mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

AND

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

FINAL

OCTOBER 2018

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

NAME OF APPLICANT: Witkop Fluorspar Mine (Pty) Ltd

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DOCUMENT CONTROL

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Important Notice

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

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

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

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

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

Objectives of the Environmental Impact Assessment Process

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

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

Table 1 identifies the structure of an EIA Report as required by the EIA Regulations, 2014 (as amended) and cross-references to the relevant sections of this report where the requirements of the Regulations have been addressed.

Table 1: Structure of EIA Report (Part A)

Regulatory Requirement for EIA Reports	Relevant Section of this report
3. (1) An EIA Report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—	
(a) details of— (i) the EAP who prepared the report; and	Please refer to Section 2.2, Section 2.3 and Appendix 1 of this Report.

Regulatory Requirement for EIA Reports	Relevant Section of this report
(ii) the expertise of the EAP, including curriculum vitae.	
(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted Scoping Report, including: (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	Please refer to Section 3.
(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale.	Please refer to Appendix 2: A3 Plans and Plan 3 to Plan 11.
(d) a description of the scope of the proposed activity, including— (i) all listed and specified activities triggered; and (ii) a description of the associated structures and infrastructure related to the development.	Please refer to Section 4.
(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.	Please refer to Section 5.
(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Please refer to Section 6.
(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report	Please refer to Section 6 and Section 7.
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: (i) details of the development footprint alternatives considered;	Please refer to Section 7.
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner	Please refer to Section 8 as well as Appendix 14: Public Participation Process.

Regulatory Requirement for EIA Reports	Relevant Section of this report
in which the issues were incorporated, or the reasons for not including them;	
(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Please refer to Section 9.
(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Please see Section 10.
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Please see Section 10.1.
(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	Please see Section 10 and Part B: Environmental Management Programme Report Please refer to Section 7 for a full discussion on alternatives.
(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	Please see Section 11
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report 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;	Please refer to Section 10.1.

Regulatory Requirement for EIA Reports	Relevant Section of this report
(j) an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	Please see Section 10 and Appendix 15: Impact Assessment Tables.
(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Please see Section 10.7.
(l) an environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment: (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Please see Section 11.
(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Please refer to Section 13 and Section 20.
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Please refer to Section 3 and Section 4.
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Please refer to Part B: EMPr, which should be made a condition of the authorisation.

Regulatory Requirement for EIA Reports	Relevant Section of this report
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Please see Section 14.
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Please see Section 13.
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	The activity includes operational aspects.
(s) an undertaking under oath or affirmation by the EAP in relation to— (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Please refer to Section 27.
(t) where applicable, details of any financial provision for the rehabilitation, closure, and on-going post decommissioning management of negative environmental impacts;	Please refer to Section 25.5.
(u) an indication of any deviation from the approved scoping report, including the plan of study, including— (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	The only deviation is the methodology used for the impact assessment and ratings. In order to comply with the new draft guidelines, the rating methodology had to be updated. Please see Section 17.
(v) any specific information that may be required by the competent authority.	No specific information has been requested as part of this application.
(w) any other matters required in terms of section 24(4)(a) and (b) of the Act.	Refer to Section 18

LIST OF ACRONYMS

ACRONYM:	DESCRIPTION:
AEL	Atmospheric Emissions License in terms of NEM:AQA
AIPS	Alien Invasive Plant Species
BID	Background Information Documents
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983) as amended
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EA	Environmental Authorisation in terms of NEMA
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment (process or report)
EIA Regulation	Environmental Impact Assessment Regulation published under NEMA
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme Report
GIS	Geographical Information Systems
GN	General Notice (issued under an Act, providing notice or information)
GNR	General Notice Regulation (issued under an Act, providing instruction)
I&AP	Interested and Affected Parties
IAIA SA	International Association of Impact Assessment South Africa
IDP	Integrated Development Plan
IWUL	Integrated Water Use Licence
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
LoM	Life of Mine
MAMSL	Metres Above Mean Sea Level
MBGL	Metres Below Ground Level
MHSA	Mine Health and Safety Act (Act 29 of 1996) as amended
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002) as amended
MR	Mining Right in terms of the MPRDA
MRA	Mining Right Area
NAEIS	National Atmospheric Emissions Inventory System
NEM:AQA	National Environmental Management: Air Quality Act (act 59 of 2008) as amended
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004) as amended
NEM:PAA	National Environmental Management: Protected Areas Act (Act 57 of 2003) as amended

ACRONYM:	DESCRIPTION:
NEM:WA	National Environmental Management: Waste Act (Act 39 of 2004) as amended
NEMA	National Environmental Management Act (Act 107 of 1998) as amended
NFEPA	National Freshwater Ecological Priority Areas
NHRA	National Heritage Resources Act (Act No. 25 of 1999) as amended
NPAES	National Protected Area Expansion Strategy
NWA	National Water Act (Act 35 of 1998) as amended
PES	Present Ecological State (usually followed by category A-F)
PM10/5/2.5	Particulate Matter up to 10/5/2.5 micrometres
POI	Points of Interest
PPP	Public Participation Process
RoD	Record of Decision (for specific application)
RWQO	Resource Water Quality Objectives
SCC	Species of Conservation Concern
S&EIR	Scoping and Environmental Impact Report
S&LP	Social and Labour Plan
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resource Agency
SAMRAD	South African Mineral Resources Administration System
SANBI	South African National Biodiversity Institute
SANS	South African National Standard (followed by standard number)
SASS5	South African Scoring System version 5 (in terms of aquatic invertebrate assessments)
SAWIS	South African Waste Information System
SOP	Standard Operating Procedure
SPLUMA	Spatial Planning and Land Use Management Act (Act No.16 of 2013)
Stats SA	Statistics South Africa
WMA	Water Management Area
WML	Waste Management Licence in terms of NEM:WA

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PART A: SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 INTRODUCTION

Witkop Fluorspar Mine (Pty) Ltd intends to develop a Gypsum mine over the remaining extent of the farm Kanakies 332 and as such has submitted an application for a Mining Right (MR) in terms of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA).

An application for Environmental Authorisation (EA) was submitted simultaneously, as per the requirements of the National Environmental Management Act, Act No. 107 of 1998 (NEMA) and the National Environmental Management: Waste Act, Act No. 59 of 2008 (NEM:WA); read with the requirements of the MPRDA.

South African Law requires that the environmental and social impacts associated with mining activities be assessed to identify any potential negative and / or positive consequences as result thereof. Following which measures must be proposed to avoid or minimise these impacts.

As the application relates to mining activities, a full Scoping and Environmental Impact Report (S&EIR) is required as well as an Environmental Management Programme (EMPr) report.

The Scoping phase has been completed and this report constitutes the EIA and EMPr. The purpose of the Report is to discuss the key environmental issues that have undergone further investigation during the Environmental Impact Assessment (EIA) phase of the project; and to outline the EMPr. The purpose of the report is also to also to provide the DMR, as the competent authority, with the relevant information so that they can assess the project and reach a decision on the application.

2 CONTACT DETAILS

The contact details of the applicant are as follows:

2.1 APPLICANT

Applicant Name:	Witkop Fluorspar Mine (Pty) Ltd
Registration No.:	1972/006392/07
Contact Person:	Dr Johannes J.C. Erasmus, Group Technical Manager
Telephone:	082 310 9612
Fax:	086 010 3516
E-mail:	jaco@sakg.co.za
Postal Address:	PO Box 688, Stellenbosch, 7599
Physical Address:	2nd Floor, A-Block, Octo Place, Electron Avenue, Technopark, Stellenbosch

2.2 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Cabanga Environmental has been appointed by Witkop Fluorspar Mine (Pty) Ltd as the independent Environmental Assessment Practitioners (EAP), responsible for completing the S&EIR for the proposed project. The contact particulars of the EAP are indicated below.

EAP:	Cabanga Concepts cc) (*t/a Cabanga Environmental*)
Contact Person:	Michelle Venter
Telephone:	+ 27 11 794 7534
Fax:	+ 27 11 794 6946
E-mail:	info@cabangaenvironmental.co.za
Postal Address:	Postnet Suite 470, Private Bag x3, Northriding, 2162
Physical Address:	Units 5 & 6 Beyers Office Park, Bosbok Road, Randpark Ridge

2.3 EXPERTISE OF THE EAP

Name:	**Role:**	**Qualification:**	**Experience:**
M.Venter	Lead Author	Cert.Sci.Nat 114447 BSc. (Hons) Geography	8 years
C. Wallington	Contributing Author	Pr. Sci. Nat 116313	5 years

Name:	Role:	Qualification:	Experience:
		MSc Environmental Science	
L. Claassen	Contributing Author & Review	BSc (Hons) Environmental Management	10 years
K.van Rooyen	Project Leader	Pr.Sci.Nat 400121/93 MSc. in Geography, specialising in the environment & coal discard dump	Over 30 years

CVs and Proof of qualifications are attached as Appendix 1.

3 DESCRIPTION OF THE PROPERTY

The site is located in the Hantam Local Municipality of the Namaqwa District Municipality. The details of the affected farm are detailed in Table 2.

Table 2: Affected Properties

Farm Name:	Kanakies 332
Farm Portion	Remaining extent
Application area (Ha)	7456.6974 ha
Magisterial district:	Calvinia
Distance and direction from nearest town	The project area is situated in the Northern Cape, 45km west-south-west of the town of Loeriesfontein and 40km north-north-west of the town of Nieuwoudtville.
21 digit Surveyor General Code for each farm portion	C01500000000033200000

The mining right area (MRA) is currently zoned for agricultural purposes, and land use activities are mainly grazing and wildlife/wilderness. The property is bisected by the Sishen-Saldanha railway line, owned by Transnet Freight Rail, which links Sishen Iron Ore Mine to the Port of Saldanha. Existing infrastructure at the Kanakies Loop 6 includes a small rail siding, power lines, substation, cellular (MTN) tower, farmsteads and associated infrastructures.

There are no sites of cultural heritage significance in the project area (Archaetnos Culture & Cultural Resource Consultants, March 2018).

Intact Knersvlakte Vygieveld, Overgrazed Knersvlakte Vygieveld and Transformed areas occur on Kanakies farm (Scientific Terrestrial Services, July 2018c). There were several floral species of conservation concern (SCC) noted during the summer and

winter assessments, these are protected in terms of the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) and include:

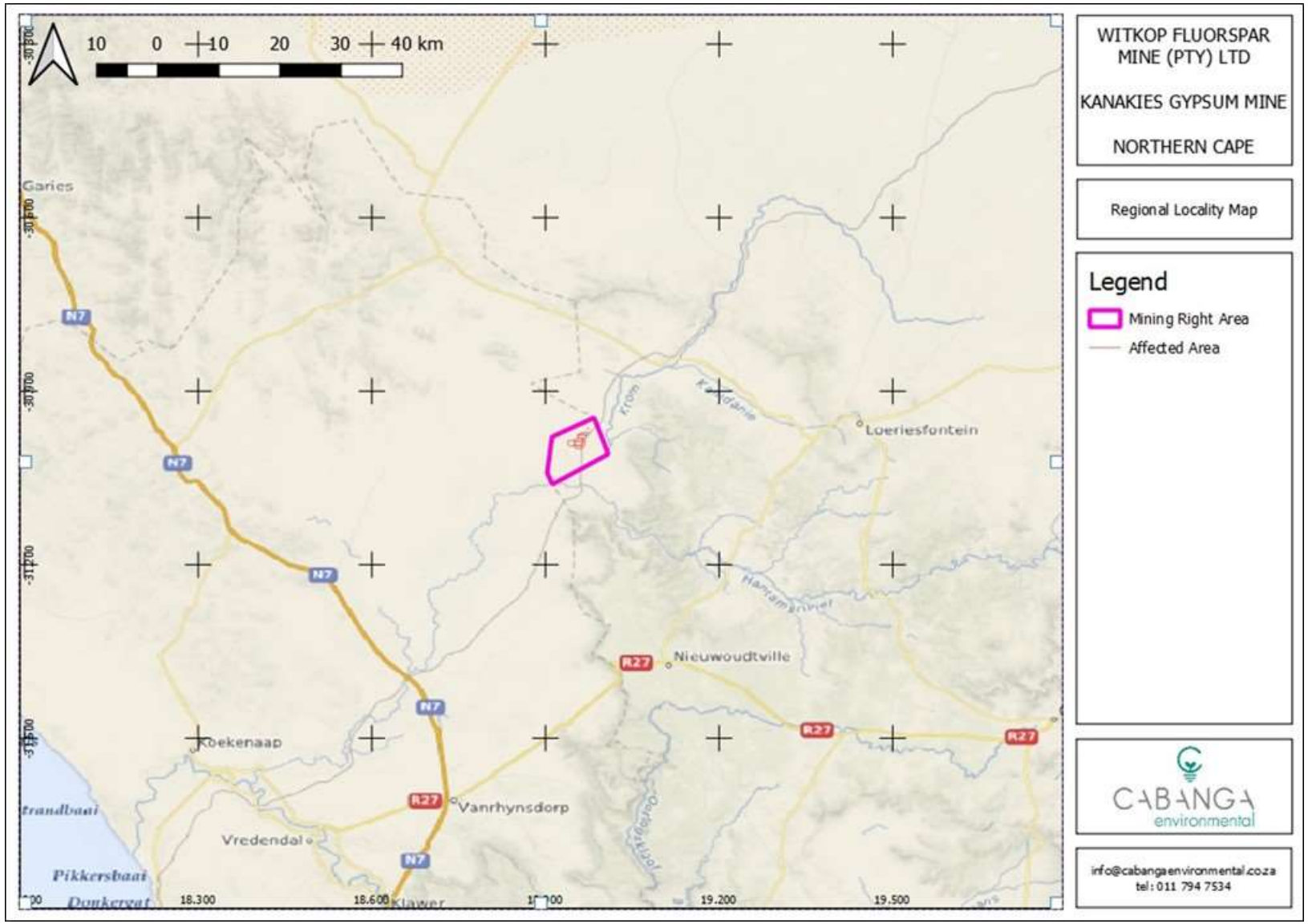
- *Hoodia gordonii;*
- *Mesembryanthum spp.;*
- *Drosanthemum spp.;*
- *Brownanthus spp.;*
- *Lessertia frutescens;*
- *Oxalis ambigua;*
- *Oxalis luteola;*
- *Lampranthus maximiliani;*
- *Ornithogalum secundum;*
- *Lapeirousia spinosa;*
- *Tetragonia microptera*
- *Malephora purpureo-corcea;*
- *Ruschia robusta;*
- *Gethyllis villosa;*
- *Delosperma hisidium;*
- *Bulbine torta;*
- *Trachyandra falcata; and*
- *Moraea collina.*

Fauna SCC encountered during the assessment include *Ardeotis kori* (Kori bustard), *Orycteropus afer* (Aardvark), *Otocyon megalotis* (Bat-eared fox) and *Brinckiella arboricola* (Tree Winter Katydid). It is anticipated that the following SCC will also occur on site; *Felis nigripes* (Black-footed cat); *Homopus signatus* (Speckled tortoise); *Brinckiella mauerbergerorum* (Mauerberger's Winter Katydid) and *Brinckiella aptera* (Mute Winter Katydid) (Scientific Terrestrial Services, July 2018c).

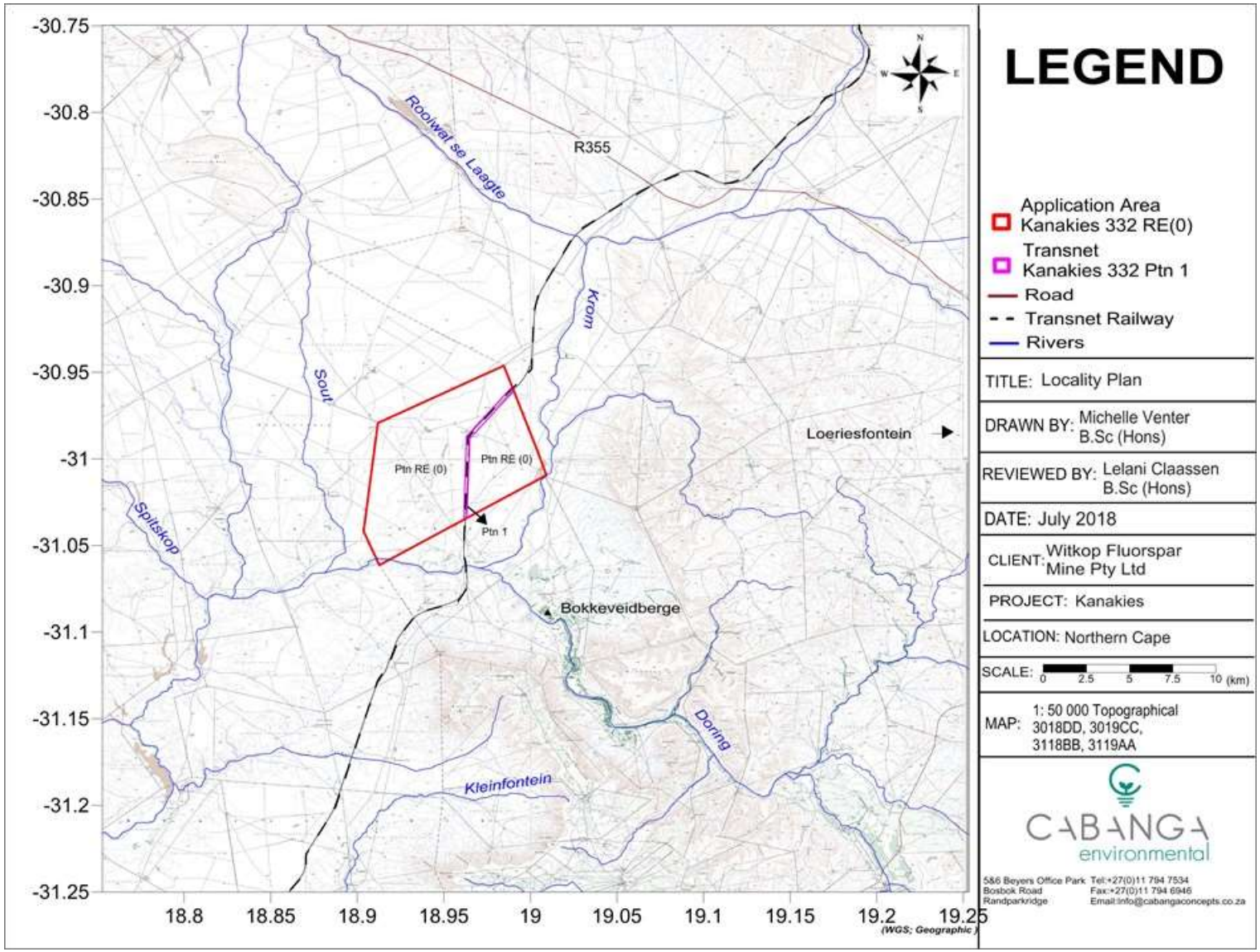
The surface rights of the affected property are detailed in Table 3. The Applicant and Surface owner have entered into an Access and Land Use Agreement in this regard.

Table 3: Surface right holders

Property	**Portion**	**Deed of Transfer**	**Extent - Ha**	**Registered Owner(s)**	**Share Owned**
Kanakies 332	0 (RE)	TT37913/2016	7456.6974 Ha	PPC Cement SA (Pty) Ltd	100%
Total Extent of Mining Right Application Area			**7456.6974 Ha**		



Plan 1: Regional plan



Plan 2: Locality plan

4 DESCRIPTION OF THE OVERALL ACTIVITY

This section outlines the relevant listed activities applicable to the project (Section 4.1) and gives a detailed project description (Section 4.2), as summarised in Table 4 below.

Table 4: Summary details of project

<table>
<tr><th>ITEM</th><th>DETAIL</th></tr>
<tr><td>Type of mineral</td><td>Gypsum</td></tr>
<tr><td>Mining method</td><td>Surface trench mining</td></tr>
<tr><td>Depth of the mineral below surface</td><td>The deposit consists of 2 layers of gypsum i.e. a powder layer of approximate thickness 0.4 meter, which lies approximately 0.2 to 0.7 meter under the surface, followed by a nodular crystalline layer of gypsum of approximate thickness 0.9 to 1.3 meter.</td></tr>
<tr><td>Geological formation</td><td>Quaternary formation</td></tr>
<tr><td>Life of mine</td><td>+ 30 years</td></tr>
<tr><td>Production rate</td><td>
<table>
<tr><th>Powder (Ton)</th><th>Crystal (Ton)</th><th>Life (Years)</th><th></th></tr>
<tr><td>156 480</td><td>258 192</td><td>8.4</td><td></td></tr>
<tr><td>47 318</td><td>251 856</td><td>6</td><td></td></tr>
<tr><td>81 101</td><td>278 784</td><td>7.3</td><td></td></tr>
<tr><td>21 806</td><td>171 336</td><td>3.9</td><td></td></tr>
<tr><td>35 352</td><td>129 624</td><td>3.3</td><td></td></tr>
<tr><td>60 192</td><td>174 240</td><td>4.7</td><td></td></tr>
<tr><td>0</td><td>172 392</td><td>3.5</td><td></td></tr>
<tr><td>402 250</td><td>1 436 424</td><td>37.1</td><td>Total</td></tr>
</table>
</td></tr>
<tr><td>Primary market</td><td>Local (agricultural and industrial use)</td></tr>
</table>

4.1 LISTED ACTIVITIES TO BE UNDERTAKEN

The Department of Environmental Affairs have published three notices which list activities for which environmental authorisations is required in terms of section 24(2) and 24D of NEMA, prior to commencement.

Furthermore, a list of waste management activities that have, or are likely to have, a detrimental effect on the environment were published in terms of section 19(2) of the NEM:WA. No person may commence, undertake or conduct a listed waste management activity unless a waste management license (WML) is issued in respect of that activity.

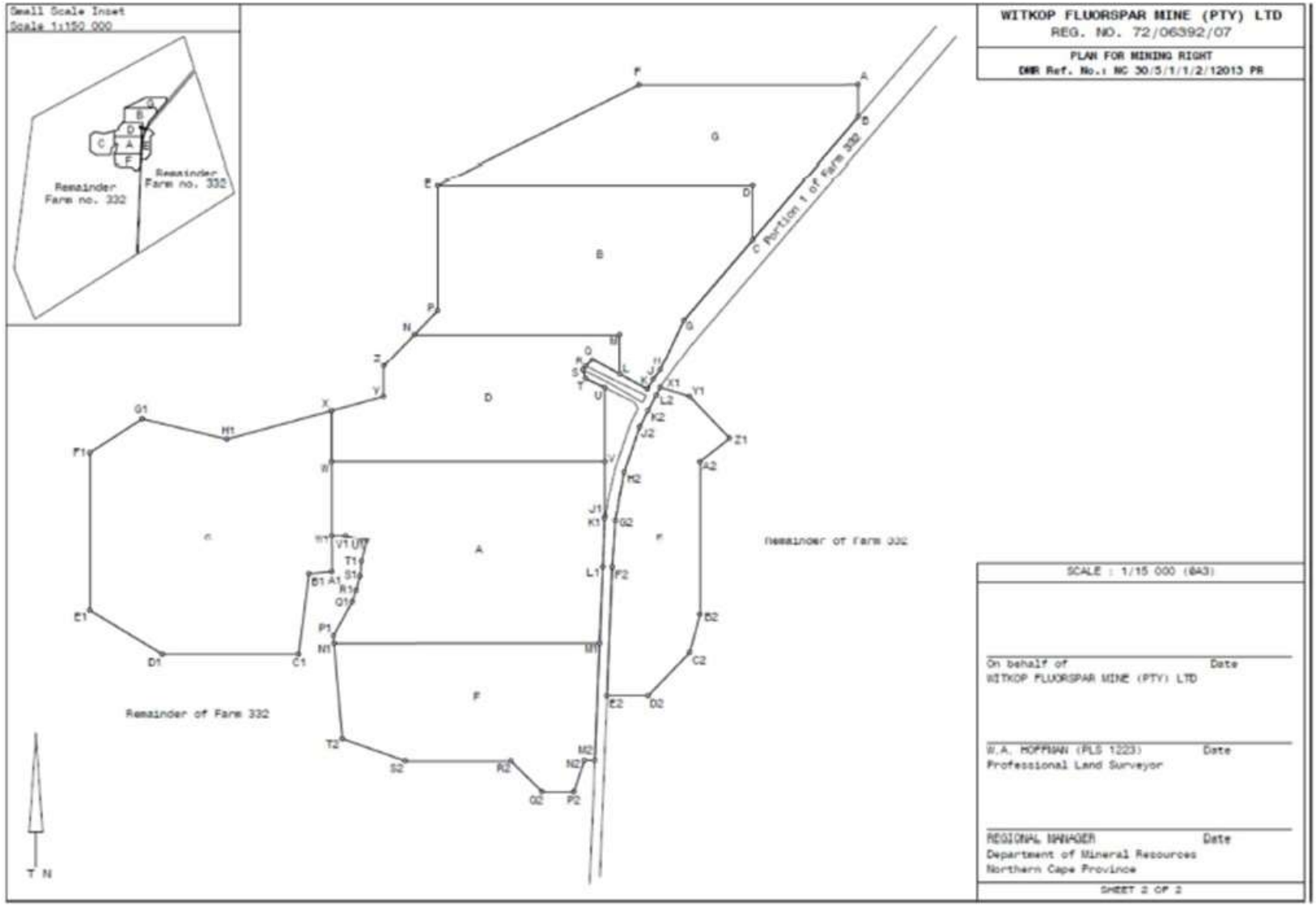
The Department of Mineral Resources (DMR) is the Competent Authority for mining related activities in terms of both NEMA and NEM:WA. As such an integrated application has been submitted as per the One Environmental System. Table 5 below summarises the applicable listed activities for which authorisation is being sought.

Plan 3 to Plan 10 illustrates the mine layout.

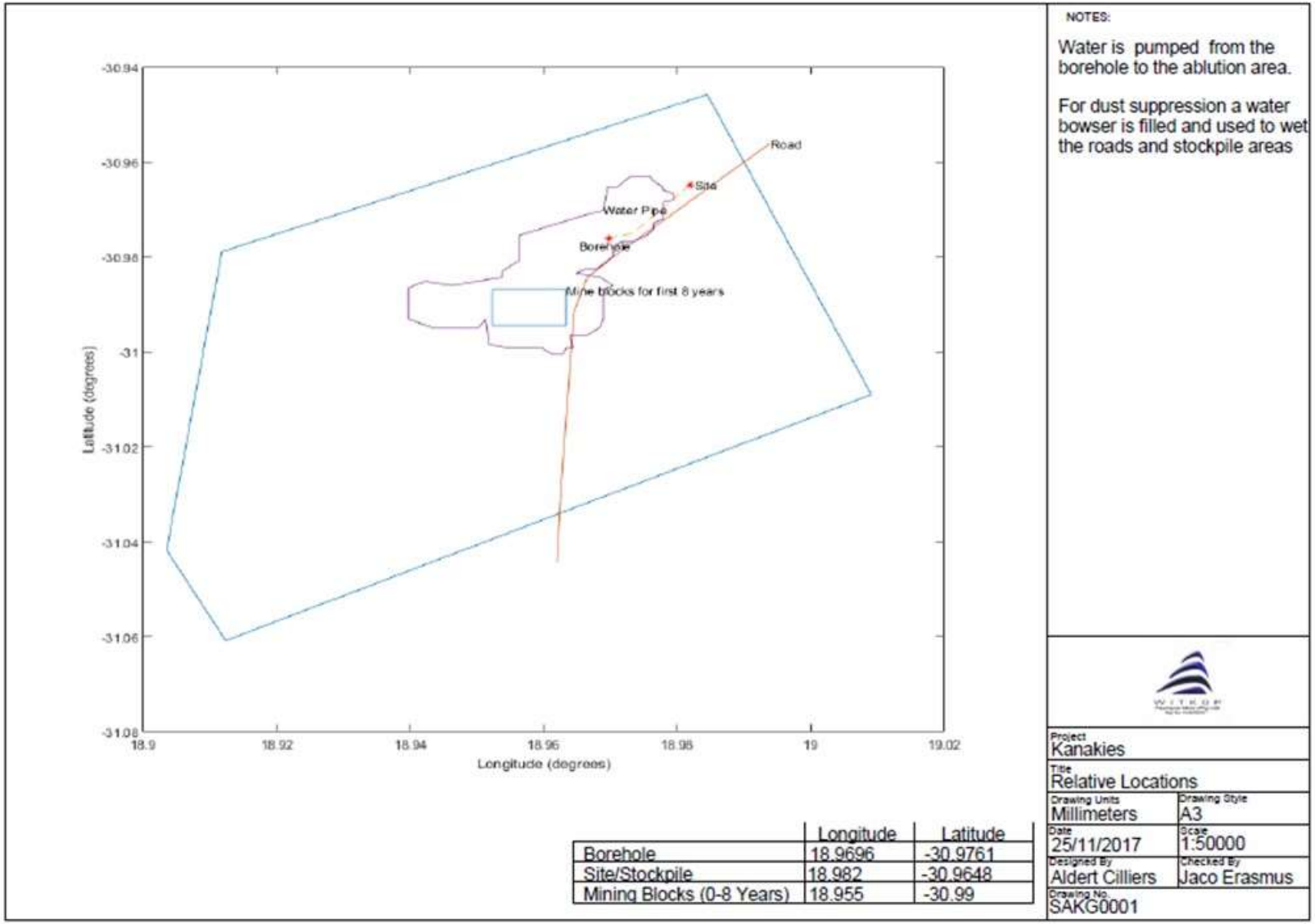
Table 5: Summarised listed activities and relevant legislation

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE	WASTE MANAGEMENT AUTHORISATION
Administrative and ablution facilities, change house and conservancy tanks	0.2 Ha	-	-	-
Maintenance Shed	0.3 Ha	-	-	-
Vehicle Park & Fuel Storage	0.6 Ha	10	Listing Notice 3	-
Water supply via borehole & storage within Jojo tanks	81m3 abstracted / day and stored within 2,500 litre tank	-	-	-
Vegetation clearance and topsoil stripping	700 Ha	19, 27, 30 15 12	Listing Notice 1 Listing Notice 2 Listing Notice 3	-
Surface trench mining	700 Ha	19 17	Listing Notice 1 Listing Notice 2	-
Backfilling and rehabilitation	700 Ha	22	Listing Notice 1	Category A: 14 Category B: 7, 11
RoM Stockpile (moves with active mine area)	0.5 Ha	6	Listing Notice 2	Category B: 7, 10,11
Mobile Crushing & Screening Plant	0.6 Ha	-	-	-
Stockpile yard	2.1 Ha	6	Listing Notice 2	Category B: 7, 10, 11
Access & haul roads	5 Ha (10km length X 5m wide)	4	Listing Notice 3	-
Transportation of product via existing siding	<10 Ha	-	-	-

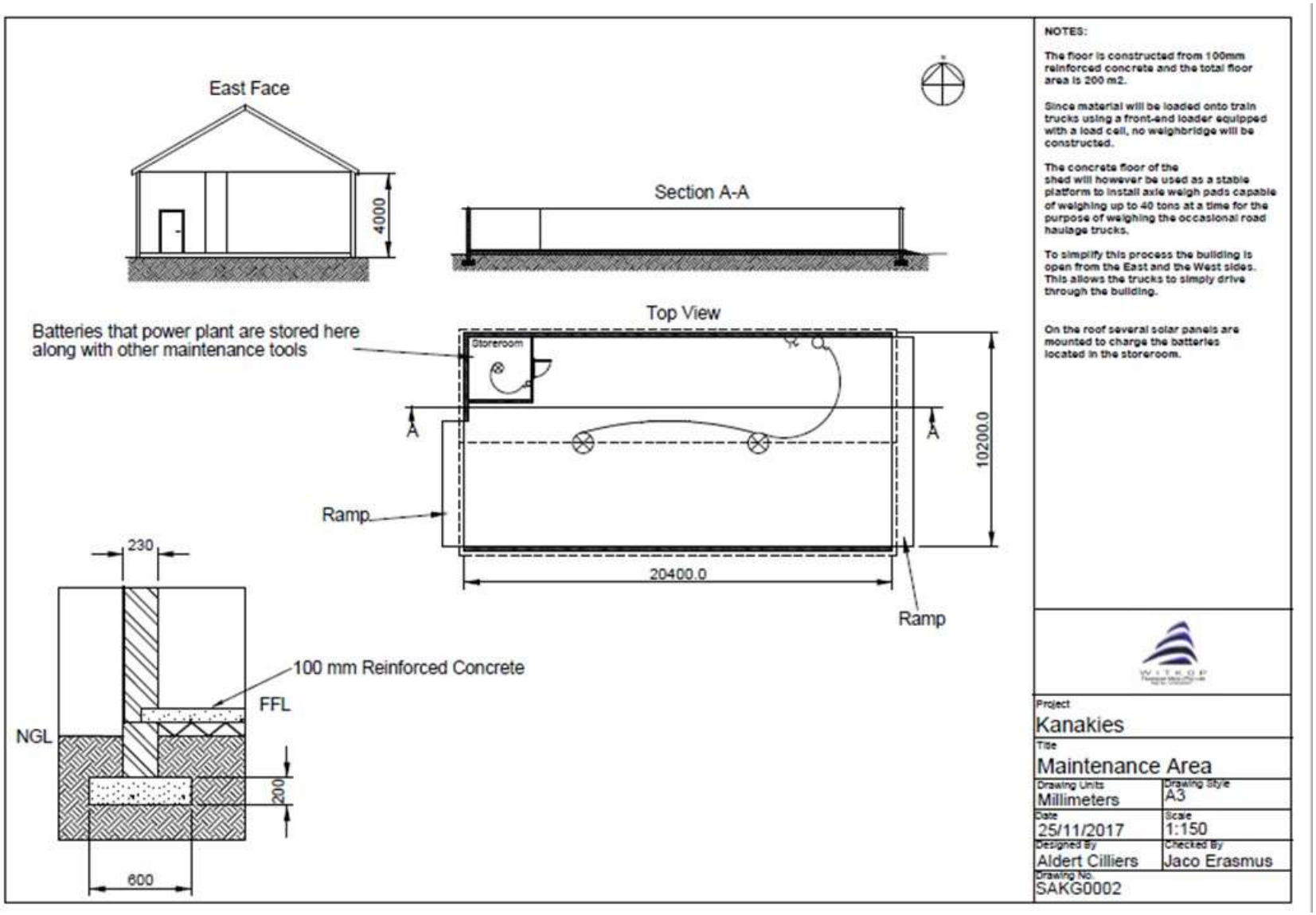
NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE	WASTE MANAGEMENT AUTHORISATION
Waste generation (domestic) & storage	Within administrative area	-	-	-



