, Model maker, Global Mapper.and Google Earth, BGIS and DAFF:AGIS

Experience in Project Management.

Worked in laboratories at North-West University – Potchefstroom

Good working knowledge of NEMA, MRPDA, NWA, CARA, NEMAQA, NEMWA, NEM:BA etc.

AWARDS & ACHIEVEMENTS

- Achieved distinctions at Northwest University for Microbiology

AREAS OF EXPERTISE

- Conceptual rehabilitation and management designs
- Rehabilitation closure plans and programs and associated mine closure costing assessments
- Alien invasive encroachment programs
- Rehabilitation programs
- Waste Management Plans
- Financial closure cost assessments (Financial provisions)
- Mine Closure Applications
- 24G Rectification Applications
- Basic Assessment Applications
- Environmental Impact Assessments Applications
- Environmental Management Plans
- Environmental Auditing
- Mining Permit/Right and Mining permit Applications
- Integrated water use licenses and applications (IWWMP and IWULA)
- Due diligence
- Plant Permit Removal Applications

CAREER HISTORY

1.	**MAY 2017 - CURRENT**
Greenmined Environmental	

ENVIRONMENTAL CONSULTANT
Responsibilities

- Compilation Environmental Impact Assessments and Environmental Management Plans;
- Compilation of Basic Assessments;
- Conduct Water Use Licence Applications (IWULA) and Integrated Waste Water Management Plans (IWWMP);
- Compilation of Waste Management Plans;
- Liaise with client and the suitable government departments; and
- Compilation of Environmental Performance Assessment Programs (EMP PAR)

Major Projects

ENVIRONMENTAL REPORT	PROJECT	CLIENT
Environmental Control Officer (ECO)	• Hendrina Quarry, • Roodekranz Quarry, • Balmoral Quarry, • Middelburg Quarry, • Bloemhof Quarry, • Bambi, • Pomona, and • Witkloof Quarry	B&E International (Pty) Ltd
	Zwartkop	Baitumetse (Pty) Ltd
	Aroams Quarry, Brandvlei Quarry, and Barrage Bulk Sand Mine (Tja Naledi Beafase Investment Holdings).	SPH Kundalila (Pty) Ltd
	Thembisa	Raubex Construction (Pty) Ltd
Environmental Performance Assessment (EPA)	• Bloemhof Quarry • Witkloof Quarry • Balmoral Quarry • Middelburg Quarry • Hendrina Quarry • De Roodepoort Quarry • Roodekrans Quarry	B&E International (Pty) Ltd
	• Aroams Quarry • Kersfontein Sand • Bridgetown Dolomite Quarry • Barrage Bulk Sand Mine	SPH Kundalila (Pty) Ltd
	Stilfontein	OMV
	• Alfa Sand • Crushco Quarry • Donkerhoek Quarry • Rosslyn Quarry • Rossway Quarry • SPH Sand • Willows Quarry • Butterworth Quarry • Mthatha Quarry	Raumix Aggregates (Pty) Ltd
Dust Monitoring	Balmoral Quarry	B&E International (Pty) Ltd
	Zwartkop	Baitumetse (Pty) Ltd
	Stilfontein	OMV
	Potchefstroom	
	Aroams Quarry	SPH Kundalila
	Witkloof Quarry	B&E International (Pty) Ltd