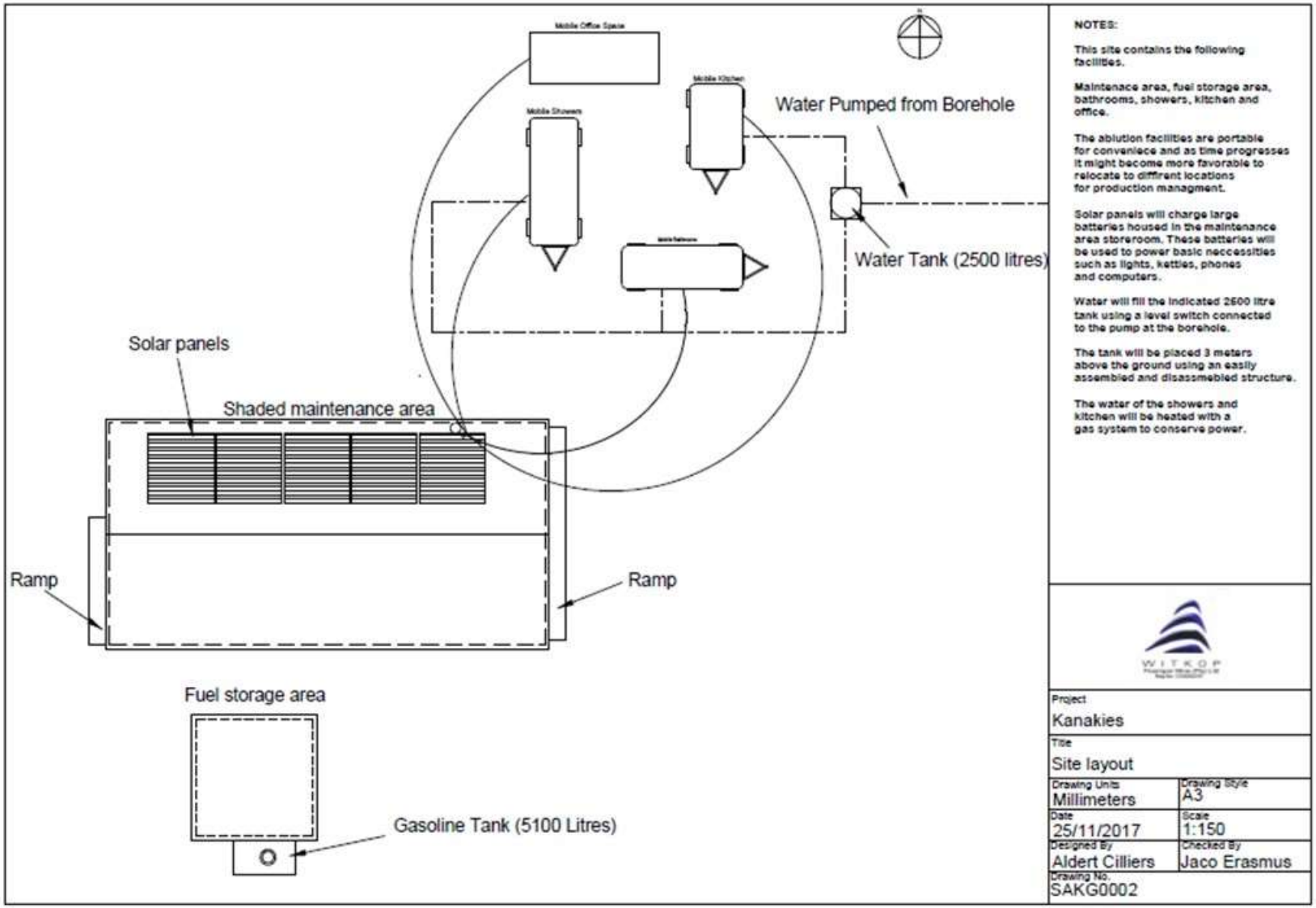
Plan 3: Mine Plan – Full life-of-mine (Witkop Fluorspar Mine, 2018)



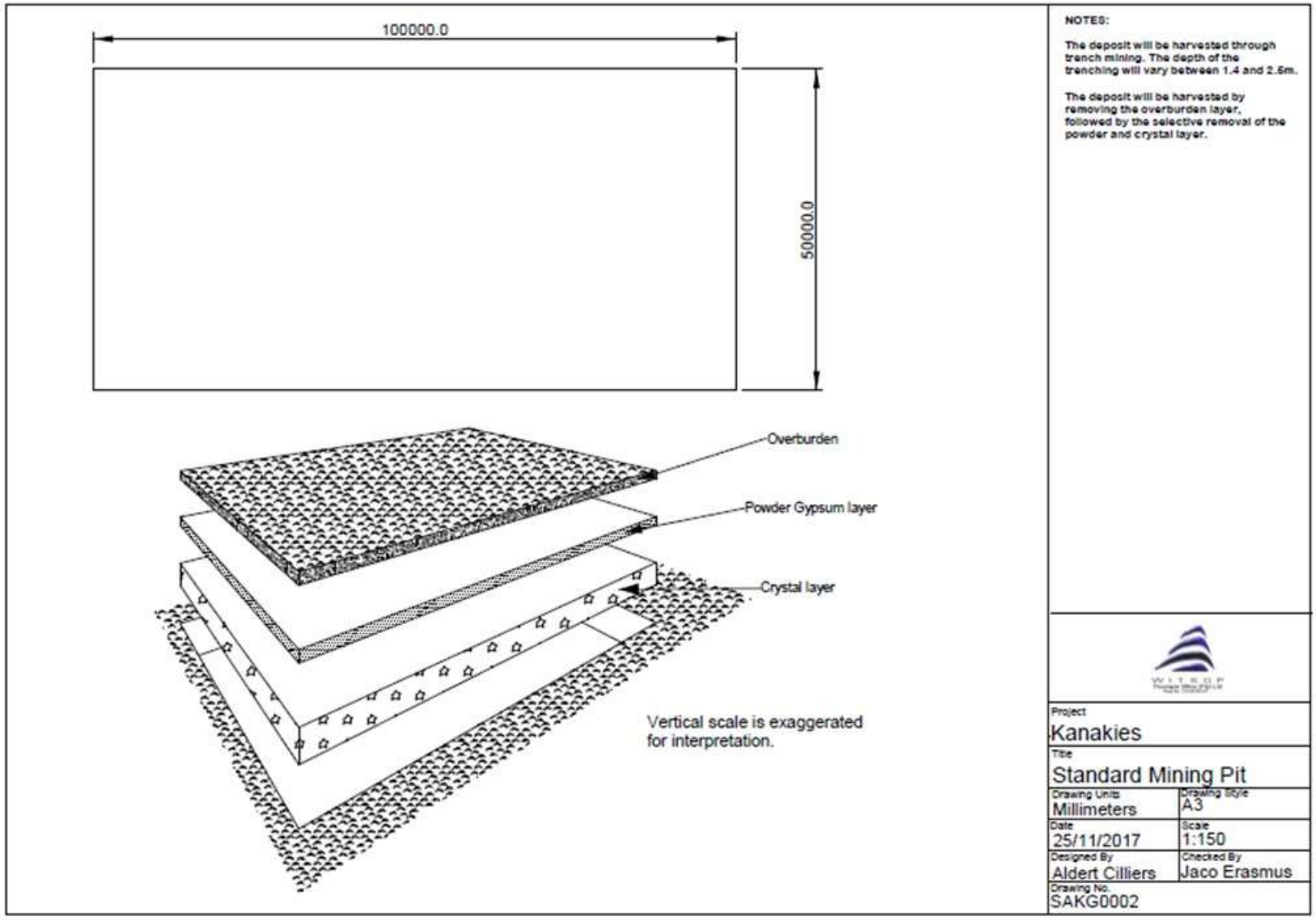
Plan 4: Surface Infrastructure Layout (Witkop Fluorspar Mine, 2018)



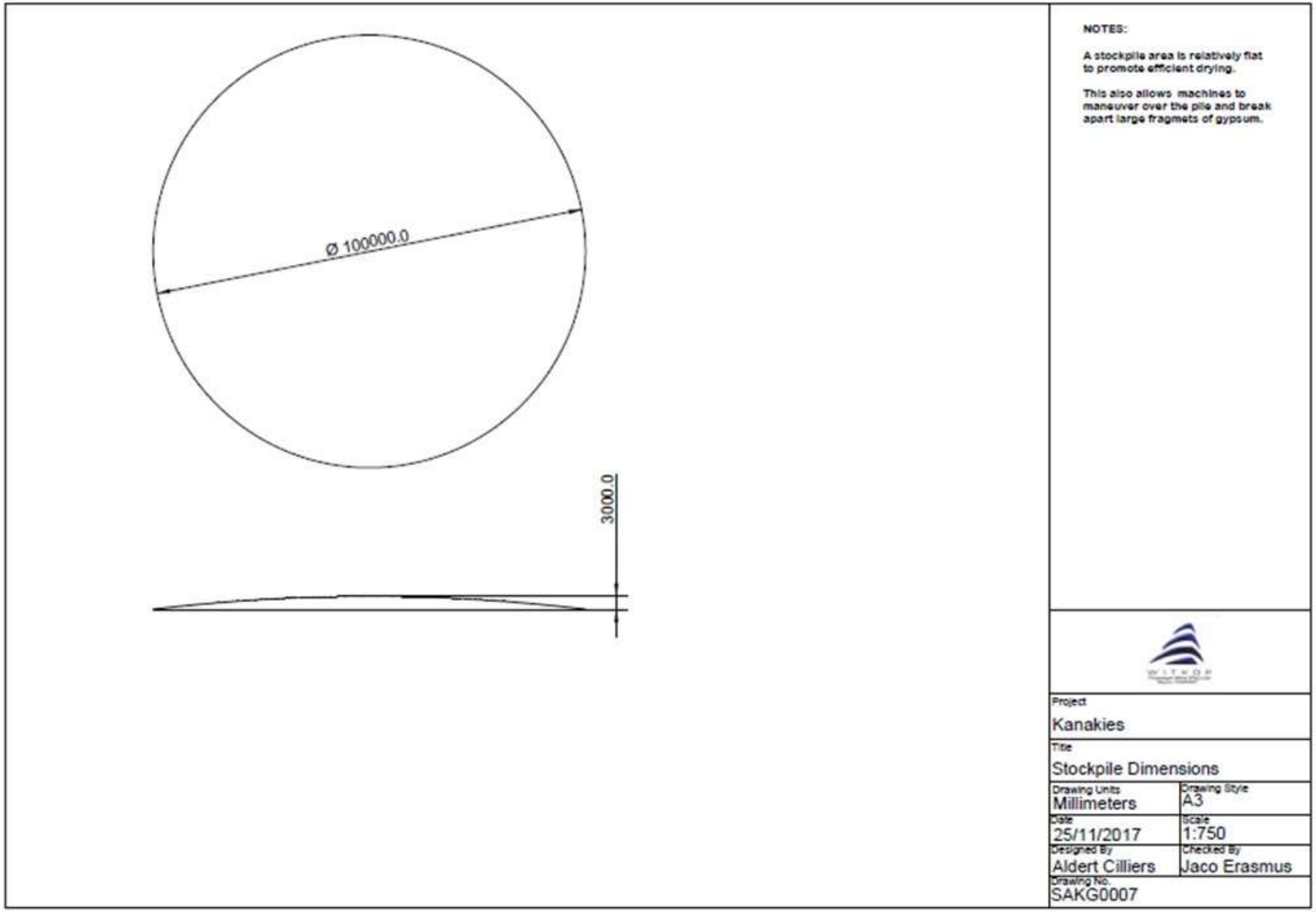
Plan 5: Maintenance Area (Witkop Fluorspar Mine, 2018)



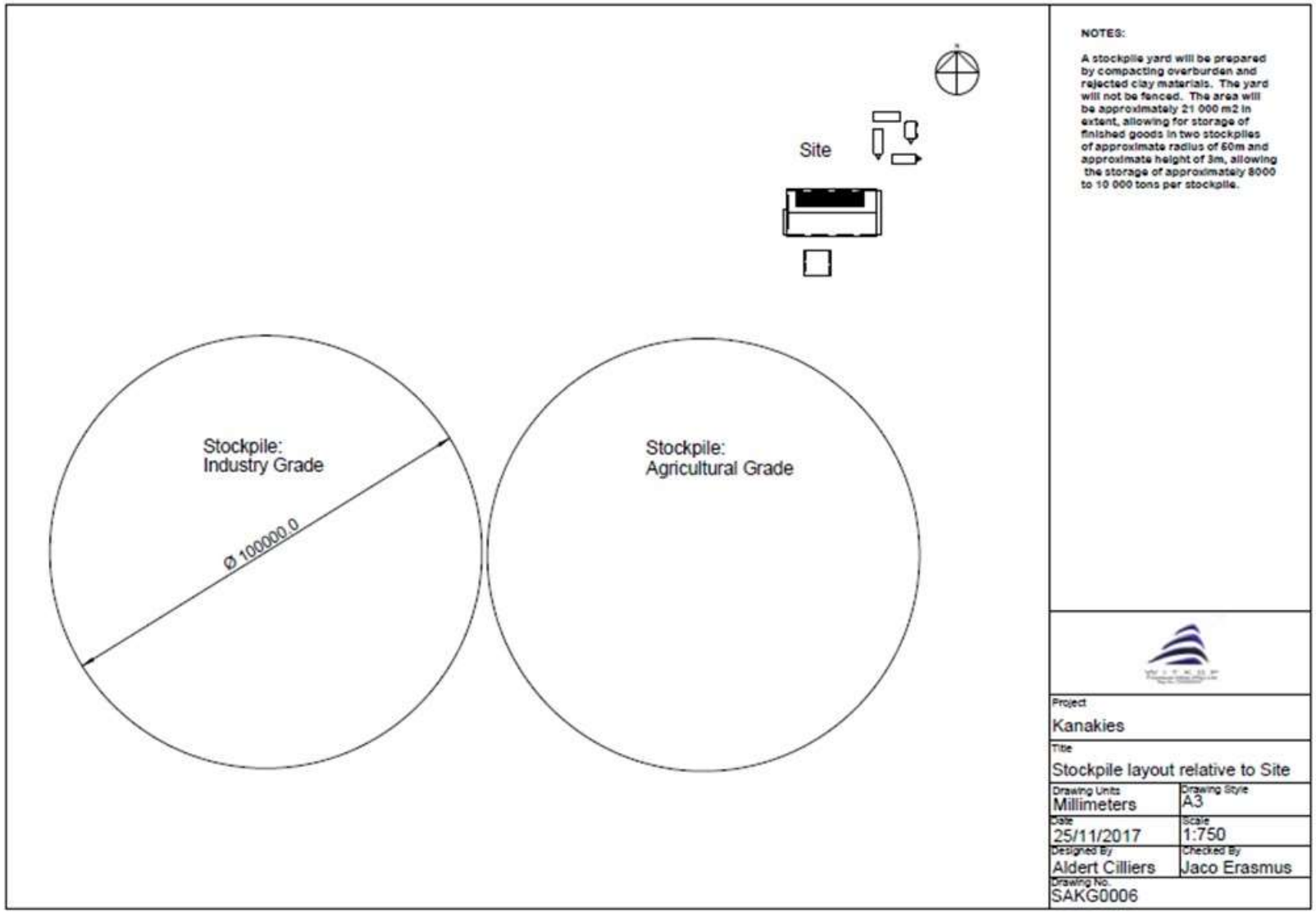
Plan 6: Site layout (Witkop Fluorspar Mine, 2018)



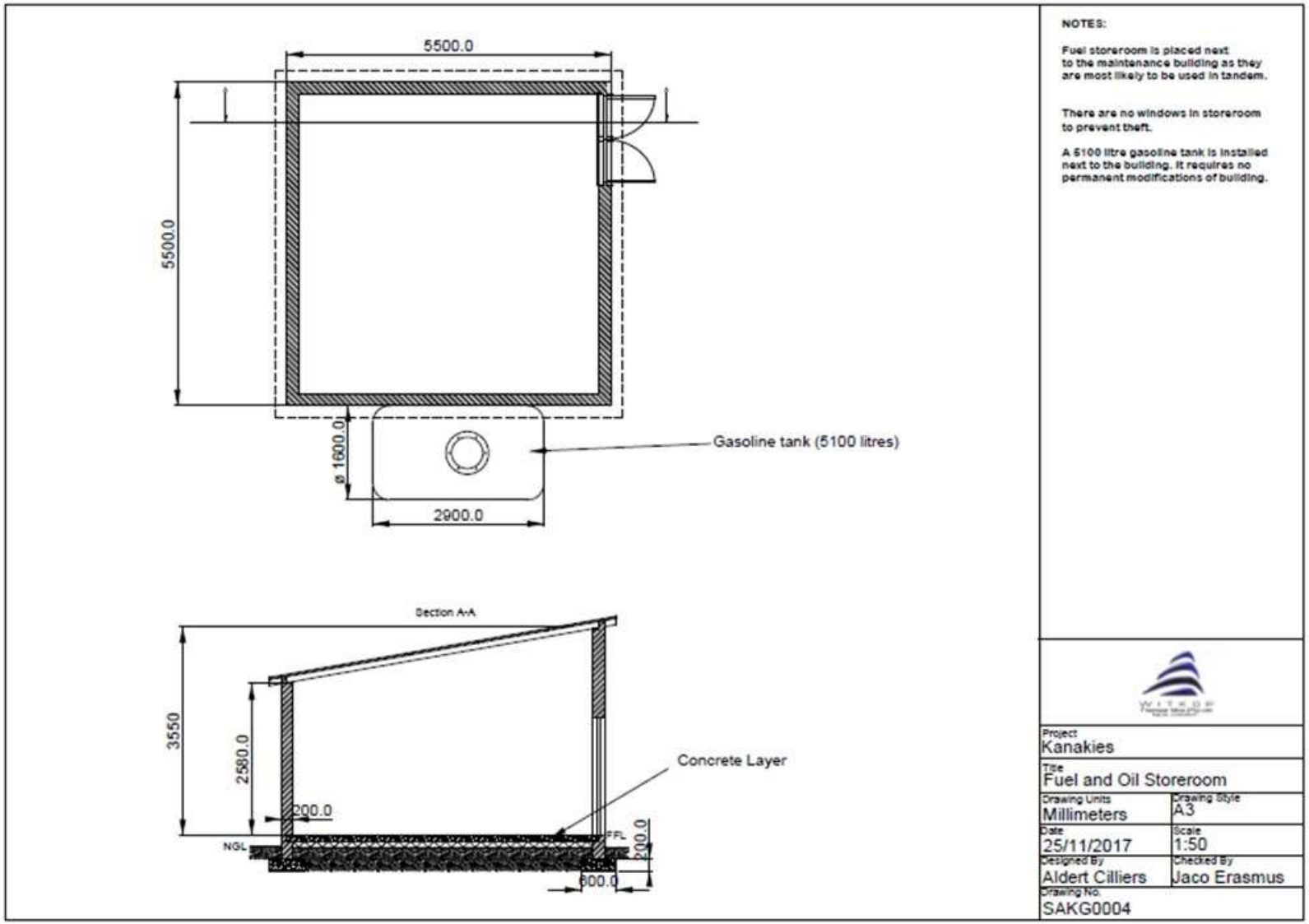
Plan 7: Standard Mining Pit (Witkop Fluorspar Mine, 2018)



Plan 8: Stockpile dimensions (Witkop Fluorspar Mine, 2018)



Plan 9: Stockpile layout relative to site (Witkop Fluorspar Mine, 2018)



Plan 10: Fuel and oil storeroom (Witkop Fluorspar Mine, 2018)

4.2 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

4.2.1 ESTIMATED LIFE OF PROJECT

The life of mine is estimated to be in excess of 30 years.

It is anticipated that construction activities will take six (6) months, the life of mine is expected to be in excess of thirty (30) years. Decommissioning and closure activities are estimated at one (1) year. During this phase and beyond the timeframe audits will occur as prescribed by the closure plan.

Thus the Environmental Authorisation (EA) and Waste Management License (WML) are being sought for a period of thirty nine (39) years.

4.2.2 MINERAL RESERVE

Gypsum is the resource to be mined.

The proposed project area is underlain with quaternary alluvium which consists of calcerous and gypsiferous soils and also quaternary gravel, silt and sand. The above mentioned overlie the Besonderheid Formation of the Knersvlakte Subgroup, Vanrhynsdorp Group.

There are two seams of horizontal gypsum. There is a 0.4m thick seam which consists of gypsum powder. This seam overlies the resource; the gypsum seam is 0.9m to 1.3m thick. This is the main gypsum seam, with the increase in depth after this seam the quality of gypsum decreases.

The below figure depicts the vertical distribution of the mineral.

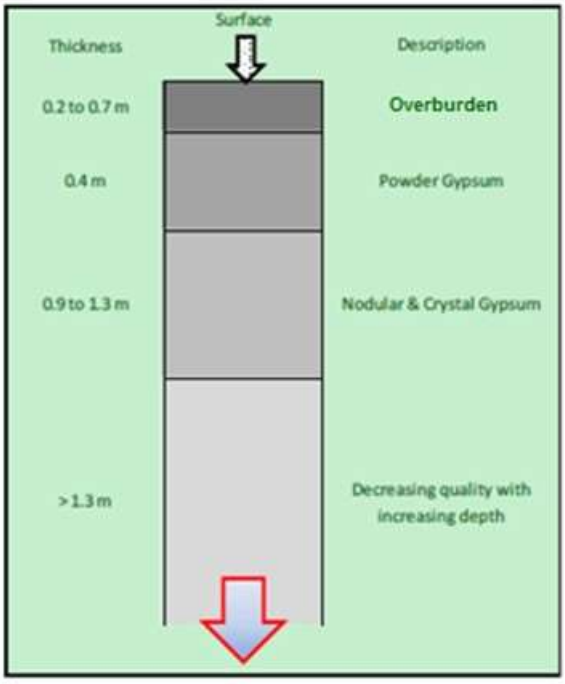


Figure 1: Gypsum seams (Witkop Fluorspar Mine, 2018)

4.2.3 MINING METHOD, PROCESSING AND RECOVERY

Kanakies will be mined via simple roll-over trench mining, as seen in Plan 7. The depth of the trenching will range from 1.4m- 2.5m. Mine blocks will be 50m x 100m. The overburden layer will be cleared across the mine block using a scraper, the overburden layer is approximately 0.4m. This will be followed by the harvesting of the powder layer in 2.2m x 50m strips with a surface miner. The material will be placed in wind rows whereby an articulated dump truck will collect the material. This layer will be screened so that foreign materials are removed. The expected minimum margin to be recovered is 40%.

Within the centre of eight mine blocks (200m x 200m area) will be the stockpiling and processing area. The run of mine (RoM) material will be crushed and screened using a roller crusher combined with a variable aperture high frequency screen with a recycle system, fed by a wheel loader. The expected recovery margin is estimated at 65%. The high frequency screening efficiency is expected to be no less than 37%, the overall mean loss of volume of material harvested has been calculated to be 76%. The upgraded gypsum will be hauled to the quarantine area where a quality check will be undertaken and then bulk blending to produce the approved finished goods.

After this process, it is repeated for the next layer which is the crystal gypsum-carrying clay. When the crystal-gypsum has been harvested this mine block has been completed and the next mine block is processed. When eight mine blocks have been

mined out concurrent rehabilitation (backfilling the excavation with stockpiled overburden) will be undertaken. As this is being undertaken, the next eight mine blocks will be prepared for mining.

The theoretical recovery per hectare are as follows:

- Powder layer at +60% purity: 0.2m x 10 000m2 x 1ton/m3 x 40% = 800 t/ha
- Powder layer at +80% purity: 0.2m x 10 000m2 x 1ton/m3 x 40% = 800 t/ha
- Crystal layer at +80% purity: 1.1m x 10 000m2 x 1ton/m3 x 24% = 2 640 t/ha

The recovery per hectare equates to 800 tons for agricultural material and 3440 tons for industrial material.

4.2.4 WATER SUPPLY, MANAGEMENT AND RETICULATION

The operation has anticipated that 81m³ of water will be used on a daily basis. 80m³ will be used for human consumption, toilets and hand washing. 1m³ will be used for dust suppression. No water will be required for the processing of gypsum.

The water for the site will be supplied by an existing borehole that is located two kilometres east of the project area. The borehole will be pumped for four hours a day at 21m³ per hour and piped to the jojo tank for storage. The jojo tank will have a storage capacity of 2500 litres.

The necessary water use license applications will be undertaken for this water use.

Berms will be constructed around areas of activity so dirty water is unable to come into contact with clean areas, and so clean water is diverted around dirty areas.

Clean and dirty water channels will be constructed throughout the site. Dirty water channels will collect dirty water from stockpile areas, overburden areas and infrastructure areas and be directed to silt traps (SD Hydrological Services: 2018). These channels will need to be based on the trapezoidal and triangular channel designs.

Channels that surround the stockpile and overburden are to be vegetated and unlined trapezoidal channels (Figure 2). The side slopes are to be 1:3, bottom width of 1m and a design depth of 1m. Channels within the infrastructure area are to be vegetated and unlined trapezoidal channels. The side slopes are to be 1:3, bottom width or 1m and a design depth of 0.5m.

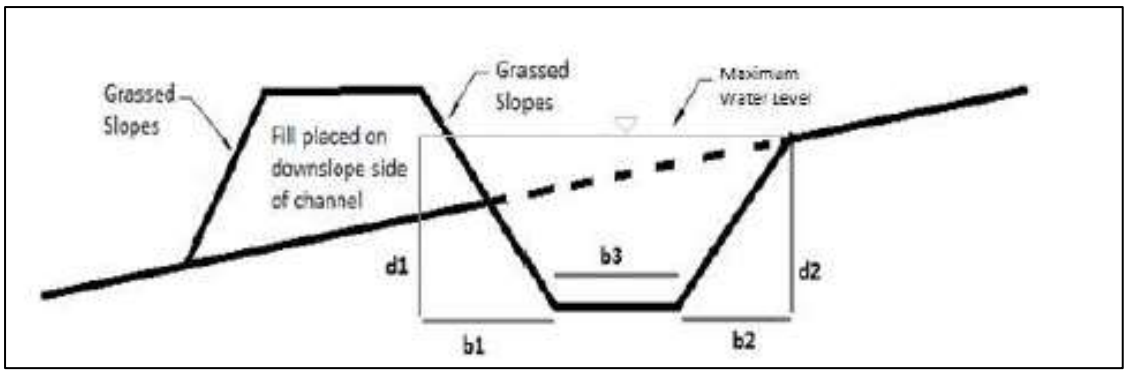


Figure 2: Conceptual Trapezoidal Channel (SD Hydrological Services, 2018)

A detailed mine water balance has been completed by SD Hydrological Services, 2018. It can be found in Appendix 4.

The study revealed a sufficient sustainable supply of water that is to be obtained from a combination of rainfall and abstraction from a borehole.

The water balance indicates that there will be no surplus of water anticipated on the project site and the mine's water requirements can be met.

As an initial step in applying for water use licensing, a pre-application meeting/site visit took place on 29th August 2018 with the DWS. Following the meeting a clarification/confirmation email regarding water uses was sent to DWS.

4.2.5 ASSOCIATED ACTIVITIES, INFRASTRUCTURE AND SERVICES

Additional services and infrastructure associated with the proposed project include:

4.2.5.1 SOIL STRIPPING AND STOCKPILING

There will be no topsoil stripping as there is little to no topsoil on site. Plan 9 exhibits the product stockpiles that will be on site in the unfenced stockpile yard. The ground will be compacted with overburden and with the rejected clay materials. The area will not be fenced off and will be approximately 21,000 m² in size. There will be two stockpiles of the finished product, one agricultural and the other industrial grade. Stockpiles will have a radius of 50m and height of 3m.

4.2.5.2 MINE INFRASTRUCTURE

The mine area will be fenced off and access to site controlled. Surface infrastructure, as seen in Table 6 will include:

Table 6: Proposed Infrastructure

SURFACE INFRASTRUCTURE:	DESCRIPTION
Access and security control	• Internal haul and access roads • Access will be via the existing Transnet service road off the R355 • Security and access control (boom) • Weighbridge • Fencing
Mine Area	• Soil berms • RoM Stockpiles • Mobile crushing and screening plant • Ablution facilities (portable toilets) • Clean and dirty water trenches, water management sumps and silt traps • Hard park area • Generator (250 kVA)
Infrastructure Area	• Vehicle park area • Workshop and store • Fuel storage • Container offices and laboratory • Ablution facilities linked to conservancy tanks • Jojo tank • Stockpile Yard • Generator (10 kVA) • Lighting • Clean and dirty water trenches, water management sumps and silt traps
Siding Area	• Stockpile and loading area • Clean and dirty water trenches, water management sumps and silt traps • Ablution facilities (portable toilets)

There will be no permanent structures on the site with the exception of the fuel storage area and the associated bunding. A total of 120 m² of office, laboratory and ablution facilities will be erected by means of mobile park-homes. In addition, a roofed shed will be erected for the purpose of providing shaded area for routine and breakdown maintenance on the small number of equipment that will be operating on site. The floor will be constructed of 100mm reinforced concrete and the total floor area will be maximum 200 m².

The infrastructure area in relation to the mine area can be found in Plan 11.

4.2.5.3 POWER SUPPLY

Kanakies Gypsum Mine will be independent from the National Grid. Electricity for administrative and maintenance purposes at the infrastructure area will be provided

on demand by means of a 10kVA generator, combined with solar panels equipped with battery storage. Gas appliances will be utilised for heating and other domestic purposes.

All mining and ancillary materials handling will be performed by diesel driven machinery and/or electricity generated by a diesel-powered generator (250kVA).

4.2.5.4 ACCESS ROADS AND RAILWAY SIDING

The site is serviced by a series of gravel farm roads, which provides access to the project area as well as the Transnet Loop 6 rail siding situated alongside the Sishen-Saldanha railway line (approximately 20km from the R355). There is currently only one option proposed for access to site, which is via the gravel Transnet Service Road and the R355. All trucks and private/staff vehicles will make use of the access via the Transnet Service Road.

A maximum of 10km internal haul and access roads will constructed on site, with a width of 5m, over the life of mine. These will be created and rehabilitated concurrently as the need arises.

4.2.5.5 TRANSPORT

Initially transport will be limited to road haulage as negotiations with Transnet Freight Rail are ongoing.

Given the expected production output of approximately 50 000t/annum; the expected number of trips will be 134 truckloads of 34 tons each per month, or approximately 6 to 7 trips per day over a 5-day week.

It is expected that from year 4 of full operation, the split between road haulage and rail transport will be approximately 60:40 i.e. about 40% of output would potentially be moved by train via the Kanakies Loop 6 Siding. This implies that the road truck trips will be reduced from 7 to approximately 4 trips per day over a 5-day week, whilst the remainder will be loaded and moved by train trucks. It is envisaged that the annual output to be transported by rail will be in the region of 20 000 ton/annum.

4.2.5.6 WASTE MANAGEMENT

General and hazardous waste will be generated on site:

- General waste includes office and domestic waste; construction and building waste; scrap metal and old tyres.
- Hazardous waste includes used hydrocarbons, oily rags and sewage.

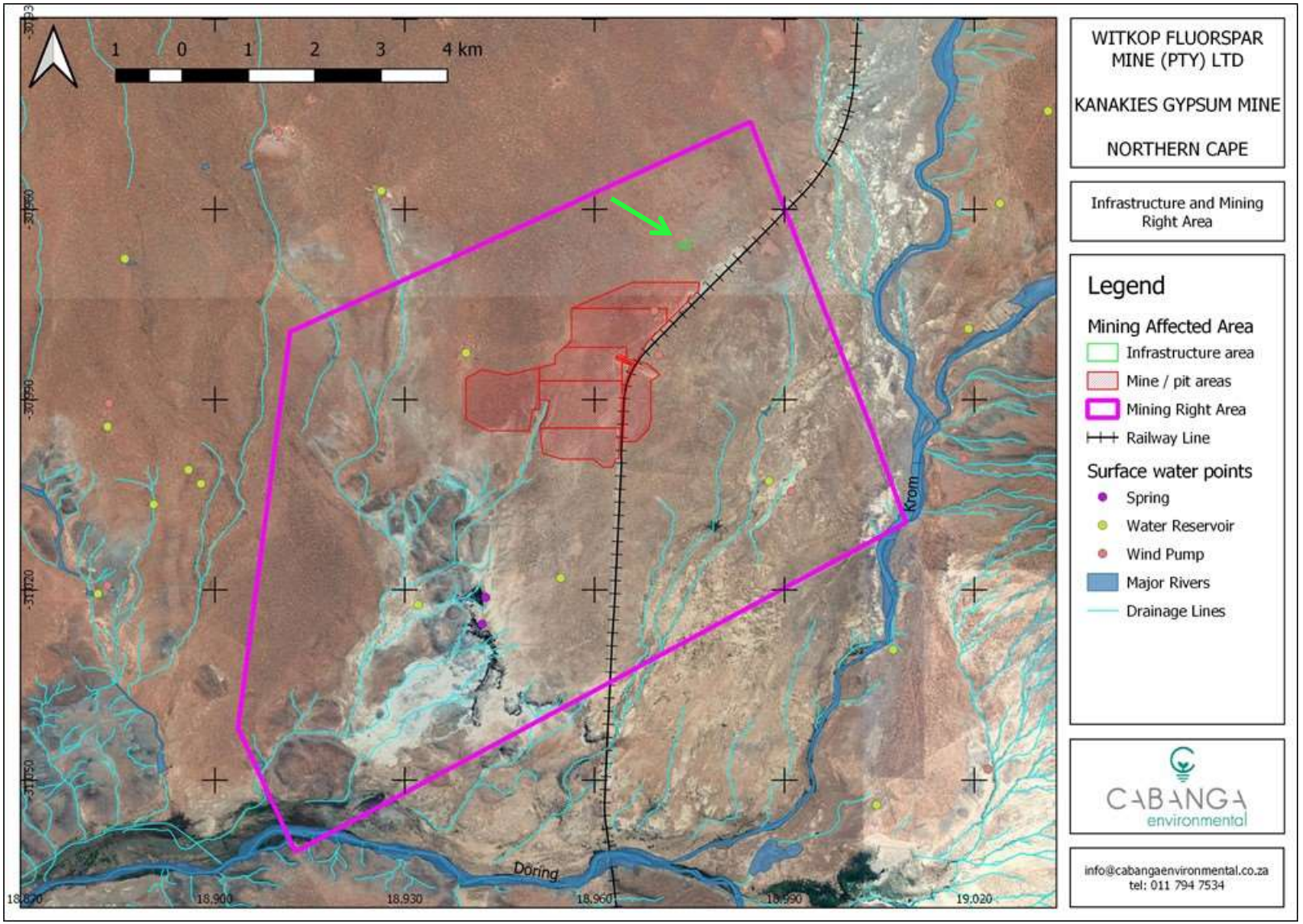
No landfill site will be constructed on site. All waste will be separated and stored as per the relevant Norms and Standards where applicable. Waste will be recycled and sold/given to interested parties as far as possible. Waste for disposal will be collected

by a reputable contractor for transport to a suitably licensed facility. Waste safety disposal certificates for hazardous waste will need to be obtained from disposal contractors and waste manifest will be maintained on site.

Sewage will be collected within conservancy tanks to be emptied by honey sucker for treatment at a suitably licensed facility. Portable toilets will be serviced by a sub-contractor on a weekly basis or as necessary.

4.2.5.7 FUEL STORAGE

Oils, greases and other hydrocarbons will be stored in a lockable stores, of approximately 30 m^2, to be constructed from brick. Diesel fuel for the machinery will be stored on site in a 5,100 litre tank, rented from an oil company such as Shell or Caltex. The fuel supply company will have specific requirements in terms of bunding. In general, the bunding capacity is to be the capacity of the fuel tank plus 50%. There needs to be an impermeable apron for when refuelling takes place.



Plan 11: Infrastructure area in relation to the mine area

4.2.6 EMPLOYMENT REQUIREMENTS

The project will employ 14 permanent staff members and more workers will be employed as service providers, as and when required. Certain skills will be required whereby employment will be sourced from Loeriesfontein and Nieuwoudtville, if the necessary skills are not found in the towns then the radius will increase to find the suitable skills needed.

A summary of the workforce for the first 5 years is depicted below in Table 7. The Social and Labour Plan (MTS, March 2018) used five-year targets as seen in the below table. It is anticipated that after the 5 years the 14 permanent employees will stay until the life of mine is completed and the SLP will be updated as required.

Table 7: Kanakies Workforce (MTS, March 2018)

Occupational Level	Current:	Year 1	Year 2	Year 3	Year 4	Year 5
Top management (F)	0	0	0	0	0	0
Senior management (E)	0	1	1	1	1	1
Professionally qualified and experienced specialists and middle management (D)	0	1	1	1	1	1
Skilled technical and academically qualified workers, junior management, supervisors, foremen and superintendents (C)	0	3	3	3	3	3
Semi-skilled and discretionary decisions making (B)	0	2	4	7	7	7
Unskilled and defined decision making (A)	0	1	1	2	2	2
Total Permanent	**0**	**8**	**10**	**14**	**14**	**14**
Non-permanent						
TOTAL	**0**	**8**	**10**	**14**	**14**	**14**

5 POLICY AND LEGISLATIVE CONTEXT

Table 8 outlines the legislation and guidelines that are considered to be applicable to the proposed project; and which were considered at the time of compiling this report

Table 8: Applicable legislation and guidelines

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
The Constitution of South Africa, 1996 (Act 108 of 1996) • Everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development. • Every person has a right to information held by the State and to information held by other people that are required in the exercise or protection of a right. • Everyone has the right to just and procedurally fair administrative action.	• Alternatives are assessed in Section 7 whilst Section 10 summarizes the anticipated impacts. • Section 8 and • Appendix 14 • Section 8 and • Appendix 14	• The EIA EMPr report has assessed the impacts of the project in detail with specialist input. • The EIA EMPr report was made available for public review and comment for a period of 30 days (from 23 August to 21 September 2018). • The Appeal Process will be described to I&APs through the RoD notification process.
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APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
• The Minerals and Petroleum Resources Development Act (MPRDA), Act No. 28 of and its Regulations (GNR527, 23 April 2004 as amended by: GNR R1288 dated 29 October 2004; GNR1203 dated 30 November 2006; and GNR349 dated 18 April 2011).	• Acceptance letters included in Appendix 14	• An application for a mining right was submitted to, and accepted by, the DMR in terms of the MPRDA. • The Scoping Report was submitted to, and accepted by, the DMR in terms of the MPRDA. • Submission of information has been on the prescribed forms, and submitted via the SAMRAD portal where applicable.
• National Environmental Management Act (NEMA), Act 107 of 1998 as amended and its associated regulations: (GNR982 – EIA Regulations; NEMA Regulation GNR983 – Listing Notice 1; NEMA Regulation GNR984 – Listing Notice 2; and NEMA Regulation GNR985 – Listing Notice 3 as amended in 2017).	• Section 4.1 identifies the applicable listed activities.	• Witkop has submitted an application for EA. The application is subject to a Scoping and EIA process. The Scoping has been accepted and this report constitutes the EIA. • This report has been compiled to meet the requirements of the EIA EMPr phase.
• NEMA: Public Participation Guidelines (GNR807) and updated in 2017.	• Section 8 and Appendix 14	• The Guidelines were considered and followed during the Public Participation Process (PPP).
• NEMA Regulations pertaining to the financial provision for prospecting, exploration, mining or production activities (GNR1147 –20 November 2015).	• Section 25.5	• The EIA includes an assessment on the Financial Provision in accordance with the relevant Regulations. The necessary guarantees must be secured accordingly.
• NEMA Guideline on Need and Desirability (2017).	• Section 6	• The Guideline was considered during the compilation of the EIA EMPr.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
• National Environmental Management: Waste Act (NEM:WA), Act 59 of 2008 as amended and its associated regulations. The regulations and various addendums pertaining to scheduled waste activities (GNR921, November 2013).	• Table 5 identifies the applicable Waste Management Activities. • Management measures within this report have considered the Regulations pertaining to the planning and management of residue stockpiles and/or deposits (GNR 632, July 2015).	• Witkop has submitted an application for EA and a WML. The Scoping phase has been completed and approved, this is the EIA phase being undertaken currently. • The mine will need to register and report on SAWIS in accordance with GNR625, August 2012.
• Norms and standards for the storage of waste on site as per GNR926, November 2013.	• Management measures proposed within this report (Section 19.1) have considered the Norms and Standards, where necessary.	• Waste volumes generated on site will be minimal, and is not expected to trigger Category C. • The EIA EMPr considers the norms and standards for storage, where relevant.
• National Environmental Management: Air Quality Act (NEM:AQA), Act 39 of 2004 as amended and its Regulations pertaining to listed activities (GNR893, 22 November 2013 as amended).	• No listed activities applicable to the operations thus no AEL is required.	• All mines and quarries are classified as Group C emitters, and must register and report on NAEIS annually.
• NEM:WA National Dust Control Regulations (GNR827, November 2013)	• Management measures have been proposed to	• An air quality study (including dispersion modelling) has been undertaken.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
	minimise dust generation on site (Section 19.1).	• A dust fallout monitoring programme is outlined in the EMPr. Monitoring data will be compared to the Regulations to ensure dust fallout is within acceptable limits.
• National Water Act (NWA), Act 36 of 1998 as amended and its associated regulations.	• Management measures proposed within this report (Section 19.1) have considered the NWA, where necessary.	• To date the DWS has been notified of the acceptance of the Mining Right Application as required by the Regulations regarding the procedural requirements for water use license applications. • DWS was sent a copy of the Scoping Report and draft EIA Report. • A pre application meeting for the necessary water use license application was undertaken on 29 August 2018. • The necessary water use license application will be submitted to the DWS in the near future.
• GNR704 of the NWA, Regulations on the use of water for mining and related activities aimed at the protection of water resources.	• Management measures proposed within this report (Section 19.1) have considered GN704, where applicable.	• All mine infrastructure and activities will be located outside the 100m buffer of the ephemeral drainage line. • Clean and dirty water channels will be constructed on site. • A surface water study (hydrological assessment) and Storm water management plan has been undertaken. This can be found in • Appendix 4.
• National Environmental Management: Biodiversity Act (NEM:BA), Act 10 OF 2004 as amended and its regulations,	• Section 9.1.7.3 and Section 9.1.8.5 lists the	• Regulations utilised to determine the need for any listed scheduled activities under Listing

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
including various regulations pertaining to protected species and to alien and invasive species.	protected species on site.	Notice 3. The MRA has been classed as a CBA2 and Ecological Support Area. • A Fauna and Flora study has been undertaken for the EIA EMPr. • Floral SCC identified will be earmarked and permits obtained where they need to be relocated. • Faunal SCC were observed and are anticipated on site but it is expected that they will relocate to adjacent undisturbed areas with the mining activity.
• National Forest Act, Act 84 of 1998	• The baseline environment as per the specialist studies can be seen in Section 9.	• A Fauna and Flora study has been undertaken for the EIA EMPr. • Floral SCC floral identified will be earmarked and permits obtained where they need to be relocated. • Faunal SCC observed and anticipated on site but it is expected that they will relocate with the mining activity.
• National Environmental Management: Protected Areas Act (NEMPAA), Act 57 of 2003 as amended and its associated regulations.	• The baseline environment as per the specialist studies can be seen in Section 9.	• Formally protected areas refer to areas protected either by national or provincial legislation whereas informally protected areas refers to privately owned reserves. • The Kalk Gat Private Nature Reserve is situated adjacent to the proposed MRA but approximately 6km from the proposed mine area. The mining activities are not immediately adjacent to the nature reserve. Attempts were

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
		made to obtain the contact details of the Kalk Gat Private Nature Reserve but to no avail.
• National Heritage Resources Act (NHRA), Act No. 25 of 1999	• The heritage assessment is discussed under Section 9.1.10.1.	• A Phase I Heritage Impact Assessment has been undertaken as per the plan of study for the EIA. No sites of cultural heritage significance were identified. • SAHRA has been consulted as a Regulatory Authority for the project.
• Spatial Planning and Land Use Management Act (SPLUMA), Act No. 16 of 2013, Promulgated 1 July 2015	• Section 9.1.4 describes the current land use and zoning.	• The applicant will need to rezone the property for mining and quarrying if EA is granted.
• Hazardous Substances Act, Act No. 15 of 1973	• Management measures proposed within this report (Section 20) have considered the Act, where applicable.	• Hazardous substances on site will be limited to hydrocarbons.
• South African National Standard: SANS 10234:2008 - Globally Harmonized System of classification and labelling of chemicals (GHS).	• Management measures proposed within this report (Section 20) have considered the Standards, where applicable.	• Material Safety Data Sheets (MSDS) will be kept on site, where applicable.
• South African National Standard: SANS 10228:2006 - The identification and classification of dangerous goods for transport	• Management measures proposed within this report (Section 20) have considered the	• The transportation and storage of dangerous good will be limited to hydrocarbons.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT
	Standards, where applicable.	
• Mine Health and Safety Act, Act 29 of 1996 (MHSA) and associated Regulations	• Management measures proposed within this report (Section 20) have considered the Regulations, where applicable.	• Although not directly addressed in the EMPr, protecting the environment contributes to a safe working environment.
• Explosives Act, Act 15 of 2003	• n/a	• No explosives will be used on site.
• GN 41381, 12 January 2018, National Water Act, 1998: Breede-Gouritz and Berg- Olifants Water Management Areas: Limiting the use of water in terms of item 6 of Schedule 6 of the Act, for urban irrigation and industrial (including mining) purposes	• Section **Error! Reference source not found.** discusses this aspect.	• The mine will have to curtail their water use by 45%.
• Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009	• Section 9.1.7.3 discusses this aspect.	• Species of Conservation Concern were identified on site. The necessary relocation permits will be obtained prior to commencement of construction activities.

6 NEED AND DESIRABILITY OF THE PROPOSED PROJECT

The Need and Desirability of the project has been assessed as per the DEA Guideline on Need and Desirability (2017).

According to these guidelines, the consideration of "need and desirability" in EIA decision-making requires the consideration of the strategic context of the proposed Project along with the broader public interest and societal needs. The development must not exceed ecological limits and the proposed actions must be measured against the short-term and long-term public interest to promote justifiable social and economic development.

The Draft National Guideline on Minimum Information Requirements for Preparing Environmental Impact Assessments for Mining Activities that Require Environmental Authorisation (DEA, 2018) has also been published. The Guideline states that the need and desirability should ultimately address "how the mine's development is justifiable based on social, environmental and economic outcomes" (DEA, 2018).

The Project need and desirability is discussed firstly in the context of securing ecologically sustainable development, and secondly in terms of economic and social development.

6.1 SECURING ECOLOGICALLY SUSTAINABLE DEVELOPMENT

The application area covers 7456.6974 hectares, this entire area will not be used for the project. Of the overall mining right area approximately 689 Ha is earmarked for mining, whilst a further 9Ha will be affected by surface infrastructure.

Although there will be impacts it is not expected that there will be very high ecological impacts as this area has already been degraded by the drought, that the area has experienced over the years, overgrazing and the railway line.

There are no sites of cultural heritage significance in the project area (Archaetnos Culture & Cultural Resource Consultants, March 2018)

Intact Knersvlakte Vygieveld, Overgrazed Knersvlakte Vygieveld and Transformed areas occur on Kanakies farm (Scientific Terrestrial Services, July 2018c). A section of the proposed mine area encroaches on Intact Knersvlakte Vygieveld but the majority is on Overgrazed Knersvlakte Vygieveld.

Faunal SCC listed mammals encountered during the assessment are as follows; *Ardeotis kori* (Kori bustard), *Orycteropus afer* (Aardvark), *Otocyon megalotis* (Bat-eared fox) and *Brinckiella arboricola* (Tree Winter Katydid). It is anticipated that the following SCC will occur on site; *Felis nigripes* (Black-footed cat); *Homopus signatus*

(Speckled tortoise); *Brinckiella mauerbergerorum* (Mauerberger's Winter Katydid) and *Brinckiella aptera* (Mute Winter Katydid). If fauna species get close to where the activity is taking place it is expected that they will migrate away due to the disturbance and human activity. They should return after the rehabilitation of the site.

Sever floral SCC noted during the summer and winter assessments, these are protected in terms of the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009), and include:

- *Hoodia gordonii;*
- *Mesembryanthum spp.;*
- *Drosanthemum spp.;*
- *Brownanthus spp.;*
- *Lessertia frutescens;*
- *Oxalis ambigua;*
- *Oxalis luteola;*
- *Lampranthus maximiliani;*
- *Ornithogalum secundum;*
- *Lapeirousia spinosa;*
- *Tetragonia microptera*
- *Malephora purpureo-corcea;*
- *Ruschia robusta;*
- *Gethyllis villosa;*
- *Delosperma hisidium;*
- *Bulbine torta;*
- *Trachyandra falcata;* and
- *Moraea collina.*

The floral SCC will be earmarked or permits applied for in order to relocate them.

Environmental awareness training will include the identification of these species and employees will be made aware that these are not to be harmed in any way.

An ephemeral drainage line exists within the project area, surface trenching and all infrastructures will avoid this drainage line and will adhere to the 100m buffer.

It is anticipated that PM10 and PM2.5 dust fallout associated with project will be low, complying with the applicable standards (Rayten Engineering Solutions, June 2018).

Surface trench mining, although still intrusive, has less negative effects than deep open cast and underground mining. The gypsum is relatively close to the surface.

The proposed Kanakies Mine should not pose a significant threat to the current environment, as shown by the Impact Assessment included in Section 10 of this Report.

6.2 PROMOTING JUSTIFIABLE ECONOMIC AND SOCIAL DEVELOPMENT

The permanent amount of jobs that will be created by the Kanakies Mine will be 14 jobs. Contractors will be used which are in addition to the 14 permanent employees. Although not a lot of employment, the use of contractors will generate employment that does not exist in the area. There is a high level of unemployment in the area and not many job opportunities available.

In order to optimize potential profit the existing Loop 6 Siding will be utilized and product will be transported via the Transnet Freight railway line which links Sishen Iron Ore to the Port of Saldanha (assuming successful negotiations with Transnet).

Alternatives were delimited by the properties available for prospecting and/or mining (i.e. not held by another company); and the geology of the area.

The site was also chosen due to its proximity to the railway siding for transportation of gypsum.

The proposed development will not infringe on any other person's right to an environment that is not harmful to their health or wellbeing. The site is currently used for grazing and the proposed project will not negatively affect the ability of the current land users to make a living as large portions of the site will not be directly affected by mining.

7 ALTERNATIVES ASSESSMENT

Refer to Plan 4 where the final layout plan is provided in terms of the motivation provided below.

7.1 THE PROPERTY OR LOCATION

Not applicable. Properties are delimited by the properties available for prospecting and/or mining (i.e. not held by another company); and the geology of the area.

7.2 THE TYPE OF ACTIVITY TO BE UNDERTAKEN

The mining right area (MRA) is currently zoned for agricultural purposes, and land use activities are mainly grazing and wildlife/wilderness. The property is bisected by the Transnet Freight railway line which links Sishen Iron Ore to the Port of Saldanha. Existing infrastructure on site includes the Loop 6 rail siding, power lines, sub-station, farmsteads and associated infrastructures. The quality of both the powder and crystalline gypsum makes it economically viable to transport it to Western Cape, Limpopo, Gauteng and the North West. Transportation through rail is a possibility by means of the existing siding.

Development in the area is limited and the unemployment rate is high. So although mining is expected to have greater impact on the environment in terms of land use, it will have a greater positive contribution to socio-economics in the area through the implementation of the Social and Labour Plan (S&LP) and through limited employment. Further to this it must be noted, that of the overall mining right area of 7,456.6974 ha, only 700 ha will be affected by the proposed mining operations. Thus it is expected that the remainder of the property can continue to be utilised for agricultural purposes.

7.3 THE DESIGN OR LAYOUT OF THE ACTIVITY

Alternatives for the mining layout are limited by the extent of the gypsum resource. The type of mining to be conducted (surface trench mining) is further limited by the shallow depth of the resource.

The surface infrastructure in relation to the mine area is indicated in Plan 11. The following aspects were considered for the final design and layout of the proposed operations:

- Proximity to the Loop 6 rail siding (shorter hauling distances);
- The R355 and access via the existing Transnet Service Road;
- Regulation 704 of the National Water Act, Act 36 of 1998 (NWA) which states that all infrastructure must be located outside the 1:100 year floodline or 100m horizontal distance (whichever is greater) from a watercourse;
- Proximity to sensitive receptors i.e. existing farmstead and nearby Kalk Gat Nature Reserve; and
- Minimising the overall footprint area.

7.4 TECHNOLOGICAL ASPECTS

The possibility of installing axle weigh pads, capable of weighing up to 40 tons, at the maintenance shed is being considered. This will negate the need to construct a permanent weighbridge on site.

In all other instances, best practices as utilised in the industry have been selected and, where applicable, SANS standards and legislative requirements will be followed in design, construction and management of infrastructure and activities on site. Technological alternatives have therefore not been further assessed.

7.5 OPERATIONAL ASPECTS

On 12 January 2018 GN 41381 came into effect, National Water Act, 1998: Breede-Gouritz and Berg- Olifants Water Management Areas: Limiting the use of water in terms of item 6 of Schedule 6 of the Act, for urban irrigation and industrial (including mining)

purposes. This stipulates that the water use in the Breede-Gouritz and Berg- Olifants Water Management Areas are to be curtailed by 45%.

Water saving initiatives such as harvesting rainwater and the re-using grey water for dust suppression or landscaping at office areas, if any, will be limited to endemic species will be considered. Other alternatives such as the use of dust binding agents, to reduce the amount of water required for dust suppression, must be considered.

7.6 THE OPTION OF NOT IMPLEMENTING THE ACTIVITY

The no-go option will result in the protection of the environment *in situ* and the continued use of the land for agriculture (grazing) purposes. Not mining the area will result in the sterilisation of the Gypsum reserves; and the contribution to socio-economics in the area through the implementation of the S&LP and employment will not be realised.

8 PUBLIC PARTICIPATION PROCESS (PPP)

8.1 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

Table 9 highlights the requirements for a public participation process as per NEMA and includes a summary of PPP carried out as part of the environmental authorisation process. Please see the PPP report in Appendix 14 for the full details of the PPP carried out to date.

The PPP aims to involve the authorities and Interested and Affected Parties (I&APs) in the project process, and determines their needs, expectations and perceptions which in turn ensures a complete and comprehensive environmental study. An open and transparent process has and will be followed at all times and will be based on reciprocal dissemination of information.

Table 9: NEMA PPP requirements and PPP conducted to date

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
1	This regulation only applies in instances where adherence to the provisions of this regulation is specifically required
Noted	
2	The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation by:
NEMA: Public Participation Guidelines (GNR807) and updated in 2017 have been followed.	

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
a	fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of:
I	the site where the activity to which the application or proposed application relates is or is to be undertaken
ii	An alternative site
Notices were compiled in English and Afrikaans and erected (30-31st January 2018) on the site boundary fence as well as other public locations in Loeriesfontein, namely: • Agrimark; • Central Traders; • Die Vis Winkel; • Gravity's Trading Shop; • Hantam Local Municipality; • Public Library; • Post Office; • Smartiebox 2; and • The Spar. These posters informed the public of the proposed activities, invited I&APs to attend the scoping phase public meeting and requested people to register as I&APs for the project. Copies of the Posters and photographic evidence thereof have been included in the relevant Annexure of the PPP Report attached as Appendix 14.	
b	giving written notice, in any of the manners provided for in section 47D of the Act, to:
i	the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
ii	owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
iii	the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
iv	the municipality which has jurisdiction in the area;
v	any organ of state having jurisdiction in respect of any aspect of the activity; and
vi	any other party as required by the Competent Authority.
A comprehensive database / I&AP register was compiled, this included various stakeholders, authorities, land owners, land users and associations within the area. Background Information Documents (BIDs) detailing the project was compiled in English and Afrikaans. These were hand delivered to land owners / users and adjacent land owners / users on the 30-31st January 2018. In addition, copies were distributed to all I&APs on the database via e-mail, post and fax. Persons who did not have access to a computer, fax machine or postal service were notified via hand delivered documents where possible, and/or SMS. The purpose of the BID was to:	

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
• Invite members of the public to register as I&APs; • Introduce the proposed project, and inform the public on the application / environmental process and their involvement; • Provide information on the potential impacts the development may have on the environment which will be investigated further; • Initiate a process of public consultation to record perceptions and issues; and • Invite I&APs to attend the Scoping Phase Public Meeting. A copy of the BID and proof of delivery thereof is attached in the relevant Annexure of the PPP Report included as Appendix 14.	
c	Placing an advertisement in:
i	One local newspaper; or
ii	Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations.
d	placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii)
Advertisements were placed in one (1) local newspaper, in both English and Afrikaans: • Noordwester, publication date 2nd February 2018. Copies of the Adverts are attached in the relevant Annexure of the PPP Report included as Appendix 14.	
e	Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to- (i) illiteracy; (ii) disability; or (iii) any other disadvantage.
No issues in information dissemination have been noted to date.	
3	A notice, notice board or advertisement referred to in sub regulation (2) must –
a	Give details of the application which is subject to public participation
b	State -
i	whether basic assessment or S&EIR procedures are being applied to the application
ii	Whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation
iii	The nature and location of the activity to which the application relates
iv	Where further information on the application or activity can be obtained
v	The manner in which and the person to whom representations in respect of the application may be made
These aspects are addressed in the BIDs, Notices and Adverts. Please see the relevant annexures in the PPP Report included as Appendix 14.	

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
4	A notice board referred to in sub regulation (2) must -
a	be of a size at least 60cm by 42 cm
b	Display the required information in lettering and in a format as may be determined by the Competent Authority
Notices were A2 in size (42 x 60 cm).	
5	Where public participation is conducted in terms of this regulation for an application or proposed application, sub regulation (2)(a), (b), (c) and (d) need not be complied with again during the additional public participation process contemplated in regulations 19(1)(b) or 23(1)(b) or the public participation process contemplated in regulation 21(2)(d), on condition that : -
a	such process has been preceded by a public participation process which included compliance with sub regulation (2)(a), (b), (c) and (d); and
b	written notice is given to registered interested and affected parties regarding where the: -
i	revised basic assessment report or, EMPr or closure plan, as contemplated in regulation 19(1)(b) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due;
ii	revised environmental impact report or EMPr as contemplated in regulation 23(1)(b) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due; or
iii	environmental impact report and EMPr as contemplated in regulation 21(2)(d) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due;
Noted. No deviation required.	
6	When complying with this regulation, the person conducting the public participation process must ensure that:
a	Information containing all the relevant facts in respect of the application is made available to potential interested and affected parties; and
b	Participation by potential interested and affected parties is facilitated in such a manner that all potential interested and affected parties are provided with a reasonable opportunity to comment on the application.
Noted. The Scoping Report was made available for public review from 27th March – 29th April 2018. The Draft EIA/EMPr was made available for public review from 23 August to 21 September 2018.	
7	Where an environmental authorisation is required in terms of these Regulations and an authorisation, permit or licence is required in terms of a specific environmental management Act, the public participation process contemplated in this Chapter may be combined with any public participation

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
	processes prescribed in terms of a specific environmental management Act, on condition that all relevant authorities agree to such combination of processes.
The PPP has been combined for all the authorisations required from the DMR in terms of the MPRDA, NEMA and NEM:WA. The notices have also included information on the water use license application process through the DWS under the NWA.	

8.2 PPP COMPLETED TO DATE

This section summarises the PPP undertaken to date (Please refer to Appendix 14 for a copy of the PPP report):

8.2.1 I&AP CONSULTATION

As summarised in Table 9 above, I&APs for the project were identified using information from similar projects in the past, as well as from information and responses received from the press advertisements, notices and the BID's sent out.

The I&APs include a broad database of immediately affected landowners, adjacent landowners, land users, communities, local authorities, ward councillors and other interest groups. A copy of the I&AP register and proof of notification (BIDs, notices, advertisements etc.) is included in the PPP report, attached as Appendix 14.

All comments, questions and/or concerns received in response to the various notices to date, have been summarised in the issues and response table below (Table 10).

The Scoping Phase Public Meeting was held on 9th February 2018 at the Loeriesfontein Public Hall. The purpose of the meeting was to introduce the project to I&APs and explain the environmental authorisation process. All registered I&APs were notified of the meeting's date through the BIDs, posters and adverts. In addition, a reminder SMS was sent to all registered I&APs prior to the meeting. Copies of the minutes and associated presentation are attached under Appendix 14.

Further to this all registered I&APs were notified of the Scoping Report's availability for review and comment. The report was made available between 27th March – 29th April 2018 at the following locations:

- Online at www.cabangaenvironmental.co.za; and
- The Loeriesfontein Public Library.

All comments and / or issues raised during the review period have been included in the reports for submission to the DMR.

A second Public Meeting took place on 29th August 2018 to provide feedback of the findings of the specialist studies, the Environmental Impact Assessment and

Environmental Management Plan (EIA/EMPr). All registered I&APs were notified of the meeting via e-mail, fax and SMS.

The Draft EIA/EMPr was made available for public review for 30 days from 23rd August until 21st September. All I&AP's were notified of the reports availability for review and comment. The report will be found at the following locations:

- Online at www.cabangaenvironmental.co.za; and
- The Loeriesfontein Public Library.

All comments and / or issues raised during the Draft EIA review period have been included in the final EIA EMPr (this report) for submission to the DMR.

8.2.2 AUTHORITIES CONSULTATION

The lead authority for the applications in terms of the MPRDA, NEMA and NEM:WA is the Department of Mineral Resources (DMR). The Department of Water and Sanitation (DWS) is the lead authority with regards to the water use license application.

Other Local and Regional authorities were identified and included in the I&AP register, and notified of the proposed project by means of the BID.

In addition, copies of the draft reports were circulated to the following authorities for review and comment:

- DMR;
- DWS;
- Department of Economic Development, Environmental & Tourism;
- Hantam Local Municipality;
- Matzikama Local Municipality;
- Namakwa District Municipality; and
- South African Heritage Resource Agency (SAHRA).

Comments (where received) have been included in the I&AP issues and response table below.

The Land Claims Commissioner was contacted to determine whether any land claims have been registered over the affected properties. The response from the Department indicates that there are currently no land claims on Kanakies 332 Portion 0 (RE).

8.3 OUTSTANDING PPP

The IWULA (Integrated Water Use Licence Application) and IWWMP (Integrated Water and Waste Management Plan) will be subject to a 60 day public review period.

Notification of the DMR's decision regarding the application will be completed in terms of the NEMA EIA Regulations as soon as a decision is received from the

Competent Authority. This will include a note describing the outcome of the application and the appeal process that can be followed.

8.4 SUMMARY OF ISSUES RAISED BY I&APS AND RESPONSES

Table 10: Summary of the issues raised by the various I&APs and authorities to date, and the EAP's response/feedback thereto

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
Landowner/s	X				
Lawful occupier/s of the land	X				
No comments received to date					
Landowners or lawful occupiers on adjacent properties	X				
Riaan Vd Merwe (RvdM)	X	9- Feb-18- Public Meeting	Will there be any permanent structures on the land? The main concern is safety, it is mainly elderly people living on these farms and we worry about farm attacks. We will also worry about theft in the area if a mine opens.	Container offices will be utilized. No permanent structures will be constructed on site. Safety is a valid concern and we will make note of it.	Please refer to Section 4
Municipal Councillor	X				
No comments received to date					
Municipality	X				
JI Swartz, Municipal Manager- Hantam Municipality	X	27-March-18- Email	The following S&LP projects are to be implemented by the Kanakies Gypsum Mine: Conversion of horse stables in Calvinia West to Economic Hubs (R1 760 000) Seebox learning Technology in Loeriesfontein (R 740 000).	Noted.	Please see Appendix 13: Social and Labour Plan
Briaan Smit- Matzikama Municipality	X	23-April- 18	Although the application area is located within the Northern Cape please register the Matzikama Municipality as an interested and affected party. Please note that on the cover letter by CABANGA Environmental dated 19 March 2018 it is stated that the application is for a "gypsum" mine but the cover page from the DMR report refers to "… Bulk Sampling Activities Including Trenching in cases of Alluvial Diamond Prospecting". Clarity on the discrepancy is needed.	The Municipality has been registered as an I&AP. This application relates to the Mining of Gypsum. The DMR's template for a Scoping Report was used as per the EIA Regulations. The cover page makes reference to the applicability of the template to the different types of applications being either mining OR prospecting with bulk sampling. Meaning that this is the correct document to use for an application for the Mining of Gypsum.	Please see Appendix 14: Public Participation Process
Admin- Matzikama Municipaloty	X	20-Aug-18- Website query	Received two lever arch files. Please send electronic copy for filing purposes.	Dropbox link sent.	Please refer to Appendix 14: Public Participation Process.

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA etc.	X				
No comments received to date					
Communities	X				
No comments received to date					
Dept. Land Affairs	X				
Ryan Oliver- Department of Land Restitution Support	X	23-Jan-18- Email	No land claims appear on our database in respect of the property. Please note however: - Some claimants referred to properties they claim dispossession of rights in land against using historical property descriptions which may not match current property description, - Some claimants provided the geographic descriptions of the land they claim without mentioning the particular actual property description they claim dispossession of rights in land against.	Noted.	Please see Appendix 14: Public Participation Process
Traditional Leaders	X				
No comments received to date					
Dept. Environmental Affairs	X				
Asiashu Lenette Tshikovhi, Department of Environmental Affairs	X	4- April-18	In response to a query regarding contact details for the Kalk Gat Nature Reserve: Unfortunately we only capture the spatial extent of the reserves we don't keep the contact details.	Noted.	Please see Appendix 14: Public Participation Process
Other Competent Authorities affected	X				
J. Janse- Spatial Planning (Northern Cape)Prov. Dept. Cooperative Governance Human Settlement and Traditional Affairs	X	29- Jan-18- I&AP Registration Document	Concerned about wear and tear on roads. Municipality will be affected.	The possibility of railing product from site, using the existing rail siding is currently being investigated. A transport impact assessment has been undertaken as per the plan of study for the EIA.	Please refer to Section 9.1.12 and Appendix 11: Transport Impact Assessment.
Danita Hohne- Department of Water Affairs and Sanitation	X	2- Feb-18- Email	A geohydrological study would need to be done, as the area has not had rain in 7 years. The area is mainly depleted of its groundwater resources. Also included in the study must be a hydrocensus of about 5km around the property and pump test	A geohydrological study was undertaken as per the plan of study for the EIA. This includes a hydrocensus. Mining activities will be undertaken at a depth of approximately 1.4 – 2.5m, thus it is not expected that the groundwater table will be intersected by mining activities.	Please refer to Section 9.1.6. Please refer to Section 4.2.

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
			must be conducted by a specialist with Pr. Status. Pump test must be undertaken for 24hours. Please note that the application for a water use licence would fall mainly on the Western Cape. Nieuwoudtville, Calvinia and Loeriesfontein all fall under the Berg Olifants CMA and therefore applications should be made to them and not the Orange CMA in Upington.	Water use will be limited that of potable/domestic water and dust suppression. This is currently estimated at 81m^3 / day and will be sourced from a borehole on site. The necessary water use license applications will be made to the Berg Olifants CMA.	
Natasha Higgit- SAHRA	X	19- Feb-18- Email	As the proposed development is undergoing an EA Application process in terms of the NEMA Environmental Impact Assessment (EIA) Regulations for activities that trigger the Mineral and Petroleum Resources Development Act, No 28 of 2002 (MPRDA)(As amended), it is incumbent on the developer to ensure that a Heritage Impact Assessment (HIA) is done as per section 38(3) and 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA). This must include an archaeological component, paleontological component and any other applicable heritage components. The HIA must be conducted as part of the EA Application in terms of NEMA and the NEMA EIA Regulations. The Archaeological Impact Assessment (AIA) must comply with the SAHRA 2007 Minimum Standards: Archaeological and Paleontological Component of Impact Assessments. A Paleontological Desktop Assessment must be undertaken to assess whether or not the development will impact upon paleontological resources as the area is located within unknown paleontological sensitivity (see www.palaeontologicalsociety.co.za for qualified palaeontologists). The PIA must comply with the SAHRA 2012 Minimum Standards: Paleontological Component of Heritage Impact Assessments. Any other heritage resources as defined in section 3 of the NHRA that may be impacted, such as maritime	A Phase I Heritage Impact Assessment was undertaken as per the plan of study for the EIA. This included a desktop Paleontological study. All environmental reports have been made available to SAHRA for review and comment timeously.	Please refer to Section 9.1.10.1 and Appendix 7: Freshwater Resource Assessment Appendix 8: Heritage Impact Assessment.

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
			archaeology, built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewscapes must also be assessed. The Scoping Report with all appendices, EIA report with all appendices must be submitted to SAHRA at the start of every Public Review period so that SAHRA comments may be incorporated as part of the Final reports.		
		4- April-18- Email	A HIA must be compiled that complies with the requirements of SAHRA, addressing both Archaeological and the Paleontological components. Cultural landscapes or viewscapes must also be assessed. The environmental reports with all appendices must be submitted to SAHRA at the start of every Public Review period so that SAHRA comments may be incorporated as part of the Final reports.	A Phase I Heritage Impact Assessment was undertaken as per the plan of study for the EIA. This included a desktop Paleontological study. Further to this a Visual Impact Assessment was undertaken. All environmental reports will be made available to the SAHRA for review and comment timeously.	Please refer to Section 9.1.10.1 and Appendix 7: Freshwater Resource Assessment Appendix 8: Heritage Impact Assessment. Appendix 12: Visual Impact Assessment
		21- Sept-18- Email	Final Comment from SAHRA- As the Final EIA has been finalised without the incorporation of this comment, this comment must be forwarded directly to the competent authority for their consideration as per section 38(8) of the NHRA. Proof of the submission of the comment and receipt thereof must be provided to SAHRA; If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately. A professional archaeologist or	Thank you for your comment. Today is the last day of our public review therefore we have not finalised the EIA as yet. This comment will be incorporated into the Final EIA/EMP report and we will submit the final report early October 2018. The reports I submitted onto SAHRA 30 days ago were draft for public review, not final.	Please refer Appendix 14: Public Participation Process. Please refer to Section 19.1.2.