	Bloemhof Quarry	B&E International (Pty) Ltd
BAR & EMPr	Witkloof Mining Permit	B&E International (Pty) Ltd
	Piet Retief Prospecting Right	Lomeza Mining Services (Pty) Ltd
	Geluk Prospecting Right	
	Barrage Bulk Sand Mine Section 102 EMP Amendment	SPH Kundalila
	Rugron Exploration Co (Pty) Ltd	
	Middelwater Exploration (Pty) Ltd	
	Aroams 3 Mining Permit	
	Van Zyl Sillimanite	Van Zyl Sillimanite
	Sillimanite Prospecting	Van Zyl Sillimanite
EIA & EMPr	Middelburg Quarry Mining Right	Inzalo Crushing and Aggreates (Pty) Ltd
	Bloemhof Quarry Mining Right	
	Sileco Lime Mining Right	Lomeza Mining Services (Pty) Ltd
	Yomba Umgodi Mining Right	Raumix Aggregates
	Aroams Quarry Mining Right	SPH Kundalila (Pty) Ltd
Closure Application	• Witkloof Quarry • Roodekrans Quarry • Dwaalfontein Quarry • Hendrina Quarry • Bloemhof Quarry (Review) • De Roodepoort Quarry (Review)	B&E International (Pty) ltd
	Howards Quarry	Howards Crushers (Pty) Ltd
	SPH Sands	Raumix Aggregates (Pty) Ltd
	Brandvlei Quarry	SPH Kundalila (Pty) Ltd
IWULA/ IWWMP	• Umfolozi Quarry • Hluhluwe Quarry • Rietfontein Quarry • Denver Quarry • Dundee Quarry • Vryheid Quarry • Qwa Quarry • Bethlehem Quarry	Afrimat (Pty) Ltd
	Alfa Sand Quarry	Raumix Aggregates (Pty) Ltd
	Crushco Quarry	
	Lichtenburg Plant	Lafarge Cement
	Tlokwe Local Municipality	Tlokwe Local Municipality
Waste Management Plan	Wouterspan Boerdery (Pty) Ltd	Wouterspan Boerdery (Pty) Ltd
	Dukathole Brickworks CC	Dukathole Brickworks CC
Rehabilitation Plan	• Witkloof Quarry • Middelburg Quarry • Roodekrans Quarry • Balmoral Quarry	B&E International (Pty) ltd
	• Alfa Sand • Butterworth Quarry • Crushco Quarry • Donkerhoek Quarry • Mthatha Quarry • Rosslyn Quarry	Raumix Aggregates

	• Rossway Quarry • SPH Sands Quarry • Willows Quarry	
Asbestos Management Plan	Dukathole Brickworks CC	Dukathole Brickworks CC
COP for Hydrocarbons	Dukathole Brickworks CC	Dukathole Brickworks CC
Financial Provision in terms of NEMA 2015	Letama Quarry	Letama Quarry
	• Alfa Sand • Crushcho • Donkerhoek Quarry • Rosslyn Quarry • Rossway Quarry • SPH Sand • Willows Quarry	Raumix Aggregates
EMPr	• Vryheid Quarry • Pietermaritzburg Quarry	Afrimat (Pty) Ltd
Sec 30 **Spillage Incident**	Tosas	Tosas
Sec 102	Barrage Bulk Sand Mine	SPH Kundalila
Mine Works Programme (MWP)	Aliwal Quarry	Raumix Aggregates
	Barrage Bulk Sand Mine	SPH Kundalila
24G Rectification Application	Golden Valley Poultry Farm Welkom	Golden Valley Poultry Farm Welkom

Achievements

- Assisted in client' understanding of relevant environmental regulations thus improving customer relations.
- Achieved project goals through consistent engagement with the client.
- Received authorisations for the projects applied for.

2.	**APRIL 2015–APRIL 2017**

Genis Consultants CC

Contract Work

ENVIRONMENTAL CONSULTANT, PROJECT MANAGER

Responsibilities

- Compilation Environmental Impact Assessments and Environmental Management Plans
- Compilation of Basic Assessments
- Conduct Water Use Licence Applications (IWULA) and Integrated Waste Water Management Plans (IWWMP)
- Liaise with client and the suitable government departments
- Compilation of Mine Closure Liability Assessments (MCL)
- Compilation of Rehabilitation Strategic Implementation Plans (RSIP)
- Compilation of Environmental Performance Assessment Programs (EMP PAR)
- Compilation of Legal Compliance and GN704 Audits
- Compilation of Soil, Alien Invasive and Biodiversity Management Plans

Major Projects

- Bosveldsrus Abattoir

Achievements

- Assisted in client' understanding of relevant environmental regulations thus improving customer relations.
- Achieved project goals through consistent engagement with the client.