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
			palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA; Should the project be granted Environmental Authorisation, SAHRA must be notified and all relevant documents submitted to the case file.		
Linda Njemla- Department of Mineral Resources	X	13-March-18- Email	Acknowledgment of Environmental Authorisation application lodged on 9th March 2018. 44 days within receipt of letter to submit scoping report and subjected to at least 30 days of public participation. Final Scoping Report due on 26th April 2018. This is not inclusive of public holidays. Acknowledgment of your application does not grant you permission to commence with Prospecting activities.	PPP and submission of Final Scoping Report undertaken.	Please see Appendix 14: Public Participation Process.
		26-March-18- Email	The report does mention that Kalk Gat private nature reserve is adjacent to this proposed mining area. However, I don't see them as registered as interested and affected parties. Nature reserves are identified as protected areas in terms of Protected Areas Act; and therefore an appropriate buffer zone for the protected area is definitely established in order to reduce or mitigate the negative influences of activities taking place outside them and the surrounding landscapes. It is not clear here whether this nature reserves will or not be affected by this development. It is recommended that you also interact with these owners. Please keep record of all attempts and advertising.	Attempts to locate the owner have been fruitless to date. No persons currently reside on the property, nor are there any security / reserve personnel residing on the property. As the property is registered to a Trust the contact details of the Land Owner are not publicly available.	Please see Appendix 14: Public Participation Process (ANNEXURE VIII within the PPP Report).
		11-April-18- Email	Extension for the submission of the Scoping Report granted – 7th May 2018	Noted. Review extension notification sent to all I&AP's.	Please see Appendix 14: Public Participation Process
		11-May-18- Email	Scoping Report approved. Notification to continue with the plan of study for the EIA / EMPr.	Noted. This report constitutes the EIA / EMPr. The pre-application process for a water use license is currently underway with the DWS.	Please see Appendix 14: Public Participation Process See Appendix 6: Faunal and Floral Ecological Assessment

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
			Notes on the Scoping Report to be considered in the EIA / EMP report: Clarification on whether the abstraction of water from the borehole is registered with the DWS in terms of the NWA. Transnet is concerned that the mining will take place across their railway line. Permission for the utilisation of the siding and railway line must be negotiated with Transnet, so as not to impact on their train service. Appropriate buffers must be recommended for biodiversity features. Specialist studies to investigate ecological buffer, and policy related legislation for Critical Biodiversity Area or Ecological Support Areas. Mr. Peter Cloete of the Northern Cape Department of Environment and Nature Conservation at the Springbok office can be contacted regarding issues relating to biodiversity. EIA / EMPr report to be submitted within 106 days, inclusive of any specialist reports, which must have been subjected to 30 days public review and comment. Where there is significant changes in information, the DMR must be notified in writing of such changes and the EIA / EMPr report must be submitted with 156 days from acceptance of the Scoping Report. You will be notified if there are further developments regarding the consultation of your scoping report by the consulted State organisations	In accordance with the MHSA and MPRDA no mining will be undertaken within 100m distance of the railway line. The applicant is in the process of negotiating with Transnet. It is currently anticipated that product will be trucked and railed from site. The Faunal and Floral Assessments have considered the biodiversity features, and the relevant buffer zones have been considered. Species of conservation concern were identified on site during the Summer survey, this coupled with the ongoing drought it was necessary to undertake a follow up winter survey. The DMR was notified in writing, and an application for extension made. The EIA / EMPr has been subjected to 30 days public review and comment, and will be submitted within the 156 day timeframe.	
		14-June-2018-Email	Extension for the submission of the EIA / EMPr Report granted 18th of October 2018.	The EIR will be submitted by the 18th of October 2018.	Please refer to Appendix 14: Public Participation Process (ANNEXURE VIII within the PPP Report)
		12-September-2018-email	This is to inform you that I have received the environmental impact report. If there is any further information required from you, you will be notified.	Noted.	Please refer to Appendix 14: Public Participation Process.
Mgxwati Lungiswa- Department of Water Affairs	X	24- July-2018-Phone call	Our records show that we have not received the copy of the scoping report. Kindly forward us the copy as per our telecom conversation.	Hard copy couriered to the Western Cape DWS on 20th March 2018. Dropbox link sent for Scoping Report.	Please refer to Appendix 14: Public Participation Process

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
		and email			
Rassie Nieuwoudt- Department of Water Affairs	X	29 Aug-2018- Public Meeting	Fourteen permanent jobs. Is this just on the mine?	This is the permanent team (14 jobs). The mine will only have jobs during the daylight hours on a shift basis, they will be sourced from Loeriesfontein and Nieuwoudtville, where the required skills are available. There will also be additional peripheral jobs associated with transport of people, supplies and products, catering, accommodation etc. but these have not been specifically quantified, as they are not directly related to the project, but residual opportunities.	Please refer to Appendix 14: Public Participation Process.
			What about transportation?	Product transport will be 60 percent road and 40 percent rail. Witkop wants to use more of the railway than trucking. There will be 50 000 tonnes a year and 5 loads a day but they want to put product on the rail. The site is on a siding and Transnet can give the mine a train for transport. The Mine Management are currently in negotiations with Transnet. The clients for the gypsum are predominantly in the north of South Africa.	Please refer to Appendix 11: Transport Impact Assessment
			The mine won't be able to adhere to the SANS 241 as the baseline water quality is already bad. There needs to be samples undertaken prior to operation so that DWS can compare the results to the baseline results.	In the management plan it stipulates that the mine needs to start with water sampling as soon as possible so that there is baseline data before construction and operation starts. Tests found potential for AMD, this will only affect the groundwater if it touches the groundwater table. If it does happen it will travel 250 metres. But the groundwater table is well below the depth of surface trenching.	Please refer to Appendix 5: Groundwater EIA/EMP Study.
Thembisa Torch- Department of Water Affairs	X	Received on 3 September 2018 but dated 30 May 2018 on letter	Scoping Report comments: -Four proposed monitoring boreholes proposed- these boreholes should be different depths to capture potential contamination within different aquifers. Continous monitoring to detect potential negative impacts. It would be advantageous to monitor background water conditins before mining commences. Data captured from monitoring boreholes need to be submitted to DWS on a 6 monthly basis. There needs to be monthly monitoring which will include water level measurements and abstraction volumes. Quarterly quality sampling should include SO_4 and TDS. Monitoring frequency should be high in the initial stages as there are many unknowns. Monitoring frequency to be assessed every two years	- The groundwater study stipulates that there will be six monitoring boreholes, these are approximately 350 mamsl. During the drilling program, which was undertaken during the rainy season when groundwater levels can be expected to be shallower, no groundwater strikes were intercepted at depths shallower than 20 m. The depth of the gypsum trench excavations will range between 1.4 and 2.5 m. The depth to groundwater is between 9.45 and 12.87 mbgl respectively. The groundwater level will not be breached by the surface trenching. Different aquifers are noted as per the groundwater report, (upper weathered material and gypsum layer, underlying competent and fractured rock material, alluvial sand in the river channels) but the alluvial aquifers will not be affected as they are associated with the watercourses and the mine is not in close proximity to them.	Please refer to Appendix 5: Groundwater EIA/EMP Study

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
			if a higher or lower frequency is to be adopted. - No operation allowed within 100m of a water resource or a 1:100 year flood line which ever is greatest. If the proposed area falls within these you will need to apply for authorisation in terms of Section 21 (c) and (i). - No abstraction of surface or groundwater may be done without prior authorisation unless it is a Schedule 1 Use or an Existing Lawful Use. - No pollution of surface water or groundwater resources may occur due to any mining activity. If there is any pollution of water resources the department must be notified immediately. - All requirements of the National Water Act regarding water use and pollution management are to be adhered to at all times.	- According to the study it is recommended that the monitoring program start with a monthly interval for the first year. The monitoring program should start as soon as possible and before mining starts in order to be able to build a database that is not impacted by the mining activities. Once the monthly database is established the monitoring frequency can change to quarterly. Submission of groundwater monitoring data and frequency of monitoring will be carried out as stipulated in the WUL once it is issued. The parameters that will be monitored and acceptable limits for the parameters will be as per the WUL, once issued, and will be determined in consultation with the DWS during the application process, and based on baseline qualities. -The mine intends to apply for a General Authorisation (GA) 21 (c) and (i) as the mine will be within 500m of an ephemeral drainage line. The proposed abstraction volumes also fall within the GA limits. No Water Uses as defined in the NWA will commence prior to issuance of a Water Authorisation, which is anticipated to be in the form of a GA. -In the event of an environmental emergency the EIA/EMPr has listed a local contact number for DWS.	Please refer to Section 24 Emergency Response plan
Johaar Rafieka- Department of Water Affairs	X	5-September-2018-Email	The Department would like to comment on the above- mentioned application. Please provide us with the Draft Environmental Impact Assessment and Environmental Management Plan Report (EIA and EMPr) electronically in order for us to comment on the application. I am unable to access the documents on the website. Thanking you in advance.	Please note that when accessing our webpage you will need to select the file, for download, before submitting the information in the form on our webpage. It is better to select one file at a time as the documents are large. Dropbox link sent.	Please refer to Appendix 14: Public Participation Process.
OTHER AFFECTED PARTIES	X				
André Bodenstein- Transnet	X	11-April-18-Email	Please provide locality maps of the project area enabling this office to determine if Transnet will be affected in any way.	Forwarded requested plans.	Please see Appendix 14: Public Participation Process.
Ria-Ri Boonzaaier- Transnet		25-April-18-Email	We hereby request an extension on the timelines to submit comments on attached. Our depot only received the information yesterday and quite a few relevant people required for comments are currently out of office.	Unfortunately due to deadlines set by the Department of Mineral Resources we are unable to extend the Scoping Report deadline further. However, any comments received after the submission of the Scoping Report will still be considered for the EIA / EMPr Phase of the project.	Please refer to Section 4.2.5.5. Appendix 14: Public Participation Process Appendix 11: Transport Impact Assessment

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
			We also have no indication as to what is being planned. Please submit at least the following information: Exact proposal with regards to work to be done, Methods to be used for mentioned work, Exact location of work in relation to railway line (distance from line is important). "It seems that the proposal would be developed over Portion 1 of Farm KANAKIES No.332, Administrative District CALVINIA (SBS0283S) and Portions as service roads (SBS0320S & SBS0795S), where KANAKIES (LOOP 6) is situated, on Sishen - Saldanha Iron Ore line [between Saggiesberg (Loop 5) – De Kop (Loop 7]." This is unfortunately insufficient information to make any comments from the depot's side.	Gypsum mining will be located on Portion 1 of the farm Kanakies 332 and will be conducted via trench mining to a maximum depth of 2.5m. No blasting will be undertaken as mining will be undertaken using diesel driven equipment. It must be noted that mine activities will remain outside the regulated 100m distance from the rail line and it is not expected that the rail line will be directly impacted on by mining activities. The applicant is in the process of negotiating with Transnet. It is currently anticipated that product will be trucked and railed from site. A Transport Impact Assessment has been completed for the proposed project.	
		26-April-18-Email	Please note that at this stage the depot cannot approve of this application. According to the locality plan the mining will take place across our railway line and we do not have sufficient time to conduct a proper investigation on this matter. The utilization of our railway line will have a huge impact on our train service and detailed investigations will need to be undertaken.		Please refer to Appendix 14: Public Participation Process (ANNEXURE VII within PPP Report) and Section 0.
Annelize Harmse- Transnet Freight Rail	X	27-June-2018-Email	Transnet SOC Limited is owner of Portion 1 of the farm Kanakies No 332. The property is currently utilized for the Sishen to Saldanha Bay railway line and is situated adjacent to the property referred to in the Scoping Report. The adjacent properties to the railway line concerned, your attention is drawn to Regulation 17 (6) (a) of the Mine Health and Safety At, 1996 which determines that no mining operations may be carried out within a horizontal distance of 100 metres from buildings, roads, railway.	Official Letter sent (full letter can be found in Appendix 14): The property in question is bisected by the Transnet Freight railway line which links Sishen Iron Ore to the Port of Saldanha (Loop 6). Existing infrastructure on site includes a small rail siding, powerlines, sub-station, farmsteads and associated infrastructures. It is proposed that mining will be undertaken using diesel driven machinery to a depth of 2.5m thus no blasting will be undertaken on site. It must be noted that mine activities will remain outside the regulated 100m distance from the rail line and it is not expected that the rail line will be directly impacted on by mining activities.	Please see Appendix 14: Public Participation Process .
INTERESTED PARTIES	X				
I&AP (*name not stated*)	X	9- Feb-18-Public	The site is not located on Calvinia Road and the direction of the site from Loeriesfontein is incorrect.	Calvinia Rd refers to the Registration Division of the Land with the Deeds office, and not the physical address.	-

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
		Meeting			
Karel Nevil (KN)	X	9- Feb-18- Public Meeting	What is the process and how will the locals get jobs for this project?	CV's and business profiles can be forwarded to MTS Holdings. These will be considered should the mine's application be successful.	Please see Appendix 13: Social and Labour Plan
Richard Mollat (RM)	X	9- Feb-18- Public Meeting	What type of waste will the mine create? Will there be hazardous waste? If the whole process takes 300 days this means that smaller companies are able to get their registration and affairs ready; so that they can be used by the mine. Will your business need to be on a database?	The mine will generate general waste as well as limited amounts of hazardous waste. Used hydrocarbons and oil rags etc. are considered hazardous waste. No disposal will take place on site. Waste will need to be removed by a contractor for disposal at a licensed facility. CV's and business profiles can be forwarded to MTS Holdings for inclusion in a database. These will be considered should the mine's application be successful. Employment and procurement will be sourced from Loeriesfontein as far as possible.	Please refer to Section4.2.5.6. Please refer to Section 19.1.2. Please refer to Section 4.2.6. Please see Appendix 13: Social and Labour Plan
Richard Mollat (RM)	X	9- Feb-18- I&AP Form	Interested in work in the project. Water will be sourced from Loeriesfontein and there is already a deficit in water.	CV's and business profiles can be forwarded to MTS Holdings. These will be considered should the mine's application be successful. Water use will be limited that of potable/domestic water and dust suppression. This is currently estimated at 81m3 / day and will be sourced from a borehole on site. The necessary water use license applications will be made to the Berg Olifants CMA. Further to this the necessary geohydrological investigations will be undertaken as per the plan of study for the EIA.	Please refer to Section 4.2.4. Please refer to Section 9.1.6. Please see Appendix 13: Social and Labour Plan
Linda Adonis (LA)	X	9- Feb-18- Public Meeting	If there are protected plants in the area they need to relocate within Loeriesfontein and not in other areas. The mine needs to make provisions for medicals before and after so that we do not get sick from the mine and then the mine says that they didn't make the workers sick. This needs to be kept on record as dust could impact our health. We have an issue with other companies coming in and not giving the locals employment, people are sourced from outside the area. Murray & Roberts came in and did that. We weren't given opportunities. We in general would like to know what skills are needed to work at a mine as we do not have mines in the area.	This is required in terms of the Health and Safety Laws. Medicals will be undertaken prior to personnel starting work on the mine; this will also need to be undertaken annually thereafter. Exit medicals are also required by law when leaving a mine. In terms of dust, an air quality study will be undertaken and dust fallout monitoring will be proposed for the mine going forward. These results can be requested by the public. Witkop Fluorspar is a small company, and the proposed mine will have limited job opportunities as discussed in the presentation. The company endeavours to employ locals as far as possible.	Please refer to Section 21. Please refer to Section 4.2.6. Please see Appendix 10: Air Quality Impact Assessment Please see Appendix 13: Social and Labour Plan

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
Johanna Basson (JB)	X	9- Feb-18- Public Meeting	Impact studies are undertaken for projects, and the companies are considered compliant but people still get sick.	On-going monitoring is important to ensure compliance with the relevant standards and to ensure mitigation is efficient. Samples will need to be analysed by accredited laboratories and compared to relevant Standards. This is then submitted to the various Authorities. The public is allowed to request monitoring data. The health effects of mining gypsum are much lower compared to coal and uranium. Precautions taken are the same with all the mines regardless of mineral.	Please refer to Section 21.
Isak Nel (IN)		9- Feb-18- Public Meeting	The locals have many skills and need to be considered. How will they handle people who need jobs?	CV's and business profiles can be forwarded to MTS Holdings for inclusion in a database. These will be considered should the mine's application be successful. MTS Holdings is responsible for the compilation of the Social and Labour Plan which will outline the procurement and employment policies of the project.	Please see Appendix 13: Social and Labour Plan.
I&AP (*name not stated*)	X	9- Feb-18- Public Meeting	How long will the mine be open for?	The estimated life of mine is roughly thirty (30) years.	Please refer to Section 4.2.1.
I&AP (*name not stated*)	X	9- Feb-18- Public Meeting	The mine will only create 14 permanent jobs? That is not a lot.	That is correct; it is a very small project. CV's and business profiles can be forwarded to MTS Holdings for inclusion in a database. These will be considered should the mine's application be successful.	Please refer to Section 4.2.6
I&AP *(name not stated)*	X		You will mine the gypsum, take it away and sell it somewhere else. That profit goes to another area. 14 permanent jobs are not a lot of jobs.	There is no market for gypsum in this area. The processing will occur at the mine not in other towns or provinces. Although only 14 permanent jobs will be created there is still a knock on effect by using contractors and services. Gypsum is sold for R10/ton, thus it is not as profitable as other mines. This needs to be kept in mind when putting the project into perspective.	Please refer to Section 4.2.6.
Beaucannith Swartz (BS)	X	9- Feb-18- I&AP Document	Project will have a good impact. Have a recycling company, interested in tenders.	CV's and business profiles can be forwarded to MTS Holdings. These will be considered should the mine's application be successful. MTS Holdings is responsible for the compilation of the Social and Labour Plan which will outline the procurement and employment policies of the project.	Please refer to Appendix 13: Social and Labour Plan.
David Okhuis (DO)	X	9- Feb-18- I&AP Document	There will be a positive impact on the poor youth that have interests in mining. The project will create work, socio-economic development, enterprise development as well as the development of black empowered businesses.	CV's and business profiles can be forwarded to MTS Holdings. These will be considered should the mine's application be successful. MTS Holdings is responsible for the compilation of the Social and Labour Plan which will outline the procurement and employment policies of the project.	Please refer to Appendix 13: Social and Labour Plan.

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
			To obtain historical background information on Kanakies contact: Mr Kenneth Ulambano, Department of Land Affairs. Kimberley, Northern Cape. Tel: 053 807 5700	Noted, the Department of Land Affairs will be consulted.	
Alana Duffell-Canham-Cape Nature	X	11-April-18-Email	In response to Cabanga: We do not have any contact details for Kalk Gat private nature reserve. We initially thought that it may have some link to the University of Stellenbosch but it does not seem to be the case. According to the Matzikama Municipality's 2015 Valuation Roll the property owner is Dieter Joachim von Willert for KLIP GAT 85/1.	Noted. **Through consultation with the neighbouring farmers and research the contact details were unable to be obtained for Dieter Joachim von Willert. A background information document was left on the locked gate of Farm Klipgat 85 Portion 1. The reserve falls on the neighbouring farm, Klipgat 85 portion RE. **	Please see Appendix 14: Public Participation Process.
Niklaas Nel- I&AP	X	29 Aug-2018-Public Meeting	The type of gypsum being mined? Some make ceiling boards? Same type?	That is not the primary market for this project. The Kanakies project market is for agricultural and industrial gypsum.	Please refer to Appendix 14: Public Participation Process.
I&AP *(name not stated)*	X	29 Aug-2018-Public Meeting	Road transportation, enterprises; everything that happens affects the middle class. People in Loeriesfontein don't get seen and helped. Jobs get advertised in Vanrhynsdorp and Vredendal. Jobs need to be sourced from Loeriestfontein, not other areas like Gauteng.	People will be sourced locally and then if specialists aren't found locally, recruitment will have to commence further away, but the Mine will look for the required skills locally first. The Mine can't afford to transport people from Vanryhnsdorp so they will use people from Loeriesfontein and Nieuwoudtville. The Project is a small mine but it will be Witkop Fluorspar Mine that will find people to fill the positions.	Please refer to Appendix 14: Public Participation Process.
F. Dreyer- I&AP	X	29 Aug-2018-Public Meeting	What about supplying food for the mine?	The Mine won't have facilities on site therefore employees will bring in their own food and lunchboxes. I&APs are encouraged to keep an eye out for positions and opportunities that will be advertised locally.	Please refer to Appendix 14: Public Participation Process.
I&AP *(name not stated)*	X	29 Aug-2018-Public Meeting	Water use for the mine? The water is very salty.	Borehole water will be used but the Mine isn't sure, and might have to bring water in. The Mine would like to use water from the borehole on site for dust suppression and domestic use, 81 m3 a day. But the water quality is bad.	Please refer to Appendix 14: Public Participation Process and Appendix 5: Groundwater EIA/EMP Study
A. Grobbelaar- I&AP	X	29 Aug-2018-Public Meeting	When will the mine start?	The operation is seasonal, March to May in this area. If the Mine can't start next year they will have to wait another year for the season. The public review ends 21st September 2018, there is a copy at the Loeriesfontein Library. All comments from today will also be included. Cabanga should take approximately a week to update the report after the 21st September 2018 and then submit it to the DMR. The	Please refer to Appendix 14: Public Participation Process.

Interested and Affected Parties	Date Comments Received		Issues raised	EAP's response to issues as mandated by the applicant	Reference in EIA/EMPr
				DMR have 107 days to evaluate the report and come to their decision, they may not take longer but they may take shorter. If the decision is positive and there are no appeals the mine may start with infrastructure establishment. They mine may not start operation until they have a water use authorisation. The Water Act has timeframes to stick to now, the entire process is about 300 days (maximum). One may not undertake a water use activity without a license.	

9 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITE

9.1 TYPE OF ENVIRONMENT AFFECTED BY THE PROPOSED ACTIVITY

9.1.1 CLIMATE

The project area is located in the Northern Cape Province of South Africa, and experiences typical semi-arid conditions with warm summers, and cold winters. Temperature fluctuations vary from 35˚C in summer to sub-zero temperatures in winter.

According to the hydrological report, the mean annual precipitation (MAP) is estimated at 146mm per annum (Table 11). The weather station NUWERUS (POL) 0131639W was chosen due to the similarity in elevation. The mean annual evaporation (MAE) is 2088 mm (Symons Pan Evaporation). The information reported was based on the WR2005 study for quaternary catchment E33A (SD Hydrological Services, 2018).

Table 11: Total monthly rainfall (mm) (SD Hydrological Services, 2018)

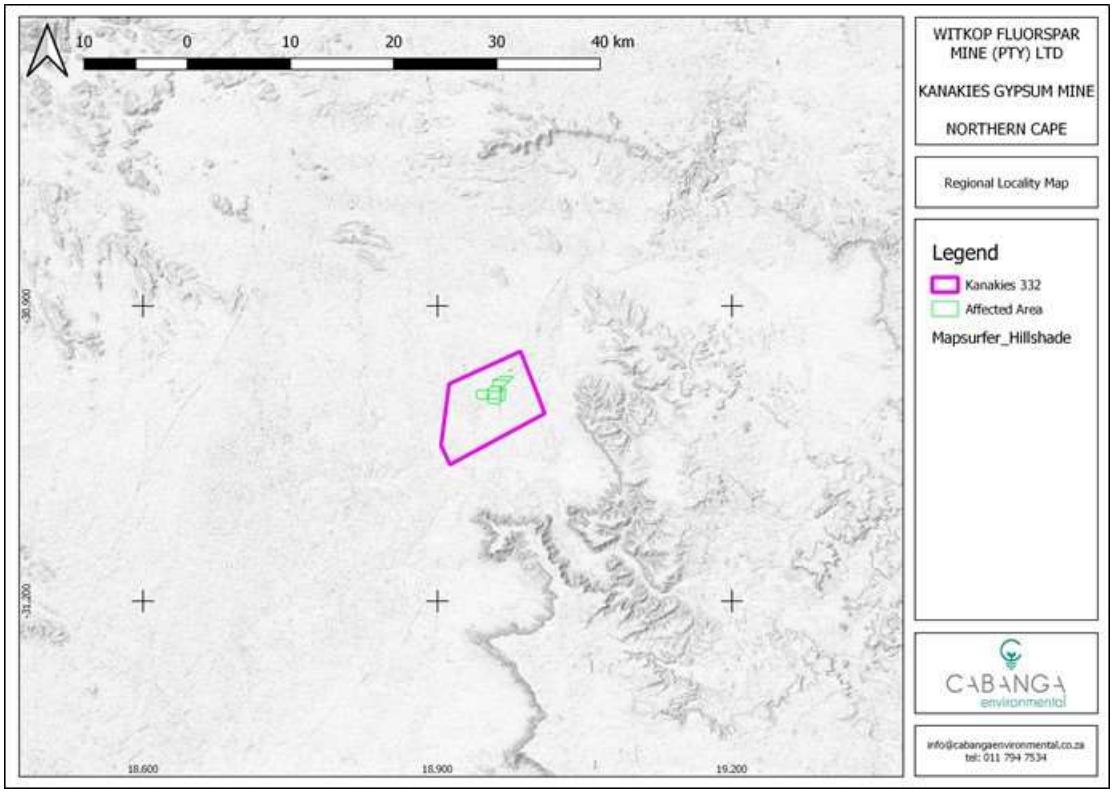
Month	CLOUDSKRAAL 0133050 W	NIEUWOUDVILLE (POL) 0133202 W	KAMABOES 0159104 W	LOERIESFONTEIN - POL 0160807 A	LOERIESFONTEIN - (POL) 0160807 W	NUWERUS (POL) 0131639 W	WR2005
JAN	7	5	4	6	6	3	4
FEB	12	8	7	11	11	3	5
MAR	17	14	10	15	15	6	8
APR	34	26	18	21	21	14	13
MAY	61	48	26	25	24	19	16
JUN	81	61	35	32	32	25	21
JULY	72	51	30	24	24	21	18
AUG	65	52	31	23	22	22	18
SEPT	39	29	16	13	14	11	10
OCT	29	20	13	11	11	10	8
NOV	20	15	10	13	13	8	7
DEC	12	10	6	8	8	4	4
MAP (mm)	**449**	**338**	**206**	**202**	**203**	**146**	**133**

Table 12: Summary of evaporation data (SD Hydrological Services, 2018)

Month	Symons Pan Evaporation (mm)	Lake Evaporation Factor	Lake Evaporation (mm)
JAN	275	0.84	231
FEB	231	0.88	203
MAR	215	0.88	189
APR	153	0.88	135
MAY	103	0.87	90
JUN	77	0.85	65
JULY	76	0.83	63
AUGt	106	0.81	86
SEPT	150	0.81	122
OCT	198	0.81	160
NOV	235	0.82	193
DEC	269	0.83	223
Total	**2088**		**1760**

9.1.2 TOPOGRAPHY

The topography of the project area is characterised by relatively flat to slightly undulating terrain with mountainous terrain surrounding the area. As seen below in Plan 12 the darker the terrain represents the higher degree slope that exists.

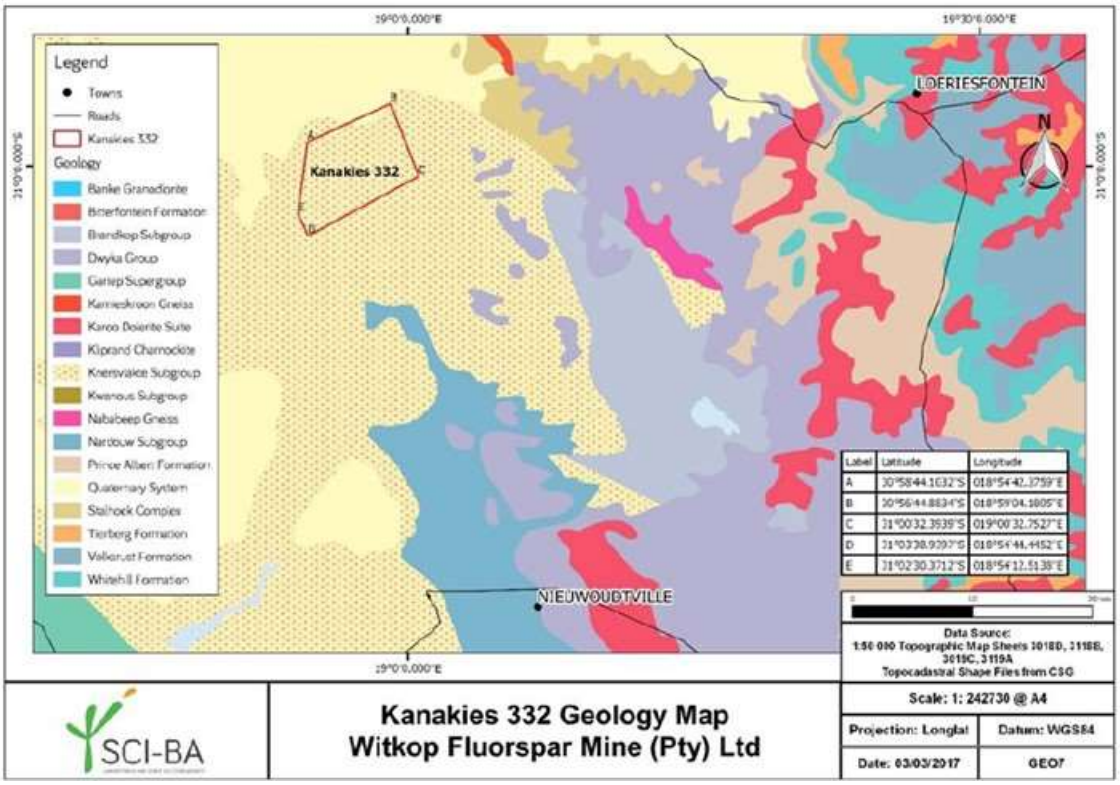


Plan 12: General Relief

9.1.3 GEOLOGY

This section has been extracted from the Mine Works Programme (Witkop Fluorspar Mine, February 2018).

The area is well known to be underlain by quaternary alluvium, comprising calcareous and gypsiferous soils, followed by quaternary gravels, silts and sands. These formations are believed to unconformably overlie the Besonderheid Formation of the Knersvlakte Subgroup, Vanrhynsdorp Group in the study area. The Besonderheid Formation comprises of green shale, siltstone, sandstone, gritstone and conglomerates, interbedded with shale, limestone and chert in the south east. It is believed that the ancient Doringrivier and its tributaries eroded the Besonderheid Formation and may have accumulated gypsiferous sediments in the paleochannels and topographic low points within the study area.



Plan 13: Regional Geology

The targeted Gypsum deposit covers approximately 700 Ha and is situated on a large flat lying sandy terrace at the north-eastern end of the Knersvlakte, close to the confluence of the Krom and Doring rivers. The gypsum layer is between 1.3 and 1.7 metres thick and is covered with a layer of sandy soil of 0.3 to 0.7 metres thick. The main contaminant in the gypsum layer is silica sand mixed with clay.

The deposit can be divided into two generally horizontal overlapping seams of gypsum, namely:

- 0.4 m thick seam of gypsum powder occurring in the southern portion of the deposit and overlying;
- 0.9 m to 1.3 m thick main gypsum seam, which occurs throughout the entire deposit, but which decreases in quality with increasing depth.

The vertical distribution of the minerals can be found in Figure 1.

9.1.4 LAND TYPE, SOILS AND LAND USE

The detailed Soils, Land Use and Land Capability Report (Scientific Aquatic Services, July 2018b) is attached as

Appendix 3. The findings thereof are summarised below.

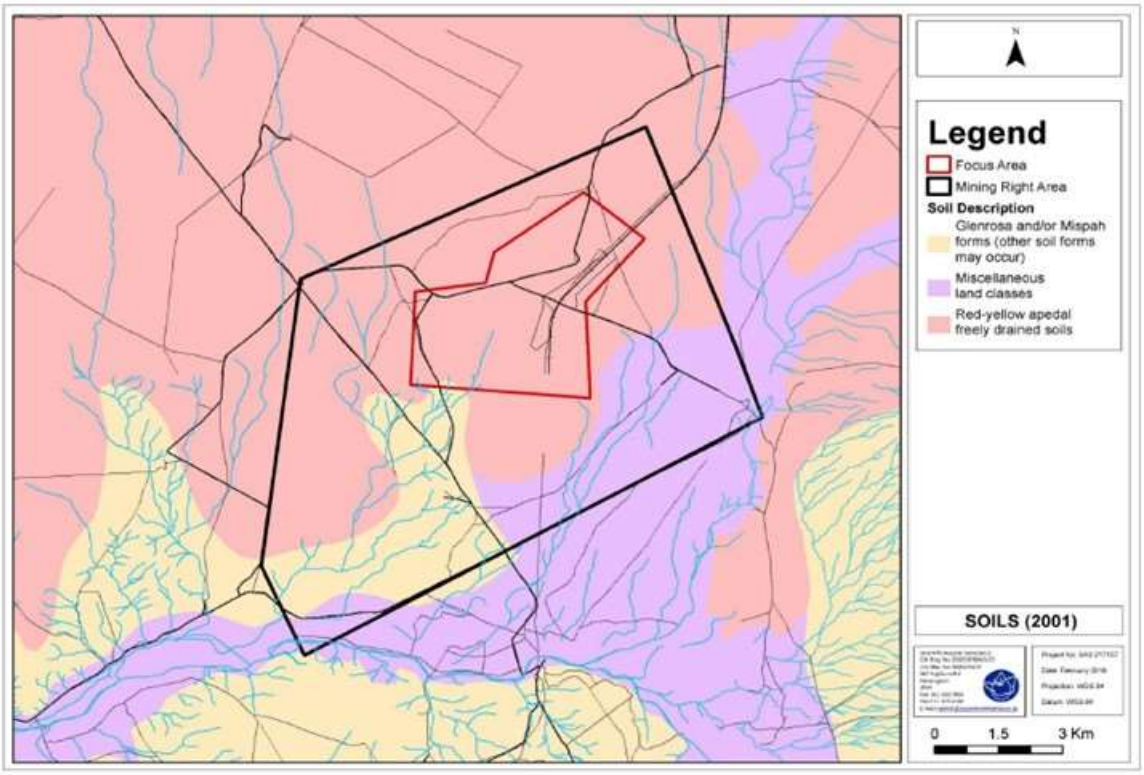
9.1.4.1 SOIL FORMS, LAND CAPABILITY AND POTENTIAL

The Soils, Land Use and Land Capability Report (Scientific Aquatic Services, July 2018b) showed that the dominant soil forms are Kimberly/Plooysburg. This type of soil is characterised by shallow effective rooting depth with carbonate horizon underlying them. These types of soils are found in relatively flat areas. The other soil form that was found in the project area is the Witbank soil form, attributable to surface infrastructure such as roads and the rail line. The Witbank soil was disturbed to such a degree that diagnostic soil morphological characteristics could not be identified. The soil forms can be seen in Plan 15.

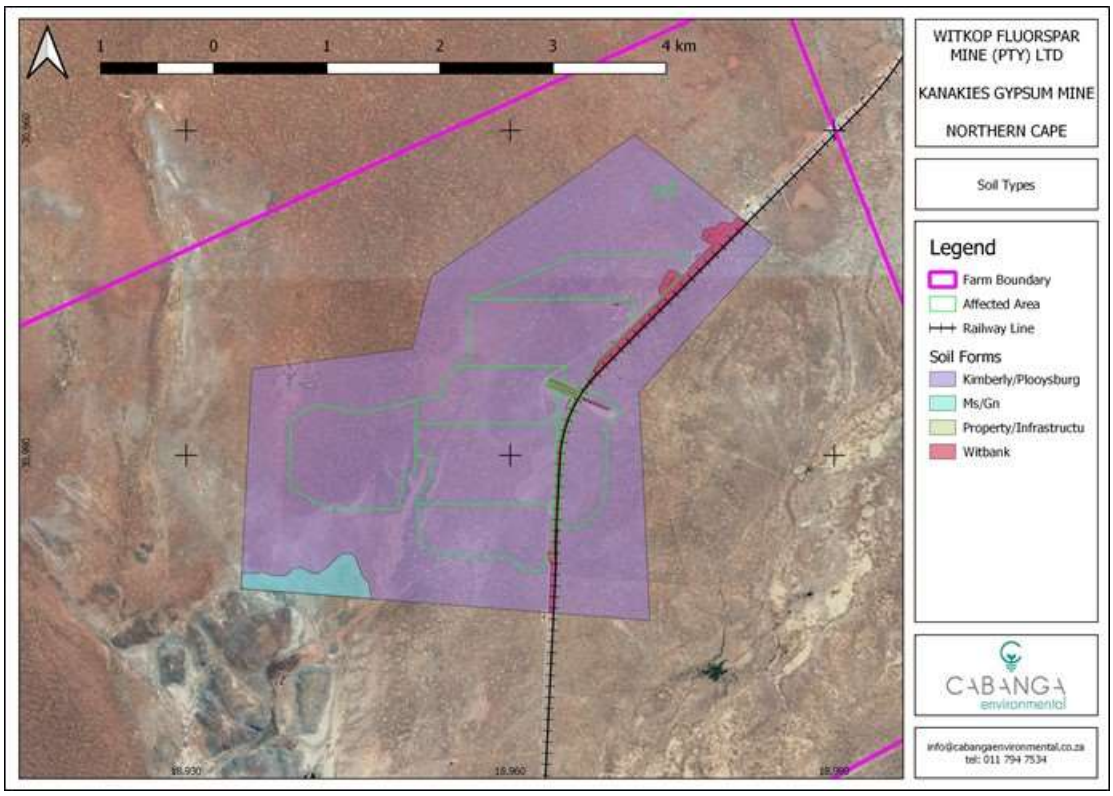
Three types of land capability were identified within the MRA, Grazing Class VI, Grazing Class VII and Wildlife/Wilderness Class VIII. The focus area contains Grazing Class VII and Wildlife/Wilderness Class VIII. The soil form observed for Grazing Class VI is of the Kimberly/Plooysburg form and covers 94.76 percent of the project site. This soil was shallow with an effective rooting depth of 35cm before a layer of refusal was reached. These soils are of limited land capability and are not the most ideal agricultural soils. These soils are suited for grazing.

The soil form observed for Grazing Class VII is of the Glenrosa/Mispah form and covers 2.13 percent of the project site. This is considered a poor class and is not suitable for arable agriculture land use. The rocky layer at shallow depths is what hinders plant roots from penetrating. Glenrosa/Mispah have a poor land capability and are best for light grazing and would contribute to local subsistence farming.

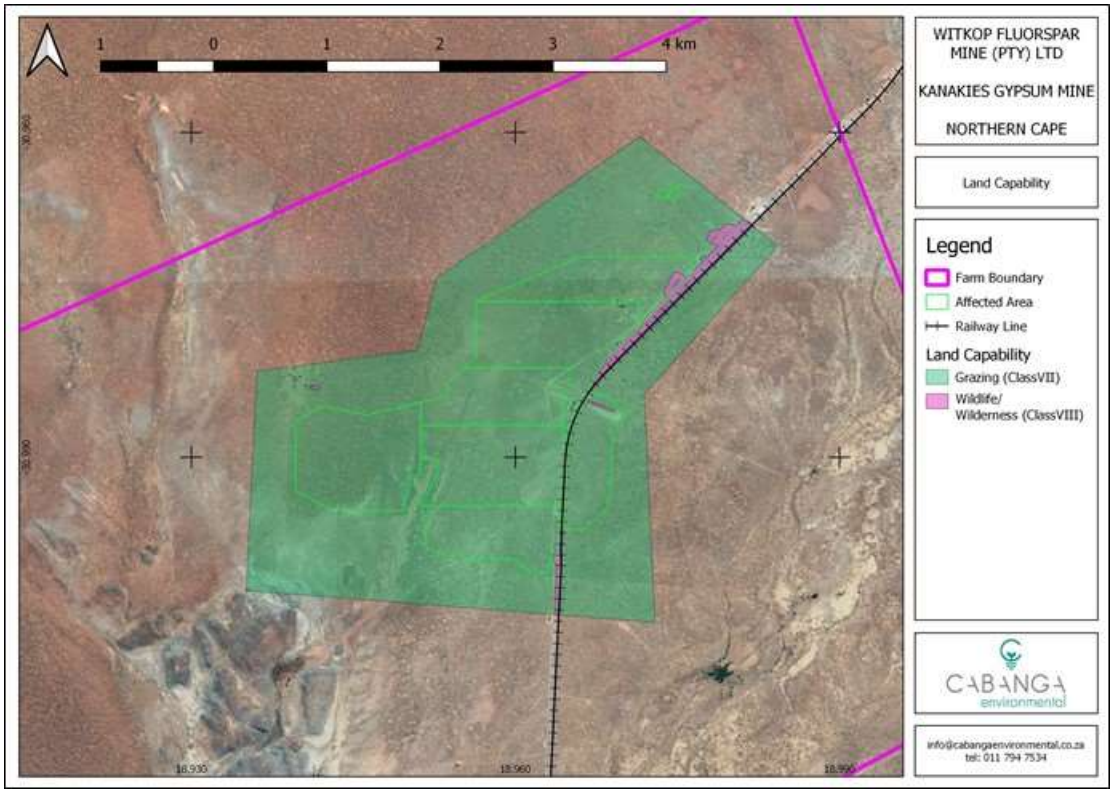
The soil observed from Wildlife/Wilderness Class VIII is of the Witbank (Anthrosols) form and covers 3.08 percent of the project site. These types of soils occur where anthropogenic activities have occurred. These soils were observed as the existing gravel roads. This type of soil lacks soil for a growth medium. Arable agriculture is not able to occur with the Witbank soil form. These soils have a poor land capability from locomotive or vehicle spills over time, anthropogenic activities and compaction. These soils will not contribute towards agriculture.



Plan 14: Soil Description (Scientific Aquatic Services, July 2018b)



Plan 15: Soil Types (Scientific Aquatic Services, July 2018b)



Plan 16: Land Capability (Scientific Aquatic Services, July 2018b)

9.1.4.2 LAND USE

The mining right area (MRA) is currently zoned for agricultural purposes, and land use activities are mainly grazing and wildlife/wilderness. Due to the climatic restrictions the grazing capacity is low.

Figure 3: Dominant land uses (Scientific Aquatic Services, July 2018b)

9.1.5 SURFACE WATER

The following sections are extracted from the Hydrology Study **(SD Hydrological Services, April 2018)**, attached as Appendix 4.

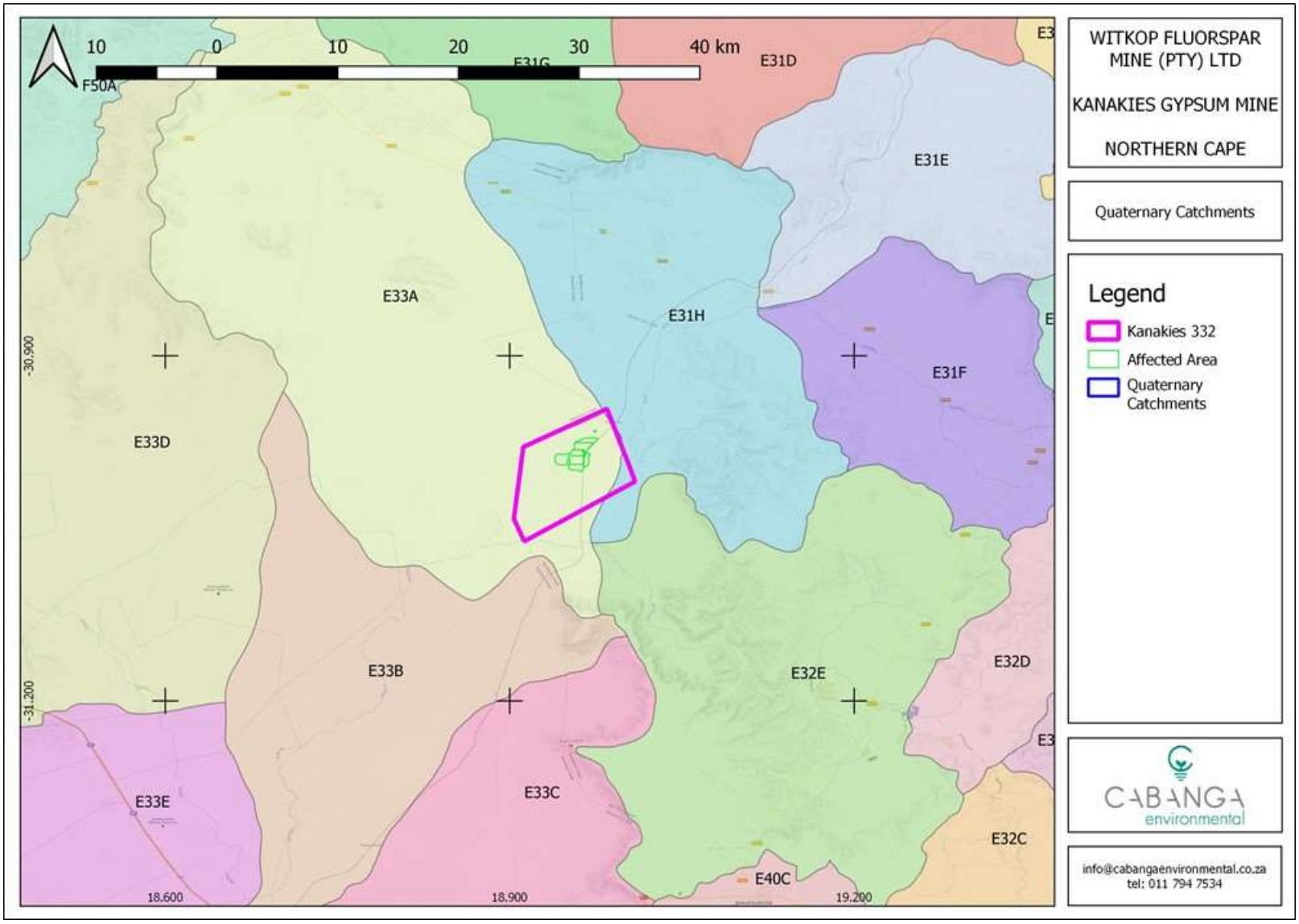
9.1.5.1 CATCHMENTS

The proposed MRA falls within the Berg-Olifants Water Management Area (Plan 17). The proposed Kanakies Gypsum Mine is on the south eastern boundary of the E33A quaternary catchment. The mean annual runoff (MAR) of the E33A quaternary catchment is 0.9 million cubic meters. The major rivers falling within Berg-Olifants is the Olifants, Doring, Krom, Sand and Sout rivers (Plan 18). Runoff from the project area drains south into the Krom River and Doring River, which runs along the southern and eastern boundary of the MRA.

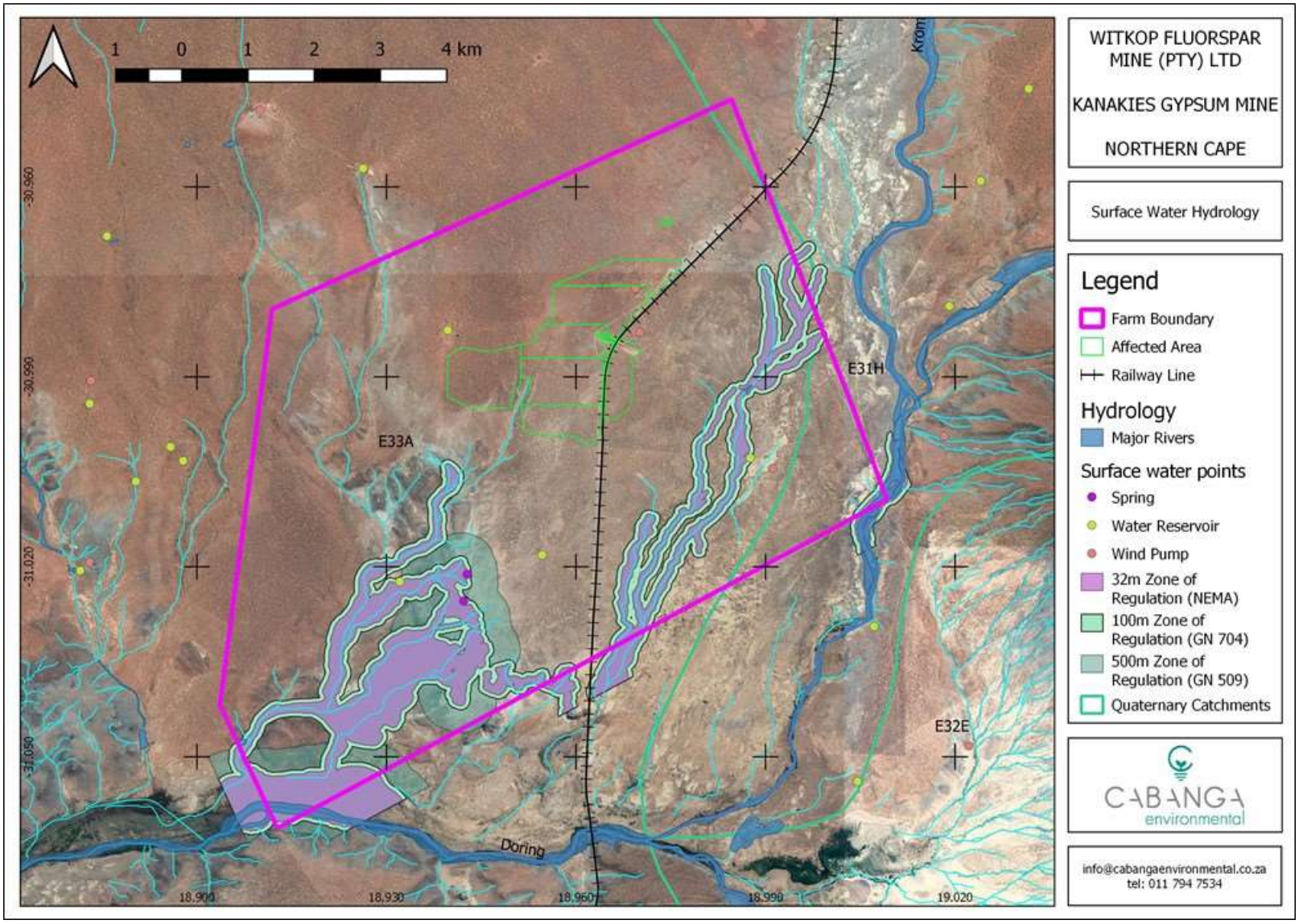
The average elevation of the northern section of E33A is from 600- 950 meters above sea level (mamsl). Towards the project area it decreases to 300- 350 mamsl.

The Sout and Krom Rivers are both listed as non-FEPA drainages. There are some non-FEPA wetlands within the MRA however; these are outside of the proposed mine and infrastructure areas.

Overall site catchments were calculated as seen in Table 13.



Plan 17: Quaternary catchments of the region



Plan 18: Surface water hydrology of the MRA (SD Hydrological Services, April 2018)

Table 13: Summary of catchment hydrology (SD Hydrological Services, 2018)

Name	Area (km)	Length of longest watercourse (m)	Height Difference (m)	Rainfall Intensity (Q50)	Tc (hours)	C-Factor
Cleanwater Diversion, Stockpile/Overburden Catchments	2.00	3449	17	25.25	1.33	0.24
Infrastructure area Catchment	0.01	100	1	73.20	0.25	0.43

9.1.5.2 STORM WATER MANAGEMENT

The storm water management plan was designed by SD Hydrological Resources (April 2018) to be in accordance with GN 704 of the National Water Act, Act No. 36 of 1998 (NWA).

The drainage direction within close proximity of the infrastructure areas occurs in a north to south direction. Therefore, all clean water is to be diverted around the infrastructure and mining area towards the nearest watercourse or clean water environment. These channels will be unlined trapezoidal and vegetated. An example of such a design is indicated in Figure 2.

All dirty water emanating in the mine and infrastructure area will be channelled to silt traps. Dirty water channels will be unlined trapezoidal channels.

Table 14 summarises the channel sizing.

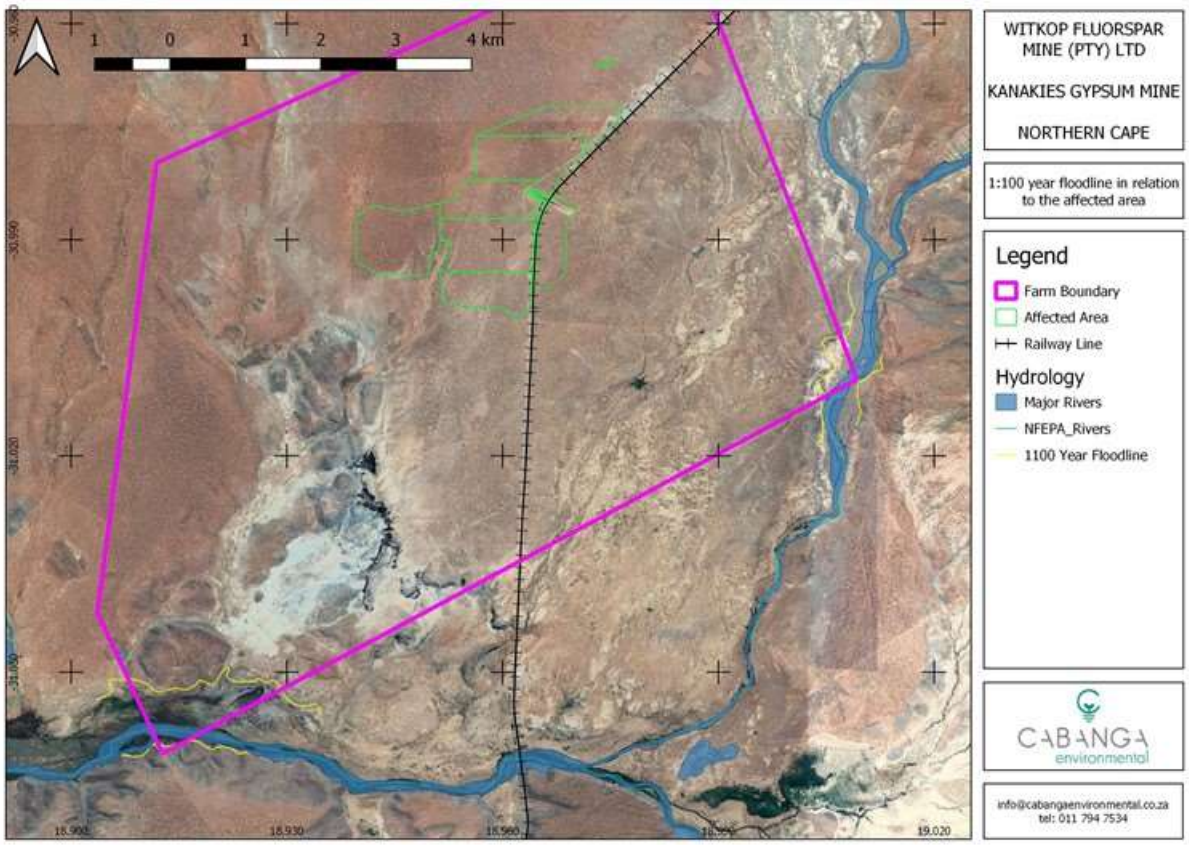
Table 14: Channel Sizing (SD Hydrological Services, 2018)

Channel Section	Q (m3/s)	Bottom width (m)	Calculated Top width (m)	Calculated depth (m)	Velocity (m/s)	Design depth (m)	Type
Clean water Diversions	2.80	1.0	7.00	0.65	1.47	1.0	Trapezoidal-Unlined
Stockpile/ Overburden channels	2.80	1.0	7.00	0.65	1.47	1.0	Trapezoidal-Unlined
Infrastructure Areas Channels	0.12	1.0	4.00	0.14	0.61	0.5	Trapezoidal-Unlined

9.1.5.3 FLOODLINES

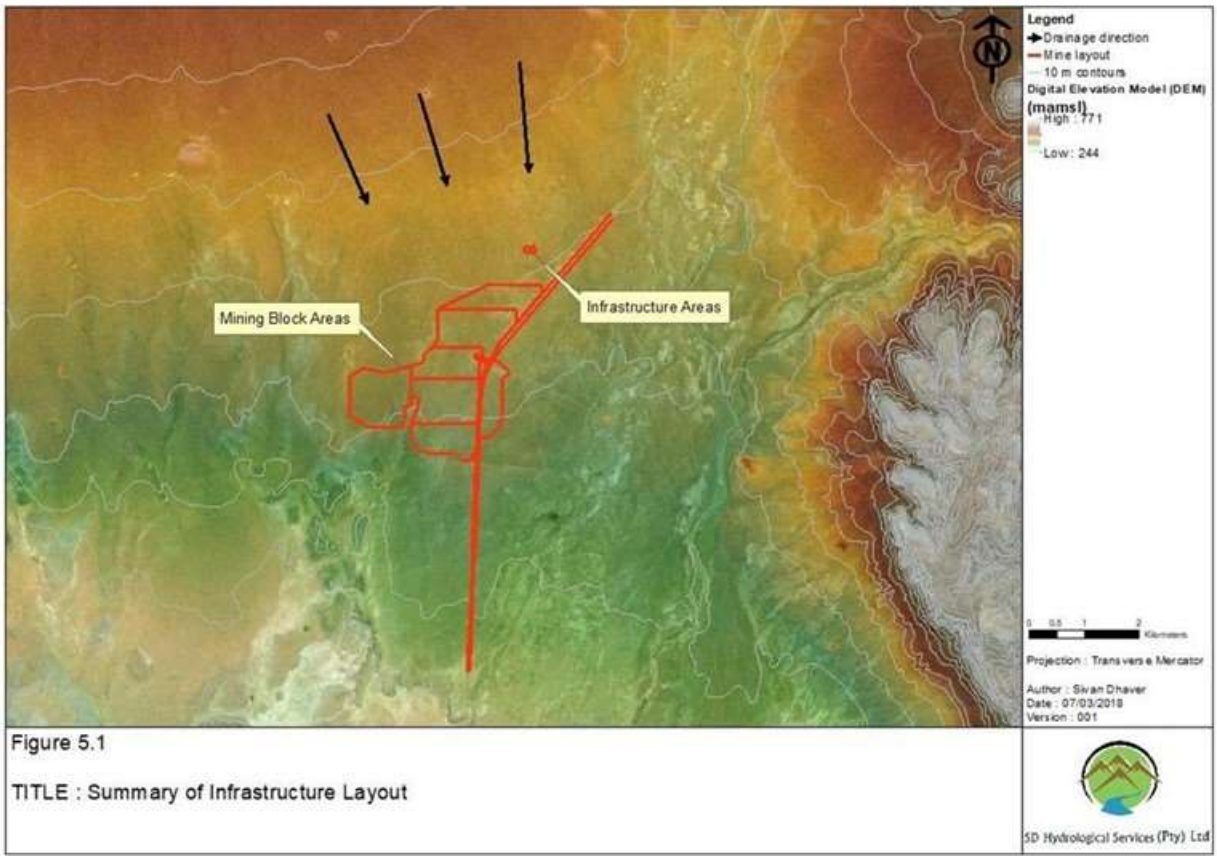
The floodlines were calculated by SD Hydrological Services, 2018 with the use of HEC-RAS 5.0 software to calculate peak flows resulting for 1:50 year and1:100 year storm events for specific rivers.

The project area falls outside of the 1:100 year floodline, as seen below in Plan 19 (yellow line). Minor drainage/streams which traverse the project area, were identified. The catchment of these range between 1km²- 5km² and the proximity to the project area, with the exception of one drainage line, falls more than 1km from the drainage/stream centreline. As a result flooding beyond the 100m drainage centreline is improbably. As such, all infrastructure should be placed outside of the 100m regulated area.



Plan 19: 1:100 year and 1:50 year delineated floodlines (SD Hydrological Services, 2018)

The drainage direction can be seen in Plan 20.



Plan 20: Drainage Direction (SD Hydrological Services, 2018)

9.1.5.4 *WATER QUALITY*

Quality of surface water was not assessed; water is only present in the drainage lines during periods of rainfall. Freshwater resources remain dry for long periods of time as there is low precipitation in this area coupled with high evaporation rates.

9.1.6 GROUNDWATER

The groundwater study was completed by Future Flow Groundwater and Project Management Services (Future Flow: GPMS, July 2018). Please refer to Appendix 5 for the full study.

9.1.6.1 HYDROGEOLOGY

Three aquifers occur in the area. These three aquifers are associated with a) the upper weathered material and gypsum layer, b) the underlying competent and fractured rock material, and c) the alluvial sand in the river channels.

Upper weathered material aquifer

The upper weathered material aquifer forms due to the vertical infiltration of recharging rainfall through the weathered material and the gypsum layer being retarded by the lower permeability of the underlying competent rock material. The aquifer thickness ranges between 16 and 20 m.

Recharge is 0.03 % of the mean annual precipitation (MAP).

Typical transmissivity values for this aquifer range between 0.1 and 5 m^2/day.

The borehole yields in this aquifer are seasonally variable due to the strong dependence on rainfall recharge. Generally, it can be said that the yields of this aquifer during the rainy season can be around 1 L/s while sustainable yields will decrease markedly during the dry season. In some areas this aquifer will be laid completely dry during the dry season.

Lower fractured rock aquifer

Groundwater flows in the lower fractured rock aquifer are associated with the secondary fracturing in the competent rock and as such will be along discrete pathways associated with the fractures. Faults and fractures in the host geology can be a significant source of groundwater depending on whether the fractures have been filled with secondary mineralisation.

Alluvial aquifer associated with the stream beds

Alluvial sand has accumulated in the river beds over time as low energy stream flows deposited transported material. During rainfall events when the streams flow surface water recharge into the alluvial sand that line the river channels. This water can be pumped from the sands during times when the rivers are not actively flowing. Yields from this aquifer can be relatively high due to the sandy nature of the aquifer material. However, once the sand is dewatered the groundwater users will have to wait until after the next significant rainfall event before water can be abstracted again.

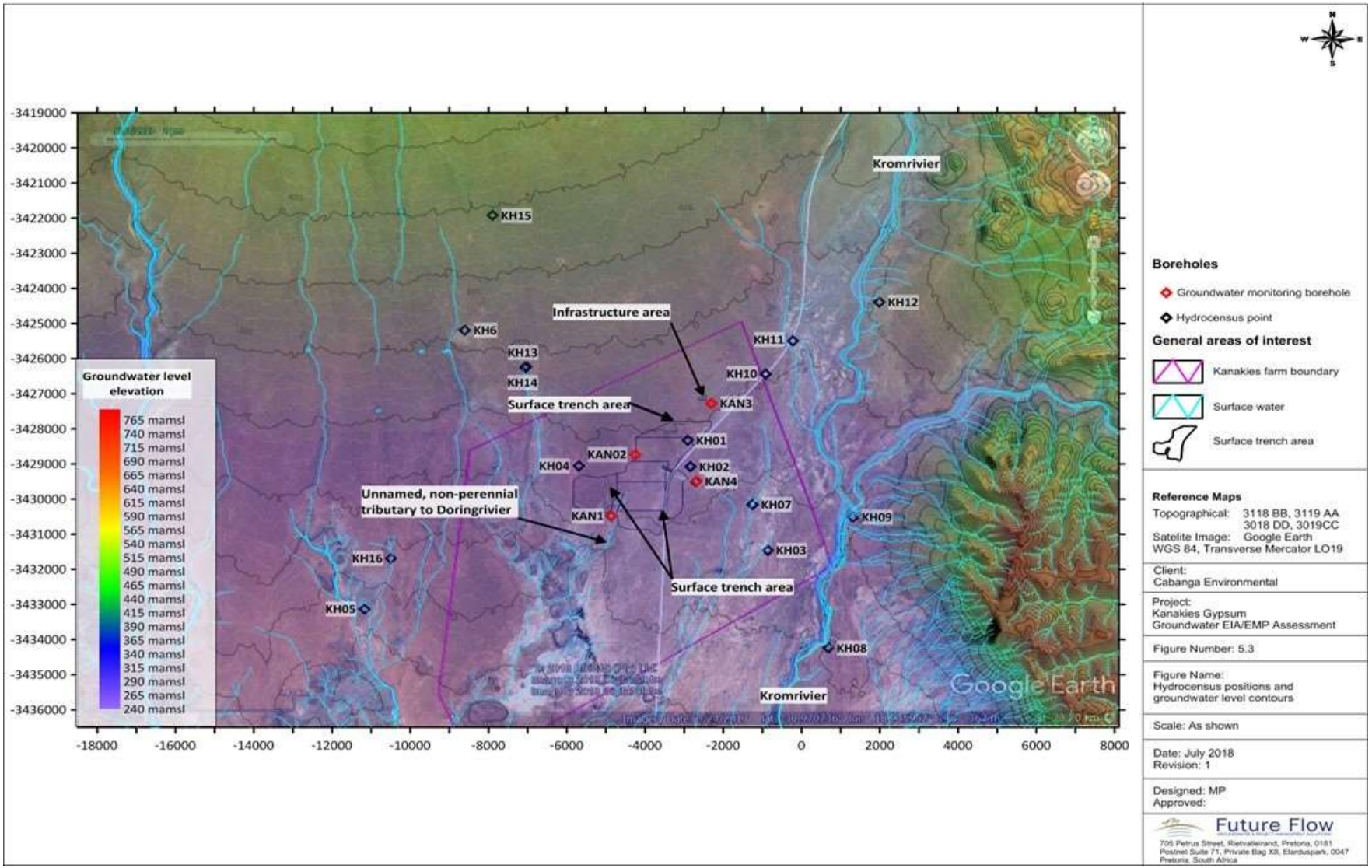
9.1.6.2 AQUIFER HYDRAULIC CONDUCTIVITY

The hydraulic conductivity of gypsum ranges between 3.5 x 10-8 and 2 x 10-3 m/day. The weathered, clayey, mudstone and siltstone that underlies the gypsum has a hydraulic conductivity in the range of 0.001 to 10 m/day.

9.1.6.3 HYDROCENSUS

A hydrocensus was undertaken for the project area. In total 16 privately owned groundwater points were located in the field (Plan 21). In addition to this, four groundwater monitoring boreholes were drilled as part of this groundwater study.

Information gathered at these points included field coordinates, elevation, static groundwater level (SWL), groundwater use and type and any other information that was available (Table 15).



Plan 21: Hydrocensus points (Future Flow: GPMS, July 2018)

Table 15: Hydrocensus results (Future Flow: GPMS, July 2018)

BH	East	North	Elevation	Water level		Farm	Owner	Use type	Equipment
	WGS84, LO19	WGS84, LO19	mamsl	mbgl	mamsl				
KH01	-2 916	-3 428 324	355	No access for measurement		Kanakies 332	PPC Cement	Stock watering (van der Merwe)	Windpump
KH02	-2 847	-3 429 079	346	No access for measurement		Kanakies 332	PPC Cement	Stock watering (van der Merwe)	Only reservoir found
KH03	-856	-3 431 463	346	9.45	336.55	Kanakies 332	PPC Cement	Stock watering	Windpump
KH04	-5 693	-3 429 056	346	No access for measurement		Kanakies 332	PPC Cement	Domestic & stock watering	Windpump
KH05	-11 173	-3 433 128	346	No access for measurement		Kalk Gat 84	M de Kock	Domestic	Windpump
KH06	-8 609	-3 425 189	346	No access for measurement		Lot B Drooge Houts Berg Vlakte 83	C van der Merwe	Domestic & stock watering	Windpump
KH07	-1 254	-3 430 162	336	12.87	323.13	Kanakies 332	Kanakies	Not used	None
KH08	696	-3 434 246	321	No access for measurement		Stinkfontein 461	Unknown	Not used	None
KH09	1 316	-3 430 517	337	No access for measurement		Klein Graaf Water 333	Unknown	Domestic	Windpump
KH10	-923	-3 426 434	357	No access for measurement		Klein Graaf Water 333	Transnet (Lus 6)	Domestic	Submersible
KH11	-228	-3 425 491	358	No access for measurement		Klein Graaf Water 333	Transnet (Lus 6)	Domestic	Submersible
KH12	1 982	-3 424 399	380	No access for measurement		Klein Graaf Water 333	K van der Merwe	Domestic	Submersible

BH	East	North	Elevation	Water level		Farm	Owner	Use type	Equipment
	WGS84, LO19	WGS84, LO19	mamsl	mbgl	mamsl				
KH13	-7 043	-3 426 220	366	No access for measurement		Lot B Drooge Houts Berg Vlakte 83	C van der Merwe	Stock watering	Windpump
KH14	-7 058	-3 426 260	364	No access for measurement		Lot B Drooge Houts Berg Vlakte 83	C van der Merwe	Stock watering	Windpump
KH15	-7 900	-3 421 925	408	No access for measurement		Lot B Drooge Houts Berg Vlakte 83	C van der Merwe	Stock watering	Windpump
KH16	-10 488	-3 431 687	303	No access for measurement		Kalk Gat 84	M de Kock	Stock watering	Windpump
KAN1	-4 860	-3 430 484	357	Dry	Dry	Kanakies 332	Witkop Fluorspar	Monitoring	None
KAN2	-4 238	-3 428 733	361	Dry	Dry	Kanakies 332	Witkop Fluorspar	Monitoring	None
KAN3	-2 302	-3 427 285	356	Dry	Dry	Kanakies 332	Witkop Fluorspar	Monitoring	None
KAN4	-2 693	-3 429 493	357	Dry	Dry	Kanakies 332	Witkop Fluorspar	Monitoring	None

N/A = Not available

mbgl = metres below ground level

mamsl = metres above mean sea level

All coordinates are provided in Transverse Mercator projection (LO19), and WGS84 datum

9.1.6.4 *GROUNDWATER QUALITY*

Four water samples were taken during the ground water study. The samples were sent to an accredited laboratory for chemical analysis.

Sodium, chloride and sulphate concentrations exceed SANS241:2015 drinking water standards for all samples taken. The fluoride concentrations in borehole KH09 also exceed the SANS241:2015 drinking water standards.

- The SANS241:2015 guideline value for chloride is 300 mg/L, the sample concentrations range between 1 576 and 2 649 mg/L thus exceeding the guideline value.
- The SANS241:2015 guideline value for sodium is 200 mg/L. The sample concentrations range between 700 and 1 272 mg/L thus exceeding the SANS241:2015 guideline value.
- The SANS241:2015 guideline value for sulphate is 500 mg/L, the sample concentrations range between 512 to 984 mg/L thus exceeding the guideline value.

The results for all parameters tested can be seen in Table 16.

Table 16: Groundwater Chemical Analysis Results (Future Flow: GPMS, July 2018)

Analysis	Units	SANS 241:2015 guideline value	KH01	KH03	KH15	KH09
pH		≥5 - ≤9.7	7.8	7.83	7.7	7.72
Electrical Conductivity (EC)	mS/m	≤170	560	538	463	497
Alkalinity	mg/L $CaCO_3$	N/G	112	146	113	146
Chloride (Cl)	mg/L	≤300	2 649	2 277	1 576	1 600
Sulphate (SO_4)	mg/L	≤500 (health)	512	984	726	674
Nitrate (NO_3)	mg/L	≤11	2.72	2.79	4.59	0.919
Ammonium (NH_4)	mg/L	N/G	0.046	0.033	0.038	0.035
Orthophosphate (PO_4)	mg/L	N/G	<0.005	<0.005	<0.005	<0.005
Fluoride (F)	mg/L	≤1.5	1.1	0.561	0.72	2.56
Calcium (Ca)	mg/L	N/G	211	263	252	271
Magnesium (Mg)	mg/L	N/G	194	177	184	160
Sodium (Na)	mg/L	≤200	1 272	1 272	700	833
Potassium (K)	mg/L	N/G	17.1	8.27	5.19	10
Aluminium (Al)	mg/L	≤0.3	<0.002	<0.002	<0.002	<0.002
Iron (Fe)	mg/L	≤2 (health)	<0.004	<0.004	<0.004	<0.004

Analysis	Units	SANS 241:2015 guideline value	KH01	KH03	KH15	KH09
Manganese (Mn)	mg/L	≤0.4 (health)	0.001	<0.001	<0.001	<0.001
Chromium (Cr)	mg/L	≤0.05	<0.003	<0.003	<0.003	<0.003
Copper (Cu)	mg/L	≤2	<0.002	<0.002	<0.002	<0.002
Nickel (Ni)	mg/L	≤0.07	<0.002	<0.002	<0.002	<0.002
Zinc (Zn)	mg/L	≤5	0.054	0.067	0.032	0.213
Cobalt (Co)	mg/L	N/G	<0.003	<0.003	<0.003	0.003
Cadmium (Cd)	mg/L	≤0.003	<0.002	<0.002	<0.002	<0.002
Lead (Pb)	mg/L	≤0.01	<0.004	<0.004	<0.004	<0.004
Total Hardness	mg/L $CaCO_3$	N/G	1 325	1 385	1 386	1 335
Bicarbonate	mg/L $CaCO_3$	N/G	112	145	112	146
	Exceed SANS241:2015 guideline value					

mS/m = milliSiemens/metre

mg/L = milligram per litre

9.1.6.5 GROUNDWATER LEVELS

The depth to groundwater level ranges from 9.45- 12.87 metres below ground level (mbgl), as seen in Figure 4.