3.	JUNE 2014 – APRIL 2015

Environmental Assurance (ENVASS)

SPECIALIST ENVIRONMENTAL CONSULTANT

Responsibilities

- Reporting to Directors
- Compilation Environmental Impact Assessments and Environmental Management Plans
- Compilation of Basic Assessments
- Conduct Water Use Licence Applications (IWULA) and Integrated Waste Water Management Plans (IWWMP)
- Liaise with client and the suitable government departments
- Compilation of Mine Closure Liability Assessments (MCL)
- Compilation of Rehabilitation Strategic Implementation Plans (RSIP)
- Compilation of Environmental Performance Assessment Programs (EMP PAR)
- Compilation of Legal Compliance and GN704 Audits
- Compilation of Soil, Alien Invasive and Biodiversity Management Plans

Major Projects

- Coal of Africa – Mooiplaats Colliery: IWWMP Update, RSIP and MCL
- Coal of Africa – Woestalleen Colliery: MCL, Legal Compliance Audit, EMP PAR
- Coal of Africa – Vele Colliery: MCL
- Samancor – Western Chrome Mine: MCL
- Eastplats Western and Eastern Limb (Rhodium Reefs Limited) – MCL, EMP PAR, Total Compliance Project: Environmental Awareness Campaign, GN704 Audit, Sol Management Plan, Biodiversity Management Plan, Alien Invasive Management Plan
- Various sand and clay brick mine MCL – Sterkfontein Bricks, Victoria Bricks, Roosema (Olifantsfontein & Delmas), SA Brix (Boekenhout and Zandfontein), and Kilo Sand.
- Mamatwan Manganese Land Capability Study, Visual Impact Assessment (VIA)
- Kongoni EMP PAR, MCL
- Assmang Technical Training College – Tree Removal Licence
- Umlabu: MCL
- LE Vervoer (Sandtoria): Rehabilitation and Terrestrial Ecology Plan, Stormwater Management Plan, EMP
- HJG Vervoer - EMP
- Stuart Coal: MCL
- Yoctolux EMP

Achievements

- Assisted in client' understanding of relevant environmental regulations thus improving customer relations.
- Achieved success in the closing of mine sites.
- Achieved project goals through consistent engagement with the client.

Reason for Leaving

Pregnancy. I wanted to be a stay at home mom.

4.	**NOV 2013 –MAY 2014**

African Innovative Solutions and Projects CC

SENIOR ENVIRONMENTAL CONSULTANT/ PROJECT MANAGER

Responsibilities

- Business Development and Marketing
- Financial Administration Duties
- Office management
- Reporting to Directors
- Managing Junior Environmental Consultants
- Compilation Environmental Impact Assessments and Environmental Management Plans
- Compilation of Basic Assessments
- Conduct Water use licence applications
- Liaise with client and the suitable government departments
- Compilation of Rehabilitation Models and the relevant reports
- Compilation of Alien invasive encroachment programs
- Compilation of Rehabilitation programs
- Conducting of pre-mining assessments (Biodiversity and Basic Soil Studies)
- Compiling operational procedure documents

Major Projects

- Thabazimbi Local Municipality (TLM) – upgrading and construction of a bulk water pipeline – BA, EMPR and IWULA
- Dr. Ruth Segamotsedi Municipality – EIA/EMP for waste water treatment works and for the bulk water pipeline
- Various prospecting rights applications in Limpopo

Achievements

- Assisted in client' understanding of relevant environmental regulations thus improving customer relations.
- Achieved success in the rehabilitation of mine sites and closing the sites.
- Achieved project goals through consistent engagement with the client.

Reason for Leaving

Company has been liquidated.