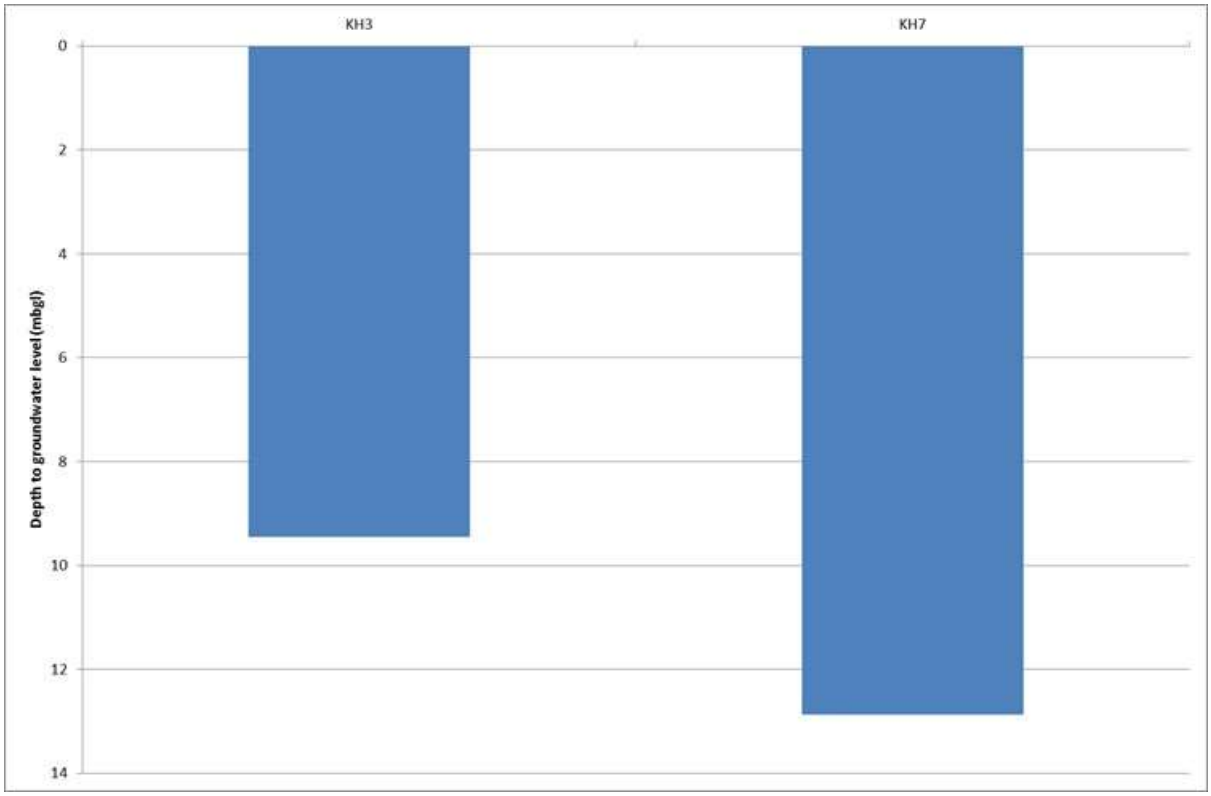


Figure 4: Depth to groundwater (Future Flow: GPMS, July 2018)

9.1.6.6 *GEOCHEMICAL ANALYSIS & WASTE ASSESSMENT CHARACTERISTICS*

Representative samples from the lithologies typically found on site were collected from the drill chips obtained during the drilling of the four groundwater monitoring boreholes. The samples represent the overburden as well as the gypsum that will be trenched. A total of three representative samples were collected and submitted to a laboratory for analysis. Table 17 details the samples used for analysis.

Analysis complied with the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) Waste Classification Regulations. These regulations include:

- Regulation 634 do: NEM:WA: Waste Classification and Management Regulations;
- Regulation 635 do.: National Norms and Standards for the assessment of waste for landfill disposal;
- Regulation 636 do.: National norms and Standards for disposal of waste to landfill.

The following tests were performed on the material:

- Total concentration testing;
- Leach concentration testing using distilled water;
- Acid-Base-Accounting.

Table 17: Sample description – Waste classification & acid-base-accounting testing (Future Flow: GPMS, July 2018)

Sample ID	Lithology
KAN2 OVBN	Weathered overburden soil.
KAN2 Calc	Gypsum
KAN4	Combined overburden and gypsum

Waste classification indicated the total concentration and the anticipated leach quality of seepage. The samples were subject to distilled water leach tests as the material is non-putrescible. No other wastes are expected to be co-disposed.

9.1.6.6.1 Total Concentration Test Results

Barium and fluoride are expected to exceed the Total Concentration Threshold 0 (TCT0) guideline. The copper concentration at borehole KAN2 has exceeded the TCT0 guideline for both the overburden and gypsum. The arsenic exceeds the TCT0 guidelines slightly for borehole KAN4. Seen in Table 18 is a summary of the results for concentration analysis.

Although some exceed the TCT0 guideline they comply with the (Total Concentration Threshold 1) TCT1 guideline values which are derived from the land remediation values for commercial / industrial land.

9.1.6.6.2 Leachable Concentration Test Results

The sulphate concentrations in both gypsum and overburden exceeded the Leachable Concentration Threshold 0 (LCT0) guideline. The boron concentration from borehole KAN4 for the overburden and gypsum exceeds the LCT0 guideline. The elements comply with the Leachable Concentration Threshold 1 (LCT1) guideline values. The leachable test results can be seen in Table 19.

Based on the results from the leach and total concentration test results the material handled on site is considered as Type 3. As extracted from the ground water study (Future Flow: GPMS, July 2018) "*Wastes with any element or chemical substance concentration above the LCT0 but below or equal to the LCT1 limits are Type 3 Wastes. All concentrations below or equal to the TCT1 limits (LCT0<LC<LCT1 or TC<TCT1), are Type 3 Wastes. Wastes with all element or chemical substances leachable concentration levels for metal ions and inorganic anions below or equal to the LCT0 limits are considered to be Type 3 Waste, irrespective of the total concentration of elements or chemical substances in the waste provided that:*

- *The concentration levels are below the relevant limits for organics and pesticides;*

- *The inherent waste and chemical character of the waste is stable and will not change over time; and*
- *The waste is disposed of to landfill without any other waste*".

Table 18: Total concentration test results (Future Flow: GPMS, July 2018)

Constituent	Units	TCT Guidelines Values			KAN2 OVBN	KAN2 Calc	KAN4
		TCT0	TCT1	TCT2			
Arsenic (As)	mg/kg	5.8	500	2 000	5.20	4.80	6.00
Boron (B)	mg/kg	150	15 000	60 000	50	28	53
Barium (Ba)	mg/kg	62.5	6 250	25 000	305	1 120	440
Cadmium (Cd)	mg/kg	7.5	260	1 040	6.40	3.20	4.40
Cobalt (Co)	mg/kg	50	5 000	20 000	<10	<10	<10
Total Chromium (Cr)	mg/kg	46 000	800 000	N/A	119	115	132
Copper (Cu)	mg/kg	16	19 500	78 000	30	23	14
Mercury (Hg)	mg/kg	0.93	160	640	<0.400	<0.400	<0.400
Manganese (Mn)	mg/kg	1 000	25 000	100 000	520	224	353
Molybdenum (Mo)	mg/kg	40	1 000	4 000	<10	<10	<10
Nickel (Ni)	mg/kg	91	10 600	42 400	28	10	15
Lead (Pb)	mg/kg	20	1 900	7 600	15	18	14
Antimony(Sb)	mg/kg	10	75	300	<0.400	<0.400	<0.400
Selenium (Se)	mg/kg	10	50	200	<0.400	<0.400	<0.400
Vanadium (V)	mg/kg	150	2 680	10 720	68	<10	32
Zinc (Zn)	mg/kg	240	160 000	640 000	82	28	33
Hexavalent Chromium (Cr^{6+})	mg/kg	6.5	500	2 000	<5	<5	<5
Fluoride (F)	mg/kg	100	10 000	40 000	785	574	347

	Exceed TCT0 guideline value

Table 19: Leachable Concentration Test Results (Future Flow: GPMS, July 2018)

Constituent	Units	LCT Guidelines Values				KAN2 OVBN	KAN2 Calc	KAN4
		LCT0	LCT1	LCT2	LCT3			
Arsenic (As)	mg/L	0.01	0.5	1	4	<0.001	<0.001	<0.001
Boron (B)	mg/L	0.5	25	50	200	0.393	0.114	0.516
Barium (Ba)	mg/L	0.7	35	70	280	<0.025	0.045	<0.025
Cadmium (Cd)	mg/L	0.003	0.15	0.3	1.2	<0.003	<0.003	<0.003
Cobalt (Co)	mg/L	0.5	25	50	200	<0.025	<0.025	<0.025
Total Chromium (Cr)	mg/L	0.1	5	10	40	<0.025	<0.025	<0.025
Hexavalent Chromium (Cr^{6+})	mg/L	0.05	2.5	5	20	<0.010	<0.010	<0.010
Copper (Cu)	mg/L	2.0	100	200	800	<0.025	<0.025	<0.025
Mercury (Hg)	mg/L	0.006	0.3	0.6	2.4	<0.001	<0.001	<0.001
Manganese (Mn)	mg/L	0.5	25	50	200	<0.025	<0.025	<0.025
Molybdenum (Mo)	mg/L	0.07	3.5	7	28	<0.025	<0.025	<0.025
Nickel (Ni)	mg/L	0.07	3.5	7	28	<0.025	<0.025	<0.025
Lead (Pb)	mg/L	0.01	0.5	1	4	<0.010	<0.010	<0.010
Antimony (Sb)	mg//L	0.02	1.0	2	8	<0.001	<0.001	<0.001
Selenium (Se)	mg/L	0.01	0.5	1	4	0.003	0.003	0.001
Vanadium (V)	mg/L	0.2	10	20	80	<0.025	<0.025	<0.025
Zinc (Zn)	mg/L	5.0	250	500	2 000	<0.025	<0.025	0.052
Total dissolved solids (TDS)	mg/L	1 000	12 500	25 000	100 000	1 440	2 358	2 568
Chloride (Cl)	mg/L	300	15 000	30 000	120 000	147	23	110
Sulphate (SO_4)	mg/L	250	12 500	25 000	100 000	826	1 394	1 432
Nitrate (NO_3)	mg/L	11	550	1 100	4 400	0.2	0.1	<0.1
Fluoride (F)	mg/L	1.5	75	150	600	0.9	1.0	<0.2

Constituent		Units	LCT Guidelines Values				KAN2 OVBN	KAN2 Calc	KAN4
			LCT0	LCT1	LCT2	LCT3			
	Exceed LCT0 guideline value								

9.1.6.6.3 Acid-Base Accounting (ABA) Testing

Neutralising Potential Ratio (NPR) from borehole KAN2 for overburden and gypsum is at slightly larger than 1. The total sulphur percentage is 0.75- 1.06 percent, this with the NPR could mean that the material could be acid generating.

NPR for mixed overburden and gypsum from borehole KAN4 is less than one. This with a sulphur percentage of 5.34% and a Net Neutralisation Potential (NNP) of -100 could mean that the material could be acid generating.

Seen below in Table 20 are the rest results for ABA testing.

Table 20: ABA Test Results (Future Flow: GPMS, July 2018)

Sample	Paste pH	Total Sulphur %	Acid Potential (AP) (kg/t)	Neutralisation potential (NP)	Net Neutralisation Potential (NNP)	Neutralising Potential Ratio (NPR) (NP:AP)	Rock Type
KAN2 OVBN	7.7	0.75	23	27	3.65	1.16	II
KAN2 Calc	8.2	1.06	33	52	18	1.56	II
KAN4	8.3	5.34	167	67	-100	0.399	I

In Table 21 are the guidelines for deducing if a material is acid generating or not.

Table 21: Neutralisation Potential Ratio (Future Flow: GPMS, July 2018)

NPR = NP/AP	Acid generating potential	Comments
<1:1	Likely	Likely AMD generating
1:1 to 2:1	Possible	Possibly AMD generating if NP is insufficiently reactive or is depleted at a faster rate than sulphides
2:1 to 4:1	Low	Not potentially AMD generating unless significant preferential exposure of sulphides along fracture planes, or extremely reactive
>4:1	Unlikely	No further AMD testing required unless materials are to be used as a source of alkalinity

Table 22: Net Neutralising Potential (NNP) (Future Flow: GPMS, July 2018)

Net neutralising potential (NNP) NNP = NP-AP	Acid generating potential
< -20	Likely to be acid generating
>20	Not likely to be acid generating

Net neutralising potential (NNP) NNP = NP-AP	Acid generating potential
Between -20 and 20	Uncertain range

Table 23: Sulphide – S Percentage Guidelines (Future Flow: GPMS, July 2018)

	NAG pH	NPR	ARD Potential	Comment
Sulphide-S <0.3%	>5.5	-	None	No further AMD testing required provided there are no other metal leaching concerns. Exceptions: host rock with no basic minerals, sulphide minerals that are weakly acid soluble.
Sulphide-S >0.3%	<5.5	<1	Likely	Likely to be AMD generating
		1-2	Possibly	Possibly AMD generating if NP is insufficiently reactive or is depleted at a rate faster than that of sulphides
		2-4	Low	Not potentially AMD generating unless significant preferential exposure of sulphides occurs along fractures or extremely reactive sulphides are present together with insufficiently reactive NP
		>4	None	No further AMD testing required unless materials are to be used as a source of alkalinity.

9.1.6.7 GROUNDWATER POTENTIAL CONTAMINANTS

The surface trench area and stockpiles (to move with the active mine area), as well as the waste overburden stockpile (to move with the active mine area) act as potential sources of contamination to the aquifers. For the purpose of this discussion it is assumed that good housekeeping such as storage of potentially hazardous material will be within properly constructed and lined or paved areas. Oil traps will be sized, operated and maintained to contain all discarded oil from working areas etc.

Leach testing results can be used to determine the potential source concentrations. The leach test results show that in general sulphate can be expected to be present in concentrations of 800 to 1 400 mg/L, which exceed the LCT0 guideline value of 250 mg/L. Leach test analysis results from the Borehole KAN4 overburden and gypsum mixture show that boron, could also be present in slightly elevated concentrations (0.516 mg/L compared to the LCT0 value of 0.5 mg/L.

9.1.6.8 AQUIFER VULNERABILITY

There is a low aquifer vulnerability for the project area (Department of Water Affairs, July 2013). The importance of the aquifer to locals is acknowledged despite its low vulnerability.

9.1.7 FLORAL ECOLOGY

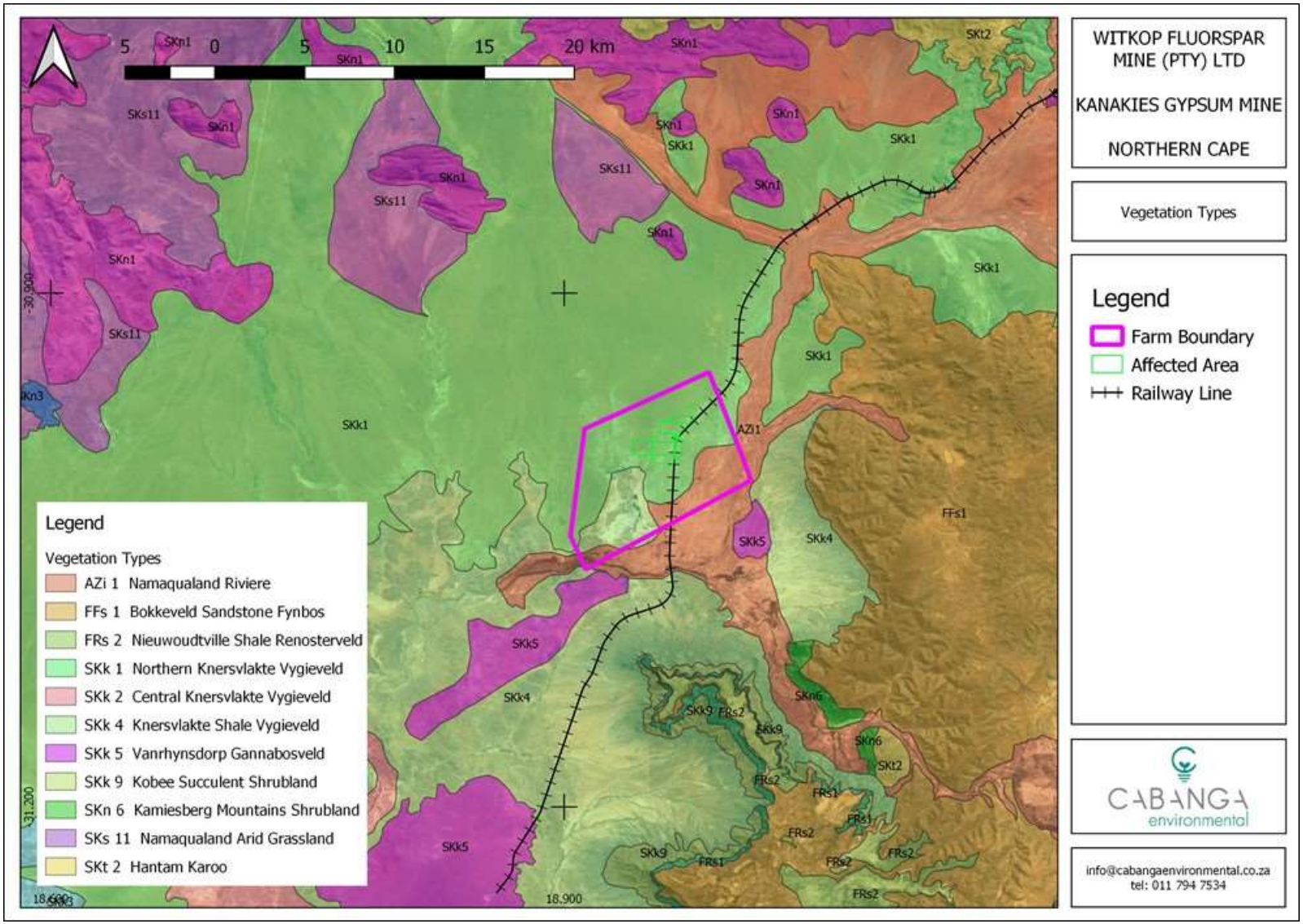
A floral ecological assessment was undertaken by Scientific Terrestrial Services in 2018 (Appendix 6). Surveys were completed in summer and winter of 2018 respectively to gain a full understanding the project area, the findings of which are summarised below.

9.1.7.1 REGIONAL & NATIONAL BIODIVERSITY SIGNIFICANCE

9.1.7.1.1 Regional Vegetation:

The project area is located in the Succulent Karoo biome of the Northern Cape Province. The Succulent Karoo biome is one of 25 internationally recognised biodiversity hotspots, and is the world's only arid hotspot. According to the Succulent Karoo Ecosystem Programme (SKEP), the project area is not situated in an area with high plant or animal endemism or sensitivity. The area has however been identified as a very important area in terms of insect sensitivity, with endemic species present.

Vegetation types within the project area include Northern Knersvlakte Vygieveld (SKk 1), Knersvlakte Shale Vygieveld (SKk4); and Namaqualand Riviere (Azi 1), see Plan 22 below.



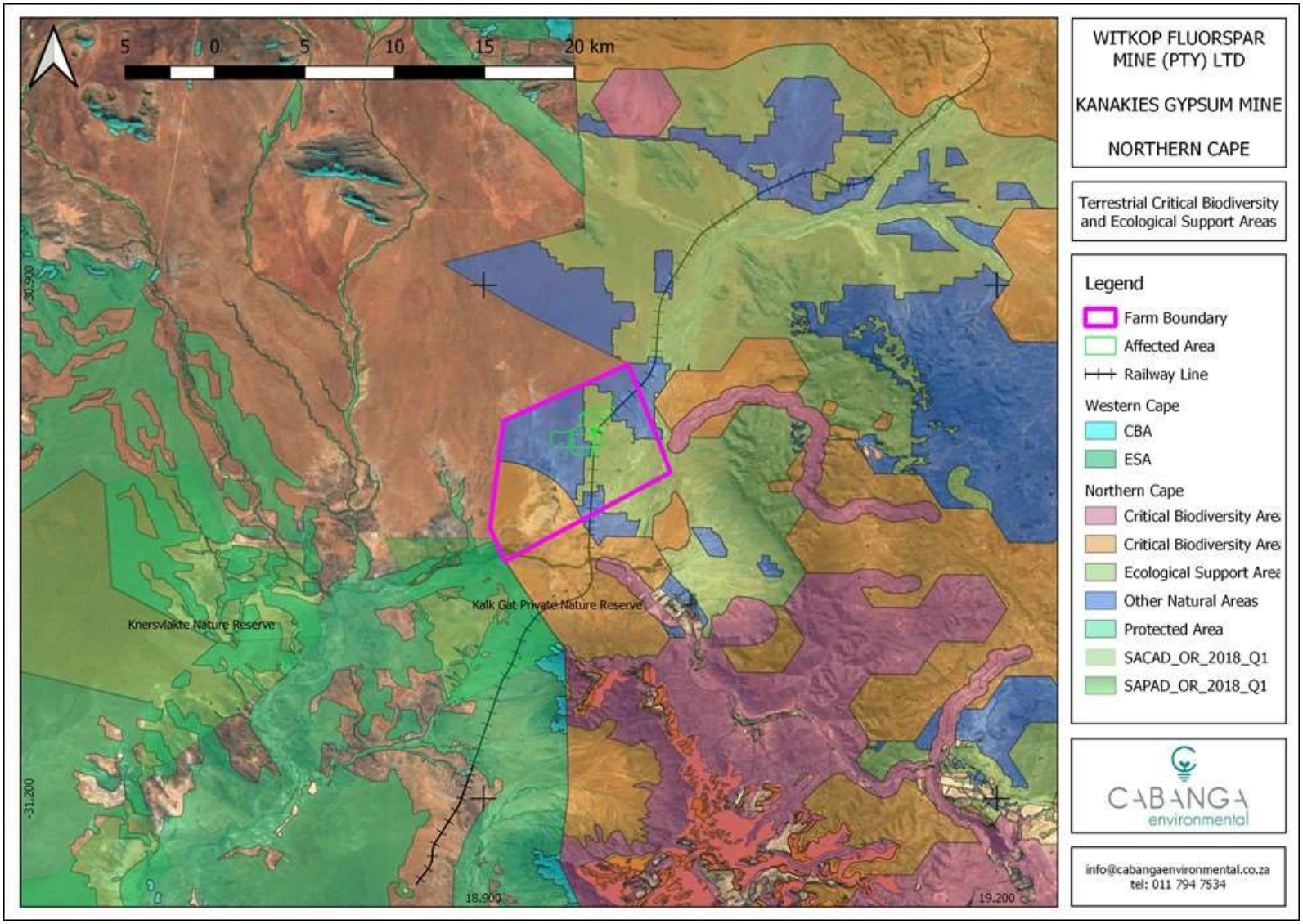
Plan 22: Vegetation Type (Mucina, L. and Rutherford, M.C., 2006)

9.1.7.1.2 Provincially Mapped Biodiversity Areas of Importance:

The Northern Cape Critical Biodiversity Areas was published in 2016 by the Northern Cape Department of Environment and Nature Conservation, which updates and replaces all older systematic biodiversity plans and associated products for the province, such as the Namakwa District Biodiversity Sector Plan (NDBSP, 2008) and the Cape Fine Scale Biodiversity Planning project (Ralston, S., de Villiers, C., Manuel, J., te Roller, K., 2009).

As depicted in Plan 23 below, a portion of the MRA has been declared Critical Biodiversity Area Two (CBA2) (terrestrial) and Ecological Support Area (ESA) (terrestrial). The project does not overlap any aquatic CBA or ESAs.

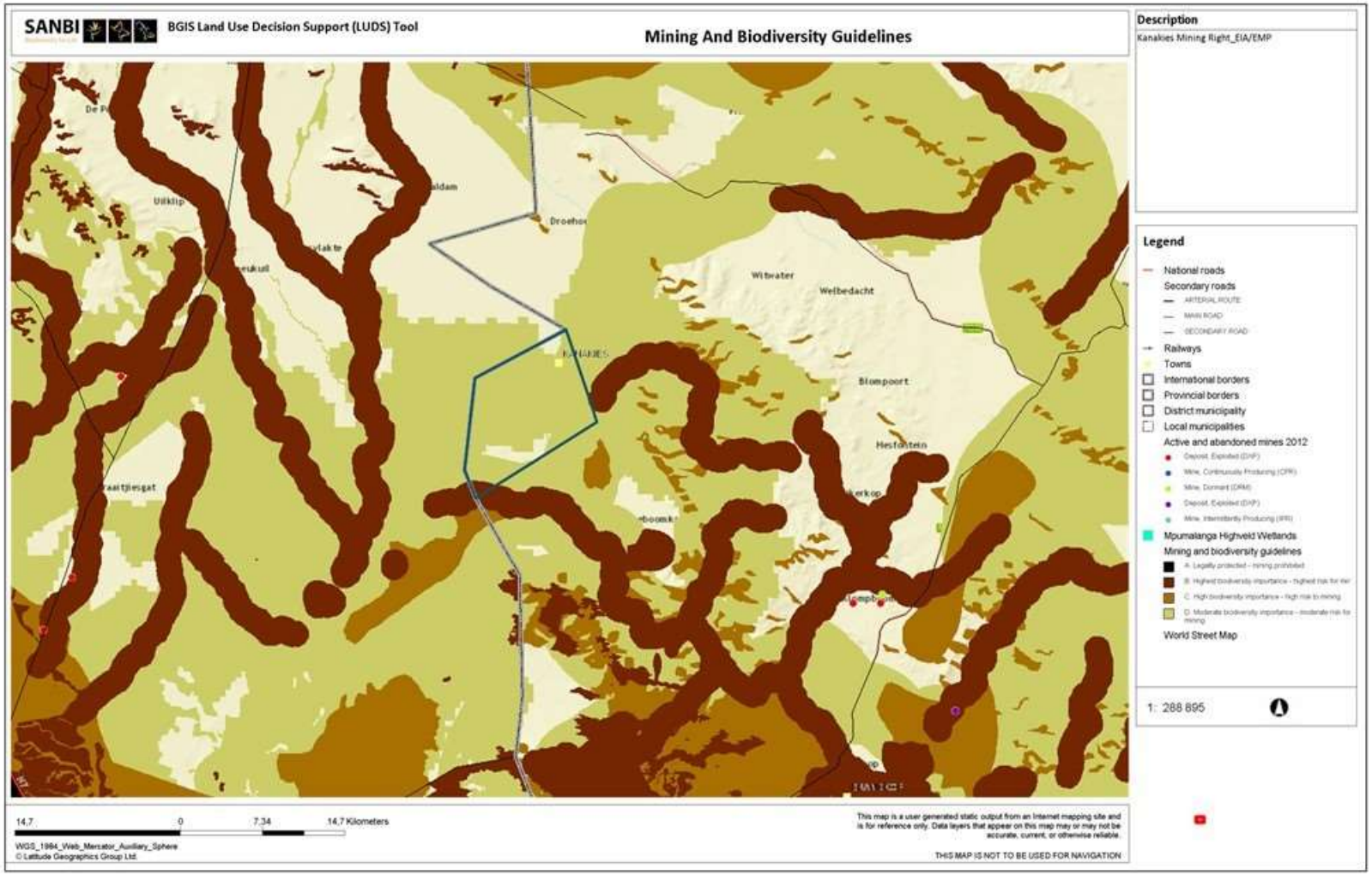
The nearest protected area is Kalk Gat Private Nature Reserve, situated adjacent to the proposed MRA, seen in Plan 23.



Plan 23: Terrestrial Critical Biodiversity Areas and protected areas

9.1.7.1.3 National Mining and Biodiversity Guideline:

According to the Mining Biodiversity Guidelines (2012) the south-western corner of the project area is considered Highest Biodiversity Importance (Plan 24). The rest of the project area is considered Moderate Biodiversity Importance. As seen in Plan 23 the south-western corner of the MRA touches on the Kalk Gat Private Nature Reserve which correlates with the Highest Biodiversity Importance.



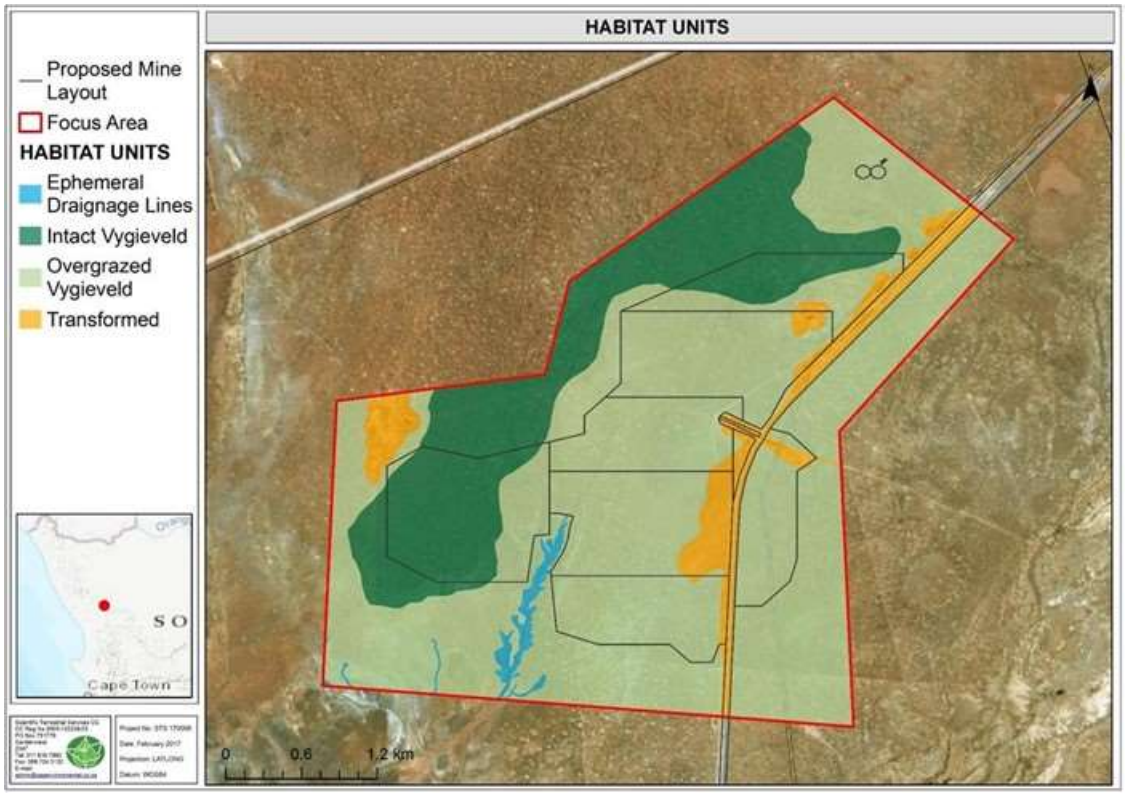
Plan 24: National Mining and Biodiversity Guideline (SANBI, 2012)

9.1.7.2 *ON-SITE HABITAT TYPES AND VEGETATION COMPOSITION*

The identified habitats are described in detail in the full report (Appendix 6) but only summarised briefly herein.

The project area falls within the Knersvlakte Vygieveld vegetation type. Two habitats fall within the vegetation type, Intact Knersvlakte Vygieveld and Overgrazed Knersvlakte Vygieveld (Plan 25). These are described in Table 24.

Ephemeral drainage lines were noted in the south-western corner of the MRA. This area does not receive enough water to support a wetland or riparian characteristics.



Plan 25: Habitat map for the MRA (Scientific Terrestrial Services, July 2018c)

Plan 26: Ephemeral drainage line (Scientific Terrestrial Services, July 2018c)

Table 24: Brief description of the Habitat Types (Scientific Terrestrial Services, July 2018c)

Habitat type	Summary Description	Sensitivity	Conclusion
Intact Knersvlakte Vygieveld  	The vegetation type that is found in this area is described as least threatened. Northern and south-western sections of the project area have more of this habitat as there is less grazing. Several SCC were observed on the site during the summer and winter assessment and these will be discussed below in 9.1.7.3. The dominant species observed were *Augea capensis, Massonia depressa, lachenalia cornosa, Oxalis ambigua, Gazania lichtensteinii and Psilocaulon* spp. Bulbs and geophytes were observed such as: *Ornithogalum sp. Massonia depressa, Sarcocornia xerophila, Mesembryathemum guericheianum, Drosanthemum hispidum* and *Ruschia robusta.* The area has been invaded by indigenous species (lack of diversity due to only two species thriving) such as *Psilocaulon spp* and *Atriplex lindleyi.*	Intermediate	Due to historical and current agriculture this habitat has moderately low ecological sensitivity. Edge effects to be limited on the Intact Knersvlakte Vygieveld. Placement of infrastructure will not have a significant impact on the environment. SCC and indigenous flora to be relocated prior to construction.
Overgrazed Knersvlakte Vygieveld  	The vegetation type that is found in this area is described as least threatened. Several SCC were observed on the site during the summer and winter assessment but these will be discussed below in 9.1.7.3. This habitat has been transformed by grazing. Poor development of the grass layer, little to no woody species, climbers and shrubs are observed. Due to these activities there has been an invasion of indigenous *Psilocaulon spp*. and *Atriplex lindleyi* (lack of diversity due to only two species thriving).	Moderately Low	Due to historical and current agriculture this habitat has moderately low ecological sensitivity. Edge effects to be limited on the Intact Knersvlakte Vygieveld. The proposed surface infrastructure has been planned to be placed in an already disturbed area.

Habitat type	Summary Description	Sensitivity	Conclusion
Transformed Areas  	There was very low floral diversity due clearing of soil for grazing and roads and burrow pits that were used during the construction of the road and railway line. No SCC were observed.	Low	Due to historical and current development this habitat has low ecological sensitivity. Placement of infrastructure will have no impact.

9.1.7.3 *SPECIES OF CONSERVATION CONCERN (SCC)*

Several SCC, listed in terms of the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009), were identified on site during the summer and winter surveys. These were:

- *Hoodia gordonii;*
- *Mesembryanthum spp.;*
- *Drosanthemum spp.;*
- *Brownanthus spp.;*
- *Lessertia frutescens;*
- *Oxalis ambigua;*
- *Oxalis luteola;*
- *Lampranthus maximiliani;*
- *Ornithogalum secundum;*
- *Lapeirousia spinosa;*
- *Tetragonia microptera*
- *Malephora purpureo-corcea;*
- *Ruschia robusta;*
- *Gethyllis villosa;*
- *Delosperma hisidium;*
- *Bulbine torta;* and
- *Trachyandra falcate*.

Permits will be required for their removal or relocation of these SCC.

Figure 5: (top) Lithops spp. and Drosanthemum spp. (middle) Hoodia gordonii and Lessertia frutescens. (bottom) Mesembryanthemum guerichianum and Zygophyllum cordifolium

Below in Table 25 is the Probability of Occurrence (POC) for species listed under SANBI SCC Floral Species, NEMBA TOPS Species and Northern Cape Nature Conservation Act – Schedule 1 & 2

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Table 25: Protected floral species potentially occurring (Scientific Terrestrial Services, July 2018c)

Family	Species	Threat Status	Habitat	POC (%) within the focus area
CR= Critically Endangered, NT = Near Threatened, EN= Endangered, VU= Vulnerable, SP = Specially protected, P= Protected				
SANBI SCC Floral Species				
OXALIDACEAE	*Oxalis senecta*	NT	Sandy banks of dry watercourses	30%
EUPHORBIACEAE	*Euphorbia fasciculata*	VU	Succulent karoo, occurs among short bushes on sandy flats and sparsely vegetated quartz-strewn flats	20%
IRIDACEAE	*Babiana sambucina subsp. longibracteata*	EN	Bokkeveld Sandstone Fynbos, in deep sandy soils on flats and gentle slopes	20%
MESEMBRYANTHEMACEAE	*Phyllobolus chrysophthalmus*	Rare	Stony soils in Knersvlakte Quartz Vygie Veld, growing in bushes, 180-350 m	60%
PORTULACACEAE	*Anacampseros comptonii*	VU	Moss pads on seasonally moist sandstone pavements	30%
NEMBA TOPS Species				
AIZOACEAE	*Cheiridopsis peculiaris*	CR	Gravels and shale derived from metamorphic rocks of the Namaqualand Complex	60%
AIZOACEAE	*Conophytum herreanthus subsp. Herreanthus*	CR	Quartz patches	60%
ASPHODELACEAE	*Aloidendron pillansii*	EN	Succulent Karoo shrubland on dry, rocky dolomite and gneiss hillsides.	30%

Family	Species	Threat Status	Habitat	POC (%) within the focus area
AMARYLLIDACEAE	*Haemanthus granitcus*	EN	Namaqualand Klipkoppe Shrubland or Namaqualand Granite Renosterveld.	20%
AIZOACEAE	*Lithops dorotheae*	EN	Fine-grained, sheared, feldspathic quartzite	60%
ASPHODELACEAE	*Aloidendron dichotomum*	VU	On north-facing rocky slopes (particularly dolomite) in the south of its range. Any slopes and sandy flats in the central and northern parts of range.	30%
AMARYLLIDACEAE	*Brunsvigia herrei*	VU	Succulent Karoo Shrubland, granitic soils on flats and sometimes in deposits of fairly large stones.	30%
AIZOACEAE	*Conophytum bachelorum*	VU	Rocky outcrops	60%
AIZOACEAE	*Conophytum ratum*	VU	Spongy quartz soil.	60%
AMARYLLIDACEAE	*Gethyllis grandiflora*	VU	Sandy and or stony soils in arid karroid shrubland.	10%
AMARYLLIDACEAE	*Brunsvigia josephinae*	VU	Heavy clay soils.	20%
ASPHODELACEAE	*Aloe krapohliana*	P	Occurs in the extremely arid northern regions of the Succulent Karoo, on clay, stony (mostly quarzitic) and sandy soils on flats and slopes.	20%

Family	Species	Threat Status	Habitat	POC (%) within the focus area
AIZOACEAE	*Sceletium tortuosum*	P	Quartz patches and is usually found growing under shrubs in partial shade.	30%
PEDALIACEAE	*Harpagophytum procumbens*	P	Well drained sandy habitats in open savanna and woodlands.	30%
Northern Cape Nature Conservation Act – Schedule 1 & 2				
APOCYNACEAE	*Hoodia gordonii*	SP	Deep Kalahari sands, on dry stony slopes or flats and under the protection of xerophytic bushes	100%
AIZOACEAE	*All Mesembryanthum spp*	P	Found on a wide range of soil types, from well-drained sandy soils (including sand dunes), to loamy and clay soils. It can tolerate nutritionally poor or saline soils	100%
	All Drosanthemum spp	P	Found on a wide range of soil types	100%
	All Brownanthus spp	P	Shallow soil and in crevices and share the habitat with succulent plant	100%
	All Phyllobolus spp	P	Stony soils in Knersvlakte Quartz Vygie Veld	60%
	Lampranthus maximiliani	P	Well-drained, poor soils	100%
	Tetragonia microptera	P	Terrestrial	100%
	Ruschia robusta	P	Rocky hillsides	100%
	Delosperma hisidium	P	Shallow, poor soils	100%
CRASSULACEAE	*All species*	P		60%

Family	Species	Threat Status	Habitat	POC (%) within the focus area
OXALIDACEAE	*Oxalis senecta*	P	Sandy banks of dry watercourses	60%
	Oxalis ambigua	P	Sandy soils	100%
	Oxalis luteola	P	Sandy soils	100%
FABACEAE	*Lessertia frutescens*	P	Dry part of South Africa	100%
HYACINTHACEAE	*Ornithogalum secundum*	P	Stony, clayey flats and slopes	100%
IRIDACEAE	*Lapeirousia spinosa*	P	Semi-arid habitats	100%
	Moraea collina	P	Lower slopes and flats of Fynbos	100%
MESEMBRYANTHEMACEAE	*Malephora purpureo-corcea*	P	Knersvlakte	100%

9.1.7.4 ALIEN INVASIVE SPECIES

Alien invasive plant species are usually able to dominate when there has been disturbance to natural areas. Few alien invasive species were noted on site, these include:

- Mesquite or Suidwesdoring (*Prosopis glandulosa*);
- Mexican poppy (*Argemone ochroleuca*) and
- Lindley's saltbush (*Atriplex lindleyi*)

The above species can become problematic in dry river beds.

9.1.7.5 MEDICINAL SPECIES

Medicinal plants identified during the assessment are detailed in Table 26 below, it must be noted that these species that are protected by the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) and permits will be required for their removal or relocation.

Table 26 Identified Medicinal Plants (Scientific Terrestrial Services, July 2018c)

Species	Name	Plant parts used	Medicinal uses
Hoodia gordonii	Bitterghaap	Whole plant	Eaten fresh as food and is used as an appetite suppressant by shepherd's, paradoxically it can be used as an appetite-stimulant, and it is eaten for

Species	Name	Plant parts used	Medicinal uses
			abdominal pain suggestive of peptic ulceration.
Mesembryanthemum spp.		Leaves	Juice of leaves are used for various skin conditions.
Lessertia frutescens	Kankerbos	Leaves	Remedy for stomach cramp problems and internal cancers.

9.1.8 FAUNAL ECOLOGY

A faunal assessment was completed by Scientific Terrestrial Services for the proposed project (Scientific Terrestrial Services, July 2018c), the findings of which are briefly discussed below.

9.1.8.1 MAMMALS

The faunal habitat sensitivity for mammals is moderately high. Several mammal species were noted during the assessment however, due to the drought the faunal diversity and food availability was affected. As there is sheep farming in the area the grazing of sheep is in direct competition for food resources with mammals in the area. During non-drought periods it is possible that faunal diversity will increase due to the increase in food availability. No SCC listed mammals were encountered during the assessment although the project areas falls within with the distribution range of the SCC *Felis nigripes* (Black-footed cat). Two species observed are considered as Protected in the National Environmental Management: Biodiversity Act (Act 10 of 2004), *Orycteropus afer* (Aardvark) and *Otocyon megalotis* (Bat-eared fox).

The following species observed/caught on camera trap or dens and spoors noted on site:

- *Desmodillus auricularis* (Cape short-tailed Gerbil);
- *Hystrix africaeaustralis* (Porcupine) den;
- *Cynictis penicillata* (Yellow mongoose);
- *Orycteropus afer* (Aardvark);
- *Antidorcas marsupialis* (Springbok)
- *Raphicerus campestris* (Steenbok) spoor;
- *Rhabdomys pumilio* (Four-striped Grass mouse);
- *Otocyon megalotis* (Bat-eared fox).

Figure 6: Mammals on project site (Scientific Terrestrial Services, July 2018c)

Left to Right: Desmodillus auricularis (Cape short-tailed Gerbil); Hystrix africaeaustralis (Porcupine) den; Cynictis penicillata (Yellow mongoose); Orycteropus afer (Aardvark); Antidorcas marsupialis (Springbok); and Rhabdomys pumilio (Four-striped Grass mouse).

9.1.8.2 AVIFAUNA

The habitat sensitivity for avifauna is intermediate. Of the species observed, one is an avifaunal SCC. Food availability has been low due to the drought experienced in the area therefore avifauna are relocating where the food resources are more abundant. The drought has caused the loss of the herbaceous layer therefore the granivorous avifauna and the insectivorous avifauna have been affected. The current availability of food resources in the area are unable to support large numbers of avifauna. The following avifauna were observed:

- *Galerida* magnirostris (Large-billed Lark);

- *Cercomela schlegelii* (Karoo Chat);
- *Aquila verreauxii (*Verreauxs' Eagle);
- *Ardeotis kori* (Kori bustard) (SCC); and
- *Falco rupicoloides* (Greater Kestrel).

Figure 7: Avifauna observed on site (Scientific Terrestrial Services, July 2018c)

Left to Right: Galerida magnirostris (Large-billed Lark); Falco rupicoloides (Greater Kestrel) and bottom: Aquila verreauxii (Verreauxs' Eagle)

9.1.8.3 HERPETOFAUNA

The habitat sensitivity of amphibians is considered moderately low. There was a wetland habitat within the MRA although no amphibians were observed and no amphibian SCC observed. Due to the arid and dry nature amphibians are not able to exist in the area. Some species of amphibians are able to burrow and aestivate but only in areas where there are seasonal pools or pans. None of these environments exist on site. There are low numbers of insects in the project area that could be a food resource so it appears that the habitat availability is more significant than food resources (Scientific Terrestrial Services, July 2018c).

The habitat sensitivity of reptilians is considered moderately high. No SCC reptiles were observed but it is expected that the SCC *Homopus signatus* (Speckled tortoise, VU) occurs in the southern portion of the project area. It is also expected that *Pachydactylus mariquensis* (Marico Gecko) and *Bitis caudalis* (Horned Adder) occur on the site. During the winter assessment several *Psammobates tentorius* (Karoo Tent Tortoise) shells were found, having not survived the prolonged drought. Reptiles are a predatory species and due to the low abundance of invertebrates and small mammals there is a low food availability; reptiles are apt to survive in arid regions such as the project area.

Species observed on site are as follows:

- *Psammobates tentorius* (Karoo Tent Tortoise)
- *Pedioplanis burchelli* (Burchell's Sand Lizard)
- Gerrhosaurus typicus (Namaqua plated lizard)
- Burrows on the bases of bushes likely to be *Agama aculeata* (Ground Agama).

Figure 8: Reptiles observed on site (Scientific Terrestrial Services, July 2018c)

Left to Right: Psammobates tentorius (Karoo Tent Tortoise) and Pedioplanis burchelli (Burchell's Sand Lizard)

9.1.8.4 INSECTS AND ARACHNIDS

The habitat sensitivity of insects is intermediate. One SCC insect was noted on site, *Brinckiella arboricola* (Tree Winter Katydid, EN). This species lays eggs in the ground or plant stems, the egg laying only occurs once a year. It is believed that the following species have an increased probability of being in the MRA: *Brinckiella mauerbergerorum* (Mauerberger's Winter Katydid, VU) and *Brinckiella aptera* (Mute Winter Katydid, VU). The insect diversity was not as diverse as it should have been due to drought and limited food resources. Due to long term grazing and erosion in the project area this has been decreasing the habitat available for the insects.

Insects that were observed include:

- Desiccated remains of *Psammodes striatus* (Striped Toktokkie),

- *Sphingonotus scabriculus* (Blue Wing);
- *Zophosis testudinaria* (Frantic Tortoise Beetle);
- *Apis mellifera* (Honey Bee);
- *Brinckiella arboricola* (Tree Winter Katydid); and
- *Brinckiella* sp (Spring katydids)

Figure 9: Insects observed on site (Scientific Terrestrial Services, July 2018c)
Left to Right: Desiccated remains of Psammodes striatus (Striped Toktokkie), Sphingonotus scabriculus (Blue Wing), Brinckiella arboricola (Tree Winter Katydid), Brinckiella sp (Spring katydids), Zophosis testudinaria (Frantic Tortoise Beetle), and Apis mellifera (Honey Bee).

The habitat sensitivity of arachnids is considered intermediate. No SCC arachnids were observed and none are expected to be observed in the area. Arachnids feed on invertebrates and small reptiles however the drought has resulted in a diminished source of food for arachnids. There are habitat opportunities for arachnids but due to lack of food resources this will define whether the habitat will be utilized or not. Arachnids expected to be in the area include:

- *Harpactira namaquensis* (Namaqua Baboon Spider);
- *Opistophthalmus pallipes;*
- *Uroplectes carinatus;*
- *Parabuthus granulatus;*
- *Parapalystes* species (Huntsman Spiders);
- *Parabuthus capensis (observed)*

Parabuthus capensis was caught within one of the pitfall traps (as seen in Figure 10) and a burrow of possibly a *Harpactira namaquensis* (Namaqua Baboon Spider) noted.

Figure 10: Arachnids on site (Scientific Terrestrial Services, July 2018c)

Left to Right: Parabuthus capensis and burrow of Baboon spider possibly Harpactira namaquensis (Namaqua Baboon Spider)

9.1.8.5 SPECIES OF CONSERVATION CONCERN (SCC)

Due to the drought being experienced in the region there has been a decrease in the diversity and abundance of fauna. Below is a list of SCC and their probability of occurring within the area:

Table 27: Faunal SCC Probability of Occurrence (Scientific Terrestrial Services, July 2018c)

Scientific name	Common Name	POC%
Felis nigripes	Black-footed cat	80%
*Orycteropus afer**	Aardvark	100%
*Otocyon megalotis**	Bat-eared fox	100%
*Ardeotis kori**	Kori bustard	100%
Homopus signatus	Speckled tortoise	60%
Brinckiella mauerbergerorum	Mauerberger's Winter Katydid	60%
*Brinckiella arboricola**	Tree Winter Katydid	60%
Brinckiella aptera	Mute Winter Katydid	60%

* Species observed during field assessment

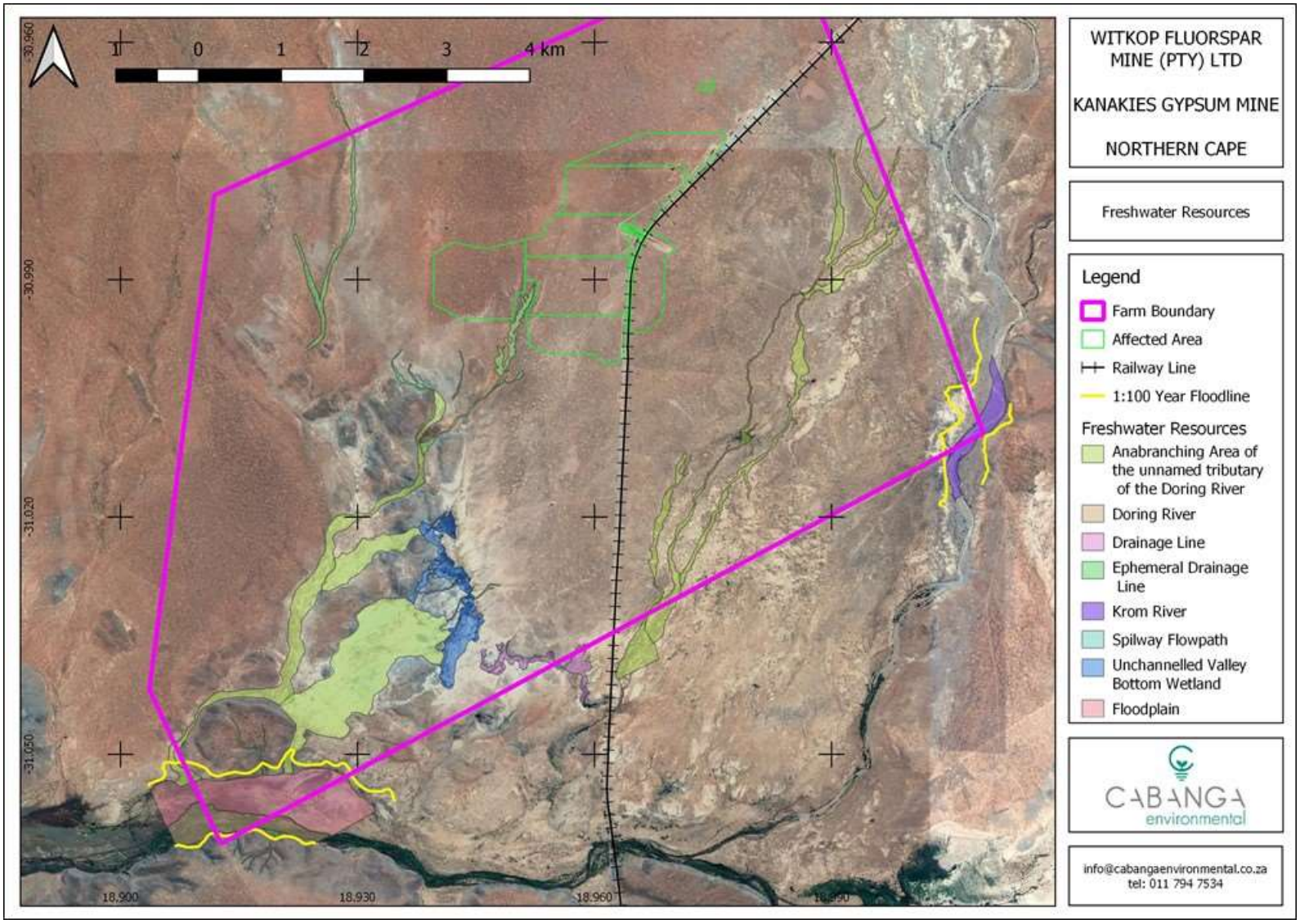
9.1.9 FRESHWATER ECOLOGY

A freshwater resource assessment for the proposed project was undertaken by Scientific Aquatic Services, 2018e.

The freshwater resources observed on site are as follows:

- Doring River and its associated floodplain traversing the south western corner of the MRA;
- Krom River traversing the eastern corner of the MRA;
- Unchannelled Valley Bottom (UVB), located south of the MRA area;
- Anabranching areas of the unnamed tributary of the Doring River; and
- Ephemeral drainage lines.

Surface water is only present during rainfall, this is due to low precipitation and high evaporation rate.



Plan 27: Identified freshwater resources (Scientific Aquatic Services, 2018e)

9.1.9.1 SUB- QUATERNARY CATCHMENT ASSESSMENT

The Krom River and the Doring River transverse the MRA. The Krom River is in the sub-quaternary catchment E31H and the Doring River is in the sub-quaternary catchment E33A. The information on E31H and E33A was derived from DWS RQS PES/EIS database. The monitoring points for both of these catchments can be seen in Plan 28.

The Krom River sub-quaternary catchment E31H has a Present Ecological State (PES) of largely natural. The mean Ecological Importance (EI) class is moderate, the mean Ecological Sensitivity (ES) is high, the length is 10.01km, the stream order is 4 and the default Ecological Category is B (High).

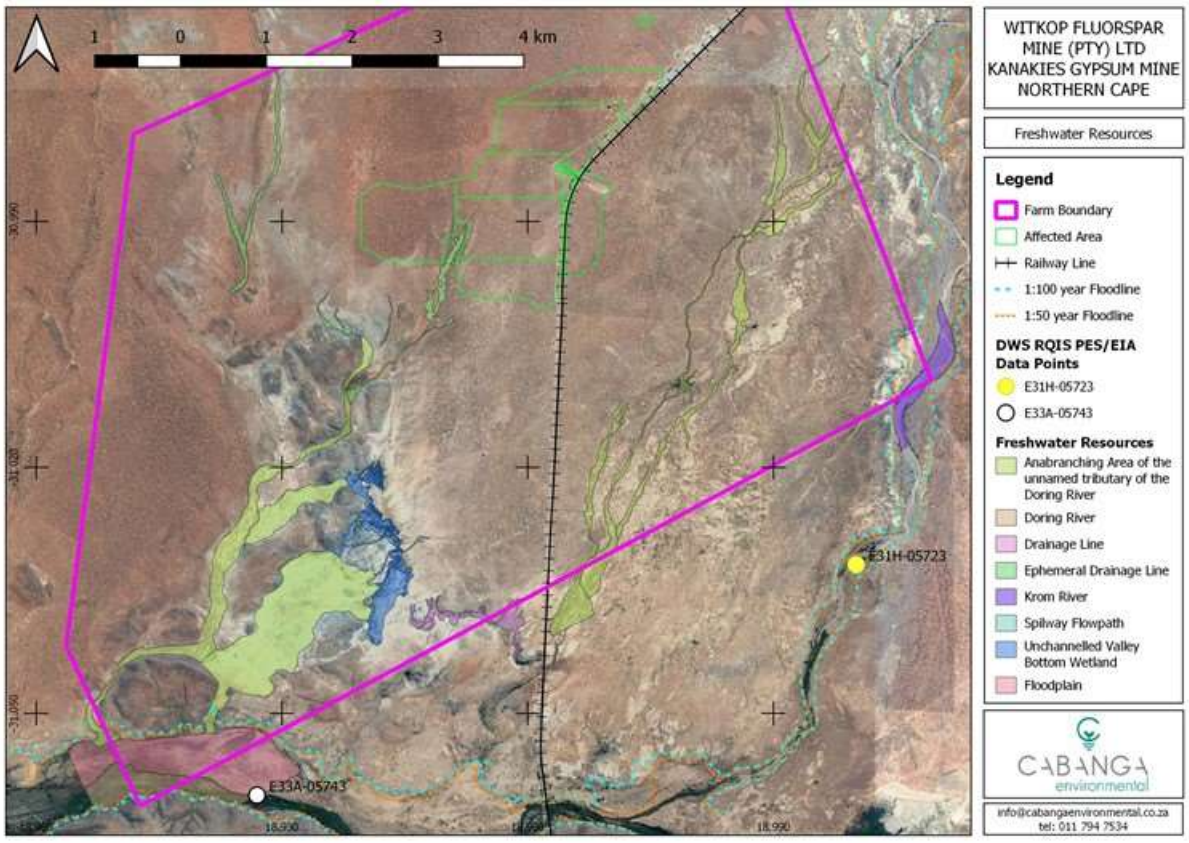
The Doring River sub-quaternary catchment E33A has a PES of largely natural. The mean EI class is moderate, the mean ES is high, the length is 9.57km, the stream order is 4 and the default Ecological Category is B (High).

Below is the ecological status of the E33A and E31H.

Table 28: Ecological status of the sub- quaternary catchments (Scientific Aquatic Services, 2018e)

PES Details	**E31H**	**E33A**
Instream habitat continuity	None	None
RIP/wetland zone continuity	Small	Small
Potential instream habitat activities	Small	Small
Riparian/wetland zone	Small	Small
Potential flow activities	Small	Small
Potential physico-chemical activities	Small	Small
EI Details	**E31H**	**E33A**
Fish spp/SQ	N/A	N/A
Fish average confidence	N/A	N/A
Fish representivity per secondary class	N/A	N/A
Fish rarity per secondary class	N/A	N/A
Invertebrate taxa/SQ	15	15
Invertebrate average confidence	2.73	2.73
Invertebrate representivity per secondary class	Low	Low
Invertebrate rarity per secondary class	Low	Low
EI importance: riparian-wetland-instream vertebrates (excluding fish) rating	Very Low	Very Low
Habitat diversity class	Low	Low

Habitat size (length) class	Very Low	Very Low
Instream migration link class	Very High	Very High
Riparian-wetland zone migration link	Very High	Very High
Riparian-wetland zone habitat integrity class	Very High	Very High
Instream habitat integrity class	Very High	Very High
Riparian-wetland natural vegetation rating based on percentage natural vegetation in 500m	Very High	Very High
Riparian-wetland natural vegetation rating based on expert rating	High	High
ES Details	**E31H**	**E33A**
Fish physical-chemical sensitivity description	N/A	N/A
Fish no-flow sensitivity	N/A	N/A
Invertebrates physical-chemical sensitivity description	Moderate	Moderate
Invertebrates velocity sensitivity	High	High
Riparian-wetland-instream vertebrates (excluding fish) intolerance water level/flow changes description	High	High
Stream size sensitivity to modified flow/water level changes description	Very High	Very High
Riparian-wetland vegetation intolerance to water level changes description	High	High



Plan 28: SQR Monitoring Points (Scientific Aquatic Services, 2018e)

9.1.9.2 *INVERTEBRATES*

Extracted from Scientific Aquatic Services, 2018e, Descriptions of the aquatic ecology is based on information collated by the DWS RQIS (Resource Quality Information Services) Department from available sources of reliable information, such as SA RHP sites, Ecological Water Requirements (EWR) sites and Hydro Water Management system (WMS) sites.

Information on the invertebrates for the area was obtained by the above-mentioned database and species collected or expected can be seen below:

- *Aeshnidae;*
- *Caenidae;*
- *Ceratopogonidae;*
- *Chironomidae;*
- *Corduliidae;*
- *Culicidae;*
- *Dytiscidae;*
- *Hydracarina;*
- *Hydraenidae;*
- *Lestidae;*

- *Libellulidae;*
- *Notonectidae;*
- *Oligochaeta; and*
- *Physidae*.

No fish were recorded within the SQR (sub- quaternary catchment reach) monitoring points from the database.

9.1.9.3 WETLANDS WITHIN THE PROPOSED AREA

Riparian features identified within the MRA are as follows:

Table 17: Riparian features within the MRA (Scientific Aquatic Services, 2018e)

Feature	Level 3: Landscape Unit	Level 4: HGM Type
UVB & Floodplain	Valley floor: the base of a valley, situated between two distinct valley side-slopes, where alluvial or fluvial processes typically dominate.	Floodplain: a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates.
Ephemeral drainage line	Plain: an extensive area of low relief. These areas are generally characterised by relatively level, gently undulating or uniformly sloping land with a very gentle gradient that is not located within a valley. Gradient is typically less than 0.01 or 1:100.	River: a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water (It should be noted that the above-mentioned description applies only to true riparian systems/true watercourses. Since the episodic preferential flow paths identified within the focus area are not true watercourses, this description does not strictly apply)

9.1.9.3.1 Unchannelled Valley Bottom

The PES Category is a C (Moderate) due to historical agriculture and from recent overgrazing and trampling of livestock.

The ecoservice provision is considered moderate/intermediate. The wetland provides an important role in the gathering of nutrients due to the nature of the wetland within the landscape. The wetland provides a habitat for several species but does not benefit humans.

The EIS Category is a B (high). This wetland forms part of a CBA (Northern Cape Critical Biodiversity Database, 2016) and has a high ecological importance due to its hydro-functionality.

Hydrology

The unchannelled valley bottom is driven by groundwater levels have been decreasing due to abstraction from the local farmers. Due to the high evaporation rates water is only present for short periods of time.

Water Quality

The water quality was not tested. There are no direct negative influencing factors such as contaminated water being released into the UVB (unchannelled valley bottom). Enrichment of water due to the grazing and trampling could occur.

Topography: Geomorphology and sediment balance

A geomorphological impact noted are the irregular soil mounts which might have been created to drain water to and from the UVB. This is also able to transport sediment into the UVB; overgrazing has led to certain areas being bare therefore sediment is able to enter the UVB.

Habitat and Biota

Common reeds and sedge species provide a habitat for several faunal species. As it is connected to drainage lines it acts as a migration corridor.

The REC (Recommended Ecological Category) of the UVB is Category C. Therefore, it needs to be maintained to be at the present level of ecological services and functioning so that there is no further deterioration.

Figure 11: Unchannelled Valley Bottom downgradient of MRA (Scientific Aquatic Services, 2018e)

9.1.9.3.2 Floodplain

The PES category is B (largely natural with few modifications) due to anthropogenic influences. The ecoservice is considered intermediate, the floodplain does not have any human benefits but plays an important role in flood attenuation due to its association to the Doring River and its location within the landscape. The EIS Category

is a B (high). This floodplain forms part of a CBA (Northern Cape Critical Biodiversity Database, 2016) and has a high ecological importance due to its hydro-functionality as it is connected to the Doring River.

Hydrology

The floodplain is part of the Doring River. Water drains into the floodplain during high rainfall from the river and from upgradient areas and exits downstream in the Doring River.

Water Quality

The floodplain was dry at the time of the assessment. The water quality is not likely to be affected by pollutants but could be enriched by nutrients from the presence of livestock in the area.

Topography: Geomorphology and sediment balance

Sedimentation is likely to occur in this area. The sediment enters through the Doring River and from upgradient areas. Due to the surface roughness and the terrestrial habitat limited sediment will be able to enter the wetland.

Habitat and Biota

Vegetation was noted as it is connected to drainage lines it acts as a migration corridor. The vegetation in the floodplain is considered intact.

The REC (Recommended Ecological Category) of the floodplain is Category B- largely natural with few modifications. This floodplain is considered largely natural. Future developments should not be allowed to impact on this as the floodplain is ecologically important.

9.1.9.3.3 Anabranching areas and Drainage lines

The PES category is C (moderate). The riparian vegetation cover remains fairly intact but some alien invasives were noted. Farm roads, trenches, fences and powerlines that bisect the drainage line has resulted in increased sediment inputs and altered flow patterns during times of rainfall. The ecoservice is considered moderately low, there are no human benefits but it plays an important role in flood attenuation, streamflow regulation and sediment trapping. The EIS Category is a B (high). This floodplain forms part of a CBA (Northern Cape Critical Biodiversity Database, 2016) and has a high ecological importance due to its hydro-functionality as it is regulates streamflow and flood attenuation.

Hydrology

The drainage line is ephemeral in nature. There have been localised changes in flow patterns due to roads and trenches crossing the drainage line. There have also been

small geomorphological changes such as sediment accumulation and trampling. None of these have a significant impact on the hydrological functionality.

Water Quality

The water quality is not likely to be affected by pollutants but could be enriched by nutrients from the presence of sheep in the area.

Topography: Geomorphology and sediment balance

Erosion was not severe at the time of the assessment. The loss of vegetation is sparse which leads to erosion thus sedimentation.

Habitat and Biota

There is sparse vegetative cover and not much wetland vegetation within the Anabranching areas and Drainage lines

The REC (Recommended Ecological Category) of the flooplain is Category C. The ephemeral drainage line is in a relatively good condition. Therefore, it needs to be maintained to be at the present level of ecological functioning so that there is no deterioration of the resource.

Figure 12: Anabranching areas within the MRA (Scientific Aquatic Services, 2018e)

9.1.9.4 BUFFER ASSESSMENT

Extracted from Scientific Aquatic Services, 2018e, buffer zones are considered to be significant in providing protection of basic ecosystem processes (in this case, the protection of aquatic as well as wetland ecological services), reduce impacts on water resources arising from upstream activities (e.g. by removing or filtering sediment and pollutants), provision of habitat for aquatic and wetland species as well as for certain terrestrial species, and a range of ancillary societal benefits. Buffer zones are unable to mitigate impacts such as water quality and water quantity degradation, impounding of water, abstraction, point sources of contamination of groundwater and stream flow reduction.

Ephemeral drainage lines have been given a 100m buffer by the hydrologist but from an ecological point of view this ephemeral drainage lines do not have true riparian characteristics and should not fall under the National Water Act protection. The buffer should be treated as a precaution to avoid flooding though no authorisation is needed.

Regulated buffer zones are shown on Plan 18.

9.1.10 HERITAGE RESOURCES AND PALAEONTOLOGICAL POTENTIAL

A Heritage Impact Assessment (HIA) study was completed by Archaetnos Culture and Cultural Consultants and a desktop Paleontological Impact Assessment (PIA) was completed by Prof. M. Bamford from the University of the Witwatersrand for the proposed operations. The sections below are largely extracted from the aforementioned studies; please refer to Appendix 8 and Appendix 9 for the detailed reports.

9.1.10.1 HERITAGE

No sites of cultural heritage significance were identified during the survey, background information is given in order to place the project area in a historical context and to contextualize possible finds that could be unearthed during mining activities (Archaetnos Culture & Cultural Resource Consultants, March 2018).

Stone Age

The Stone Age is the period in human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996: 293). In South Africa the Stone Age can be divided in three periods:

- Early Stone Age (ESA) 2 million – 150 000 years ago;
- Middle Stone Age (MSA) 150 000 – 30 000 years ago; and
- Late Stone Age (LSA) 40 000 years ago – 1850 - A.D

This geographical area is not well-known as one containing many prehistoric sites however this is likely due to a lack of research in the area.

The mentioned Late Stone Age sites are associated with the San people. Mitchell (2002: 126) indicates that the language group who occupied the Northern Cape is the /Xam. These people were hunters and gatherers which means that they would have moved around, leaving little trace of their existence.

The Hantam, Namaqualand and Bushmanland were of the last regions of the Cape Province to be settled by early European farmers. The result was that it became a last outpost of the /Xam Bushman who still hunted and gathered there in the last decades of the 19th Century (Deacon 1986, 1997). Research suggests that the `Grass Bushmen'

may have lived between Kenhardt and Brandvlei, while the `Flat Bushmen' lived between Vanwyksvlei and Kenhardt (Deacon 1996).

The environment here seems very similar to that of the project area, indicating that Stone Age material is likely to be found within the Kanakies study area. This was indeed the case, as isolated MSA tools were found scattered in the project area (Archaetnos Culture & Cultural Resource Consultants, March 2018).

Figure 13: MSA tools found within the project area

Iron Age

The Iron Age is the name given to the period of human history when metal was mainly used to produce metal artefacts (Coertze & Coertze 1996: 346). In South Africa it can be divided in two separate phases according to Van der Ryst & Meyer (1999: 96-98), namely:

- Early Iron Age (EIA) 200 – 1000 A.D.; and
- Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however, indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

- Early Iron Age (EIA) 250 – 900 A.D.;
- Middle Iron Age (MIA) 900 – 1300 A.D.; and
- Late Iron Age (LIA) 1300 – 1840 A.D.

Iron Age people occupied the central and eastern parts of southern Africa from about 200 A.D., but the San and Khoi remained in the western and southern parts (Inskeep 1978: 126; see also Huffman 2007).

During the Late Iron Age (LIA), people stayed in extensive stonewalled settlements, such as the Thlaping capital Dithakong, 40 km north of Kuruman. Sotho-Tswana and Nguni societies, the descendants of the LIA mixed farming communities, found the region already sparsely inhabited by the Late Stone Age (LSA) Khoisan groups, the so-called 'first people'. Most of them were eventually assimilated by LIA communities and only a few managed to survive, such as the Korana and Griqua. This period of contact is sometimes known as the Ceramic Late Stone Age and is represented by the Blinkklipkop specularite mine near Postmasburg and finds at the Kathu Pan (De Jong 2010: 36). It is also known that Late Iron Age people did utilize the area close to the Orange River, albeit briefly, as they did mine copper in the Northern Cape (Inskeep 1978: 135).