5.	JAN 2013 – OCT 2013
Kai Batla Minerals Industry Consultants	

SENIOR ENVIRONMENTAL CONSULTANT

Responsibilities

- Reporting to Directors
- Managing Junior Environmental Consultants
- Compilation Environmental Impact Assessments and Environmental Management Plans
- Compilation of Basic Assessments
- Conduct Water use licence applications
- Liaise with client and the suitable government departments
- Compilation of Rehabilitation Models and the relevant reports
- Compilation of Alien invasive encroachment programs
- Compilation of Rehabilitation programs
- Conducting of pre-mining assessments (Biodiversity)
- Compiling operational procedure documents

Major Projects

- Imaforce (Pty) Ltd - Prospecting Rights Application and associated Environmental Management Plans for various properties in Kwa Zulu Natal and Mpumalanga
- AEMFC - Environmental and Social prefeasibility report
- PMG- IWULA / IWWMP for Koedoeskloof and Paling Pan; Rehabilitation Program and Report for Bishop Mine
- Barleda 625cc - EMP and associated PPP
- Mogale City Municipality - Environmental Impact Assessment (EIA) Guideline Report for a Logistics Hub in the West Rand

Achievements

- Assisted in client' understanding of relevant environmental regulations thus improving customer relations.
- Achieved success in the rehabilitation of mine sites and closing the sites.
- Achieved project goals through consistent engagement with the client.

Reason for Leaving

No growth opportunities.

6.	JAN 2010 – NOV 2012

Cabanga Concepts

JNR ENVIRONMENTAL CONSULTANT

Responsibilities

- Reporting to Senior Environmental Consultant
- Compilation entire Environmental Impact Assessments and Environmental Management Plans
- Compilation of Basic Assessments
- Conduct Water use licence applications
- Liaise with client and the suitable government departments
- Compilation of Rehabilitation Models and the relevant reports
- Compilation of Alien invasive encroachment programs
- Compilation of Rehabilitation programs
- Conducting of pre-mining assessments (Biodiversity)
- Compiling operational procedure documents

Major Projects

- Sakoa Coal Madagascar – Prefeasibility Study
- Pembani Coal Carolina – New Areas EIA and 24G EIA
- Pembani Coal Carolina – Alien Encroachment Program
- Pembani Coal Carolina – Rehabilitation Models and Program
- Pembani Coal Carolina – Pre-mining assessments (Biodiversity)
- Pembani Coal Carolina – Creating a wetland to treat AMD water
- Pembani Coal Carolina – Audits and IWULA audits
- Coal of Africa – 24G EIA/EMP
- Shanduka Resources – Rehabilitation Models and Reports
- Homelands Kendal Colliery – Alien Encroachment Program
- Homelands Kendal Colliery – Rehabilitation Models and Reports
- Sekoko Resources – Scoping report for the Railway siding

Achievements

- Assisted in client' understanding of relevant environmental regulations thus improving customer relations.
- Achieved success in the rehabilitation of mine sites and closing the sites.
- Achieved project goals through consistent engagement with the client.

Reason for Leaving

Retrenched.

Volunteer Experience

- Involved in the Climate Change Community Forum – Centurion
- Involved in the feeding of the animals at the game reserve in Mokopane
- Involved in the feeding of the animals at the Cheetah project in Limpopo
- Involved with the annual Santa shoe box Christmas presents for the under privileged in South Africa.

Professional Strengths

- Creative thinker
- Versatile and able to learn new tasks/skills quickly
- Good interpersonal skills - works well with others
- Focused, self-motivated and target driven; determined to succeed.
- Willing to learn and adapt to changing environments
- Focus on accuracy and attention to detail
- Strong planning, organising and monitoring abilities and an efficient time-manager

References

Name Emile van Druten	Environmental Assurance	082 554 8051
Name Hennie Du Preez	Genis Consultants	083 407 4522
Name Chris Weideman	Greenmined Environmental	082 602 6133

APPENDIX K

ALIEN INVASIVE PLANT SPECIES PLAN

APPENDIX L

FINANCIAL PROVISION

APPENDIX M1

BOTANICAL STUDY AND ASSESSMENT

APPENDIX M2

HERITAGE IMPACT ASSESSMENT

APPENDIX N

ENVIRONMENTAL AWARENESS PLAN