Iron Age people therefore did not settle in the study area. It therefore is no surprise that no such sites were identified during the survey (Archaetnos Culture & Cultural Resource Consultants, March 2018)

Historical Age

The historical age started with the first recorded oral histories in the area. It includes the moving into the area of people that were able to read and write. This era is sometimes called the Colonial era or the recent past.

From the 1880's onwards colonial settlement was promoted in the area. Government-owned land was surveyed and divided into farms, which were transferred to farmers. Surveyors were given the task of surveying and naming some of the many farms in this region. These farms were allocated to prospective farmers, but permanent settlement only started in the late 1920s and the first farmsteads were possibly built during this period. The region remained sparsely populated until the advent of the 20th century (De Jong 2010: 36).

The farm Kanakies seems to have been surveyed in 1868 as Crown Land, although the deed was only registered in 1874 (Surveyor-General F476/1874). Another source (Van Zyl 2010: 13) also indicates that most of the farms were still Government farms and were leased to farmers in 1875, it seems as if shortly hereafter farms were sold to individuals.

The above-mentioned information means that the buildings on these farms could only have been built after the mid-19th century and most likely after 1875. Buildings on the farm Kanakies fall outside of the proposed mine and infrastructure area (Archaetnos Culture & Cultural Resource Consultants, March 2018).

9.1.10.2 PALAEONTOLOGICAL SETTING

Based on the geology of the area and the paleontological record as we know it, it can be assumed that the formation and layout of the shales, sandstones, diamictites, tillites, gneisses, schists, granites and sands are typical for the country and do not contain any microfossils, fossil plant, insect, invertebrate and vertebrate material.

The possible fossiliferous Ecca sediments are not in the mining area but occur to the north. Granites, gneisses, sands, alluvium and calcretes are not fossiliferous. There is a small chance that trace fossils and stromatolites could occur in the Knersvlakte Subgroup shales but these will not be mined. Based on the lack of any previously recorded fossils from the area, it is extremely unlikely any fossils would be identified in the proposed project area. Furthermore, the gypsum to be mined would have formed when a saline pan dried out, and this would have been long after the underground rocks were formed. The gypsum would therefore not contain fossils (Professor Marion Bamford, March 2018).

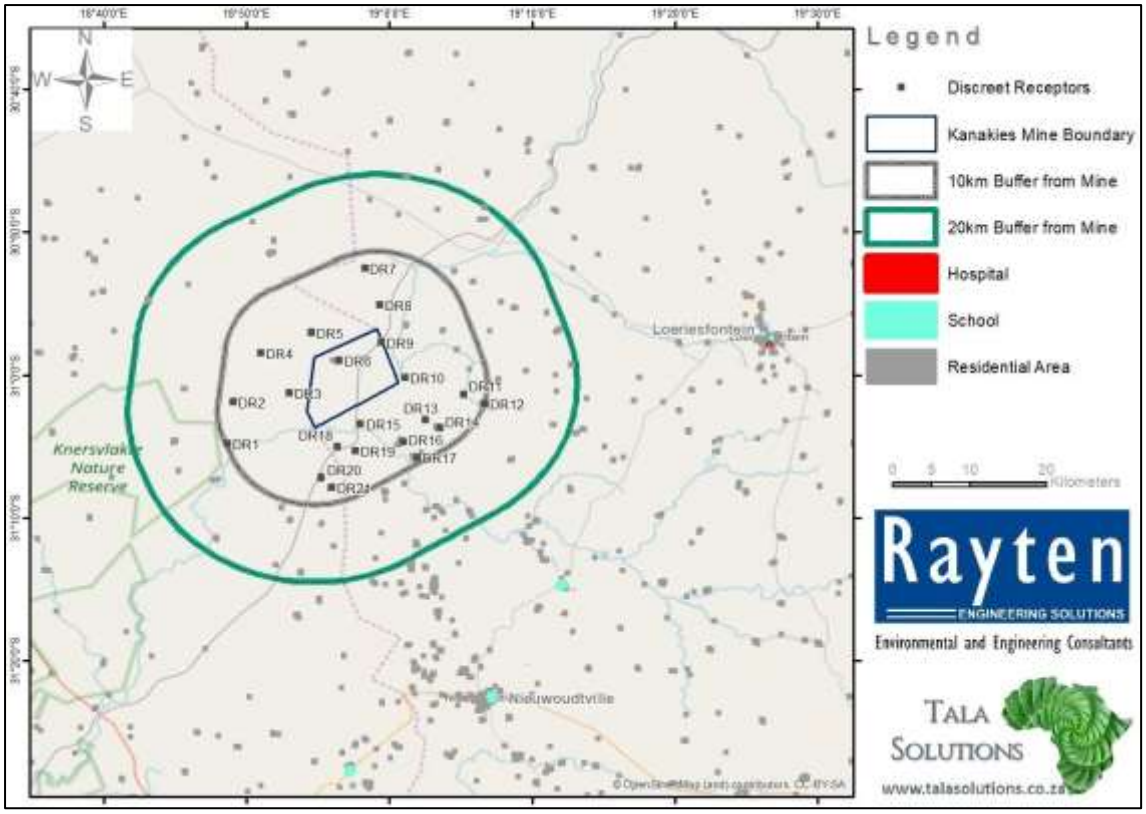
9.1.11 AIR QUALITY

The Air Quality assessment was completed by Rayten Engineering Solutions, 2017. The baseline findings are summarised herein; the full report is attached in

Appendix 10.

9.1.11.1 SENSTITIVE REEPTORS IDENTIFIED AROUND SITE

A sensitive receptor is defined as a person or place where involuntary exposure to air pollutants released by the site's activities could occur. Identified urban/residential receptors which are located within 10 km from the proposed mine are given in Plan 29. There are no schools, hospitals or old age homes located within 10 km of the site boundary.



Plan 29: Residential Receptors surrounding the MRA (Rayten, 2018)

9.1.11.2 <u>WIND</u>

The predominant wind direction is from the east (14.5 percent of the time) where as 10.5 percent of the time it is east-south-east and 9 percent south-west. Wind speeds from 2015- 2017 had speeds of less than 1m/s, moderate to fast with calm conditions. Morning winds were from east-south- east and evening winds were from south-west, west-south-west and south-south-west. During autumn and winter, the wind originated from the east and east-south-east. During summer wind originated from south-westerly, west-south-westerly and south-south-westerly. During spring winds originated from -westerly, south-south-westerly and easterly.

Using the data from 2015- 2017 it is likely that emissions will be transported westerly, west-north-westerly and north-easterly. Emissions that originate from the mine are likely to dilute and disperse due to the fast wind speed. Accelerated wind speed can also result in higher dust emissions from stockpiles.

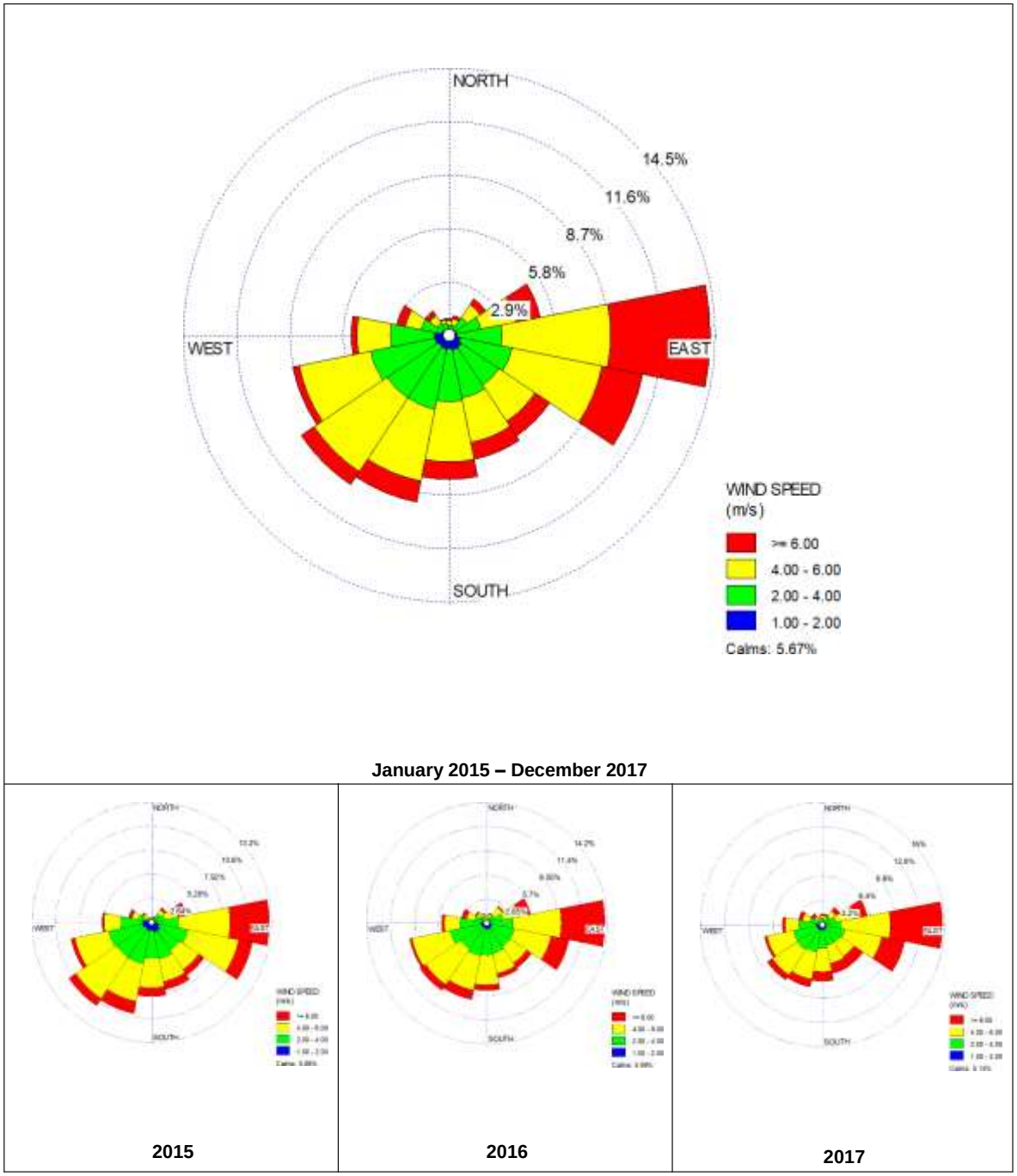


Figure 14: Period Wind Rose Plots for the project site for the period January 2015 - December 2017 (Rayten, 2018)

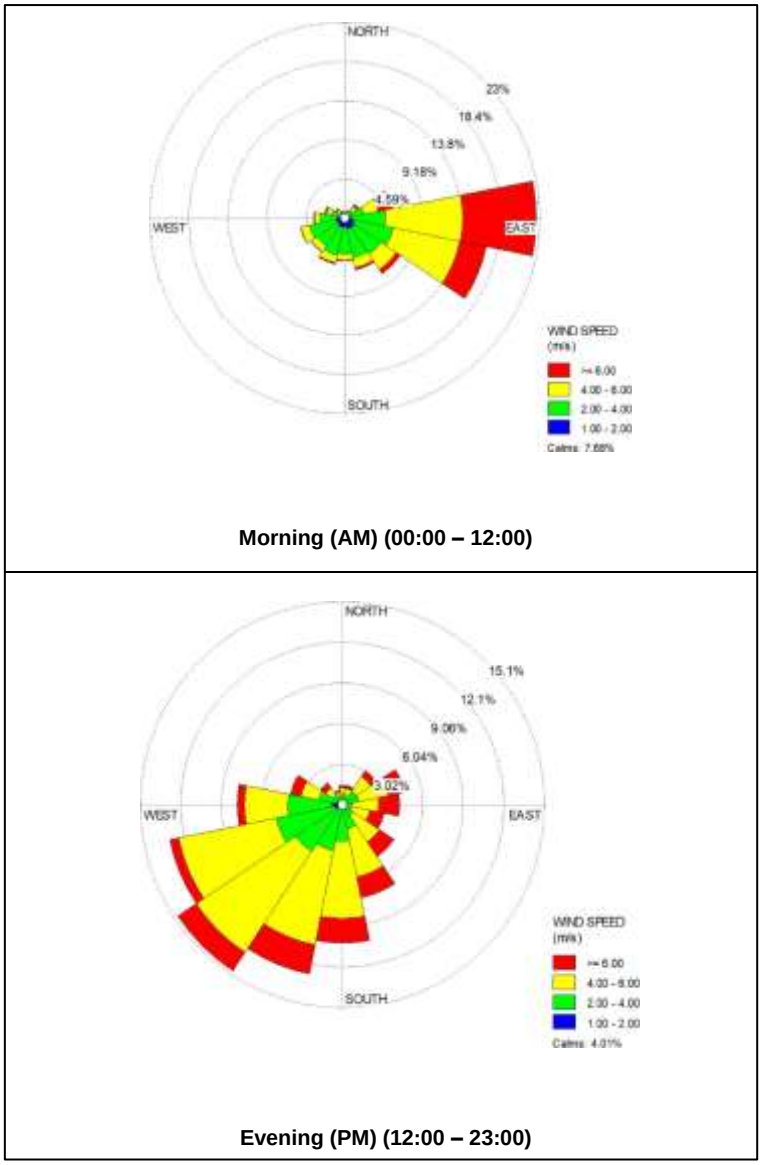


Figure 15: Morning (AM) (00:00 - 12:00) and Evening (PM) (12:00 - 23:00) Period Wind Rose Plots for the project site for the Period January 2015 - December 2017(Rayten, 2018)

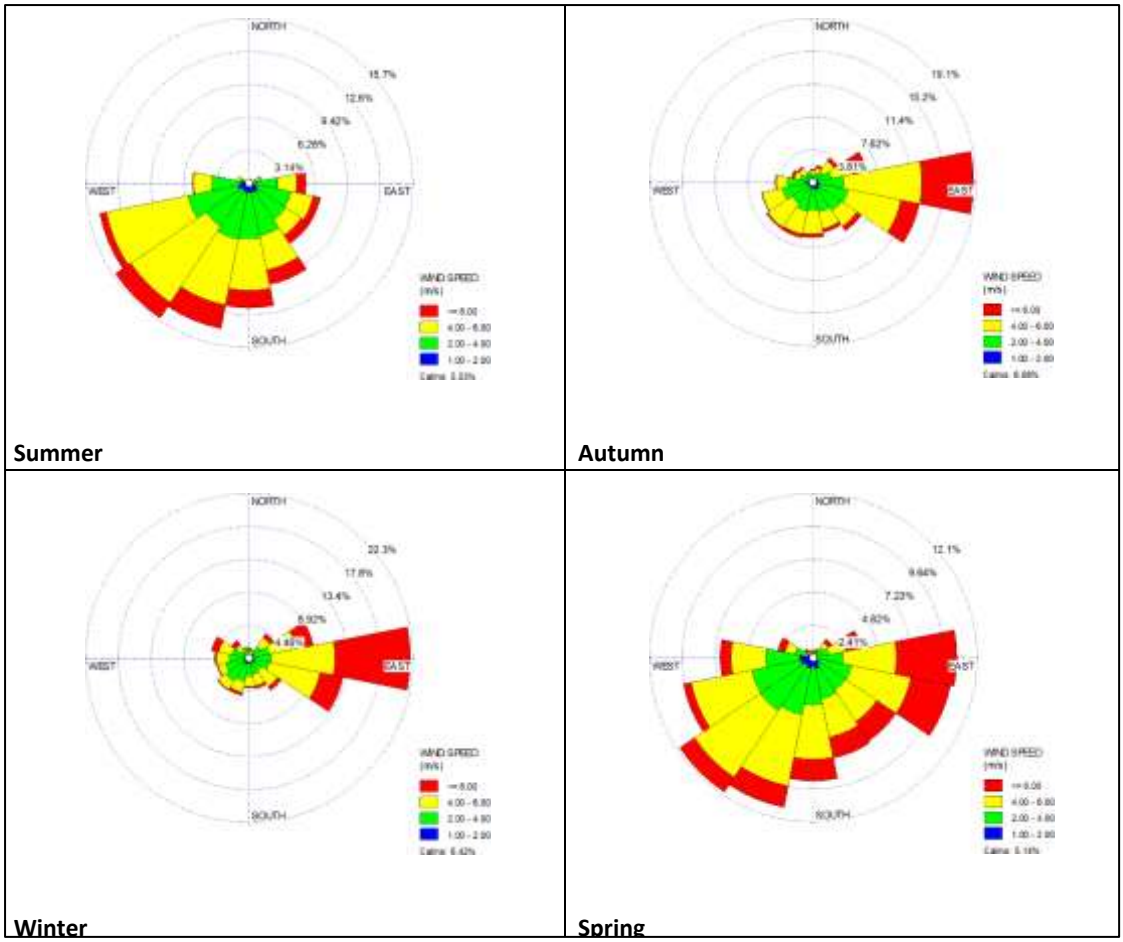


Figure 16: Seasonal Variation of Winds for the Project Site for the Period January 2015 - December 2017 (Rayten, 2018)

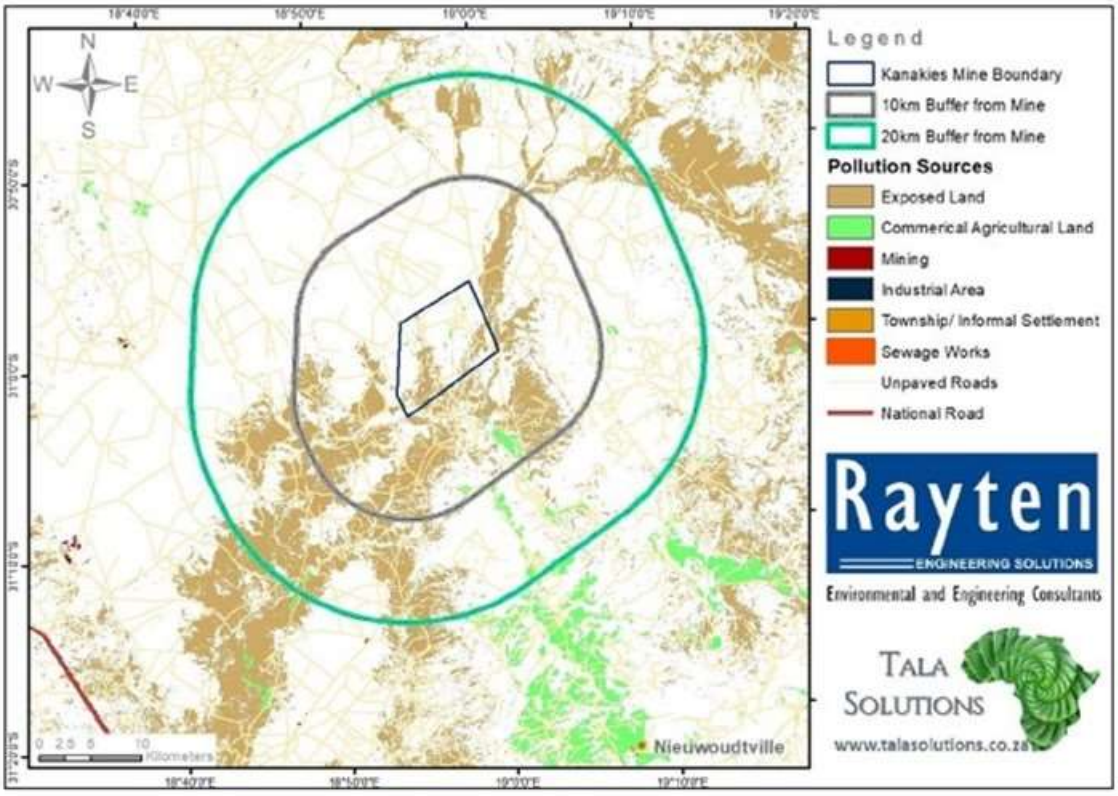
9.1.11.3 EXISTING POLLUTION SOURCES

Air quality will be affected by the following sources during operation, although dust is anticipated to be the biggest concern:

- Heavy construction activities;
- Materials handling operations (excavators, front-end loaders and truck loading/offloading operations);
- Material storage: Stockpiling;
- Crushing and screening;
- Wind erosion from exposed areas (i.e. trenches);
- Vehicle dust entrainment on unpaved roads.

The sources of pollution, currently, from surrounding areas are as follows, as seen in Plan 30 :

- Vehicle dust entrainment on unpaved roads;
- Wind erosion from exposed land (e.g. exposed cultivated fields, degraded land, etc.); and;
- Agricultural activities.



Plan 30: Surrounding emission sources (Rayten, 2018)

9.1.11.3.1 Vehicle Dust Entrainment on Unpaved Roads

Dust from vehicles driving on gravel roads is a source of fugitive dust. The force of the wheels grinding on the road surface causes the particles to lift and drop with the wheels. The road surface is exposed to strong air currents after the vehicle has passed.

9.1.11.3.2 Wind Erosion from Exposed Areas

On the site and surrounding the site are areas of bare soil and eroded natural land. As extracted from the Air Quality Impact Assessment (Rayten, 2018), "*The threshold wind speed is dependent on the erosion potential of the exposed surface, which is expressed in terms of the availability of erodible material per unit area (mass/area). Any factor which binds the erodible material or otherwise reduces the availability of erodible material on the surface thus decreases the erosion potential of the surface*".

9.1.11.3.3 Agricultural activity

Although limited, there are agricultural activities within 20 km of the project area. Emissions that are expected from agricultural activity are erosion, and chemicals from crop spraying. There will be odiferous emissions from manure, crop residue and fertilizer. Pollutants from agricultural practices would be seeds, pollen, plant tissue and pesticides.

9.1.11.4 DUST AND EMISSIONS

As mentioned above the current pollution sources are from:

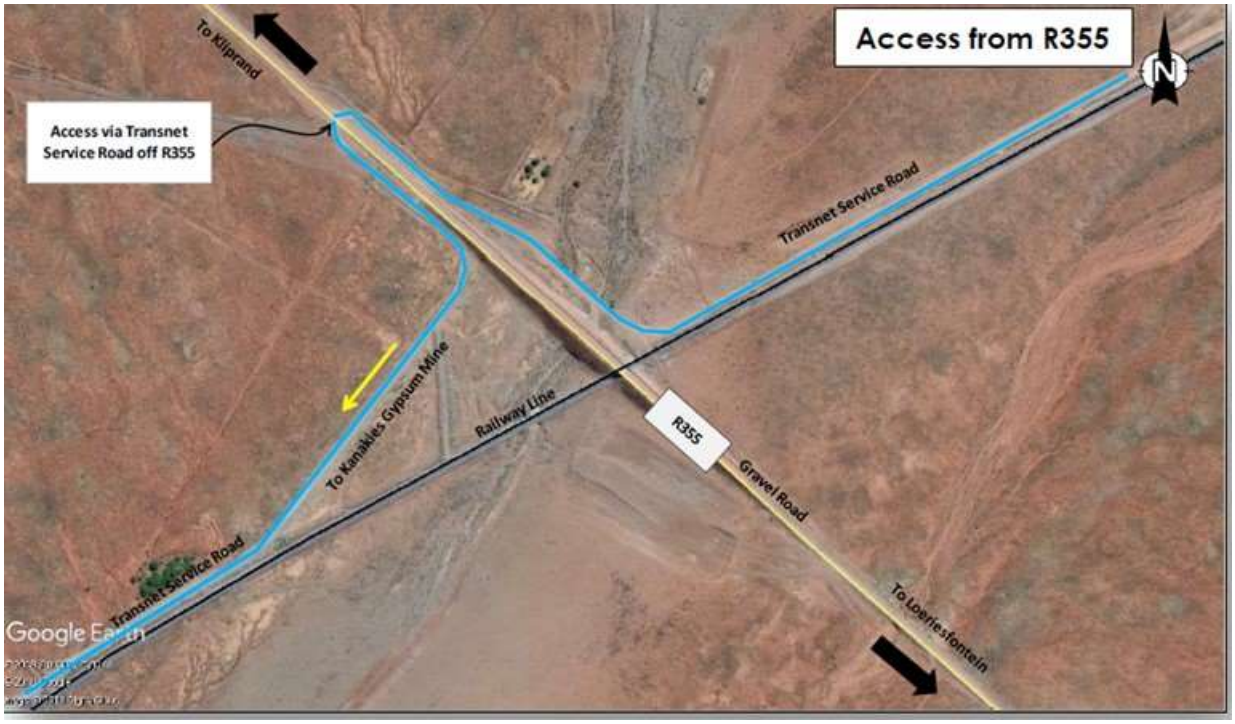
- Vehicle dust entrainment on unpaved roads;
- Wind erosion from exposed land (e.g. exposed cultivated fields, degraded land, etc.) and;
- Agricultural activity.

There is no data available for the site as no ambient air quality monitoring stations are located nearby. The closest is 40km which will not give an accurately representation of the ambient air quality. Therefore, there is no background data for SO_2, NO_2, CO, PM_{10} and $PM_{2.5}$

9.1.12 TRANSPORT

A Transport Impact Assessment study was completed by Sturgeon Consulting, 2018. The baseline findings are summarised herein; the full report is attached in Appendix 11.

The main roads that will be affected by the proposed project is the existing gravel Transnet service road and the R355. The Transnet service road runs parallel to the Sishen-Saldanha railway line. It is anticipated that this will be the only access to the project area, as seen below in Plan 31. The paved roads in the area such as the R357 are in a fair condition. The gravel roads are not in a good condition, especially when there has been rain.



Plan 31: Access to site (Sturgeon Consulting, 2018)

9.1.13 NOISE

Existing activities in the area, contributing to the current ambient noise levels include:

- Vehicle and traffic along the surrounding road networks;
- Meteorological conditions (wind, rain etc.); and
- Animal noise (birds, insects etc.).

The proposed project will add additional noise to the area with the increase in vehicle activity and mining associated disturbances (construction, reverse beeping etc.).

9.1.14 VISUAL SETTING

A visual impact assessment was completed for the proposed project (Scientific Terrestrial Services, July 2018e), attached as Appendix 12. The paragraphs below summarise the visual characteristics of the site, whilst Figure 17 depict a general view of the proposed mine and infrastructure areas.

Figure 17: General view of the proposed open cast and infrastructure areas, indicating the Transnet railway line, limited vegetative cover, bare ground, relatively flat topography of the area, with mountains in the greater region (Scientific Terrestrial Services, July 2018e)

9.1.14.1 CLIMATE

Due to the climate the appearance and the perception changes with the change in season. The summer months appear muted whilst in winter (flowering season) there are more vibrant colours in the area. As the Northern Cape has experienced drought for several years there is not much variation in the change of season. Due to the drought the haziness caused by a high dust concentration was high. The MRA is in a remote area and the only sensitive receptors are housing compounds, Transnet Railway Line, service road and gravel farm road. Overall since there are few anthropogenic transformations in the area the impact of the proposed mine will be large. As the area is remote and there are so few sensitive receptors the negative impact will not be experienced by many.

9.1.14.2 LANDSCAPE CHARACTER

The landscape is described as rural, relatively flat to slightly undulating, open canopy succulent shrubland where livestock grazing takes place. Due to the flat topography and low vegetation cover one can see a significant distance across the landscape.

9.1.14.3 VISUAL ABSORPTION CAPACITY

The visual absorption capacity has a score of 9, which is a medium score. As this area is unaffected by mining and there are limited anthropogenic structures there will be a high visual impact in comparison to the surroundings. As the soil was bare during the assessment the colour contrast between that and the surface trenching will be of a low degree. Due to the undulating terrain, the distance from the sensitive receptors, the height of the proposed infrastructure and the existing Transnet housing compound, that is 1.4km from the proposed infrastructure area, will lower the intrusion for sensitive receptors. Overall the visual intrusion will be low as all sensitive receptors are further than 5km away except the farmstead located within the MRA.

9.1.14.4 LAND USE AND VISUAL RECEPTORS

Livestock farming is considered the primary land use in this area. The other land uses in the project area are Transnet Railway Line that gets utilised, housing compound for Transnet workers, farm steads and the Kalk Gat Private Nature Reserve. Permanent residents are considered highly sensitive receptors and people that work in this area are considered moderately sensitive receptors. People that view the mine by driving on a service road, gravel farm road or the closest regional road (R355), which is 15km north of the MRA, are considered low sensitivity receptors as they only momentarily view the receiving environment, although the mine will not be seen from the R355.

9.1.14.5 LANDSCAPE QUALITY

The landscape quality received a score of 12 which is medium. The vegetation at the time of the assessment was homogenous due to the drought in the region. In the greater area, Namaqualand, there is a high floral diversity which increases the landscape quality of the area. The anthropogenic structures in the area and the proposed mine will lower the landscape quality of the area.

9.1.14.6 LANDSCAPE VALUE

The landscape will be most valued by farmers, farm workers, tourists coming to the region to see the wildflowers, people visiting Kalk Gat Nature Reserve and Transnet workers living in the housing compounds. The area will be valued by motorists travelling on gravel roads as well as on the R355, but as mentioned above the mine will not be visible from the R355. The MRA is not an area earmarked for where tourists

go to view wild flowers but for the local residents of Loeriesfontein wanting to view the wild flowers there will be a lower landscape value due to the loss on vegetation.

9.1.14.7 SENSE OF PLACE

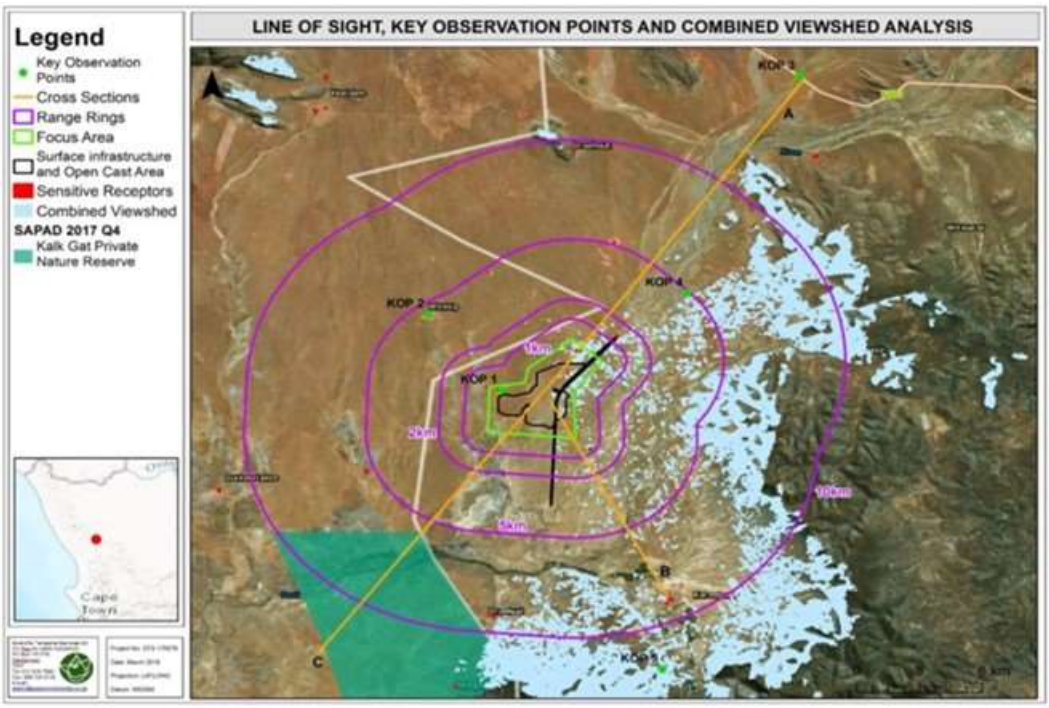
The project area and surrounds can be described as calm, tranquil, peaceful, limited development and strong association to the natural environment. The sense of place is related to the landscape character of which the landscape character is rural, flat to slightly undulating terrain with isolated farmsteads.

9.1.14.8 NIGHT TIME LIGHTING

The project area in its natural state contains a rail siding and rail lines, sub-station, power transmission lines, telephone lines, Transnet housing, cellular tower, farmsteads, borehole, farm access/service roads. Lighting is limited from the Transnet workers housing and farmsteads. The area is considered intrinsically dark (Zone E10 Natural). The impact of the proposed project is expected to be significant; this will contribute to sky glow and artificial lighting in the region. Vehicle mounted lighting will only be local and sub-regional (10 km from the project area) due to distance and the undulating topography. It is expected that operating hours will run from 7am until 7pm, as stipulated by Witkop Fluorspar Mine, this will occur after the first few years of operation. During the initial phases the operating hours will be between 7am and 4pm. The operating hours are daytime hours therefore the proposed project is not expected to have an impact on this intrinsically dark area.

9.1.14.9 VISUAL EXPOSURE AND VISIBILITY AND KEY OBSERVATION POINTS(KOPS)

The proposed infrastructure and the surface trenching will be highly to moderately visible to receptors within a 2km radius. From a viewshed analysis the project area will not be visible to sensitive receptors situated south to northwest of the area and 10km of the area. Only in limited areas will the project area be seen from northeast to south. Viewshed analysis also indicates that there is no clear line of sight from the Kalk Gat Private Nature Reserve to the project area. Based on field work the only receptor that will be able to moderately see the proposed infrastructure is within 1km of the project area. The majority of the sensitive receptors are 3km away, the surface trenching and infrastructure will be moderately to barely visible. Plan 32 depicts line of sight, key observation points and combined viewshed analysis.



Plan 32: Sensitive receptors, key observation points and viewshed (Scientific Terrestrial Services, July 2018e)

9.1.15 SOCIO-ECONOMIC CONDITIONS

The information below is largely extracted from http://www.hantam.gov.za/ and http://www.statssa.gov.za/?page_id=993&id=hantam-municipality.

The proposed mining right area falls within the Hantam Local Municipality of the Namaqwa District Municipality. The Hantam Municipality covers approximately 36,128km² and includes Calvinia (the centre) as well as Brandvlei, Loeriesfontein, Middelpos and Nieuwoudtville. Farming is the main contributor to the economy, namely sheep, wool, lucerne as well as rooibos tea.

According to Census 2011, Hantam Municipality has a total population of 21 578, with a growth rate of 0.59% (2001-2011). Approximately 82.2% of the population are coloured, 12.1% are white, 4.4% are black African, and 0.7% consists of Indian/Asian. The remainder of the population (0.6%) is made up by other groups. The predominant spoken language is Afrikaans, followed by English and isiXhosa.

Of those aged 20 years and older, 18.8% completed Grade 12, 19.7% have some primary education, 8, 4% completed primary education, 30, 6% completed some secondary education, 8, 1% have some higher education and only 14, 4% had no schooling. The unemployment rate for the Municipality is 11, 8%.

There are 6 340 households in the municipality, with an average household size of 3.2 persons per household. Of the households, 59.8% have access to piped (tap) water

inside the dwelling/institution, 35.9% have access to piped (tap) water inside the yard and 76.9% have access to electricity for lighting.

Additional socio-economic data is summarised below from MTS, 2018, and was obtained from Community Survey 2016 from Statistics South Africa for Northern Cape, Namakwa District Municipality and Hantam Local Municipality.

Table 29: Socio-economic status

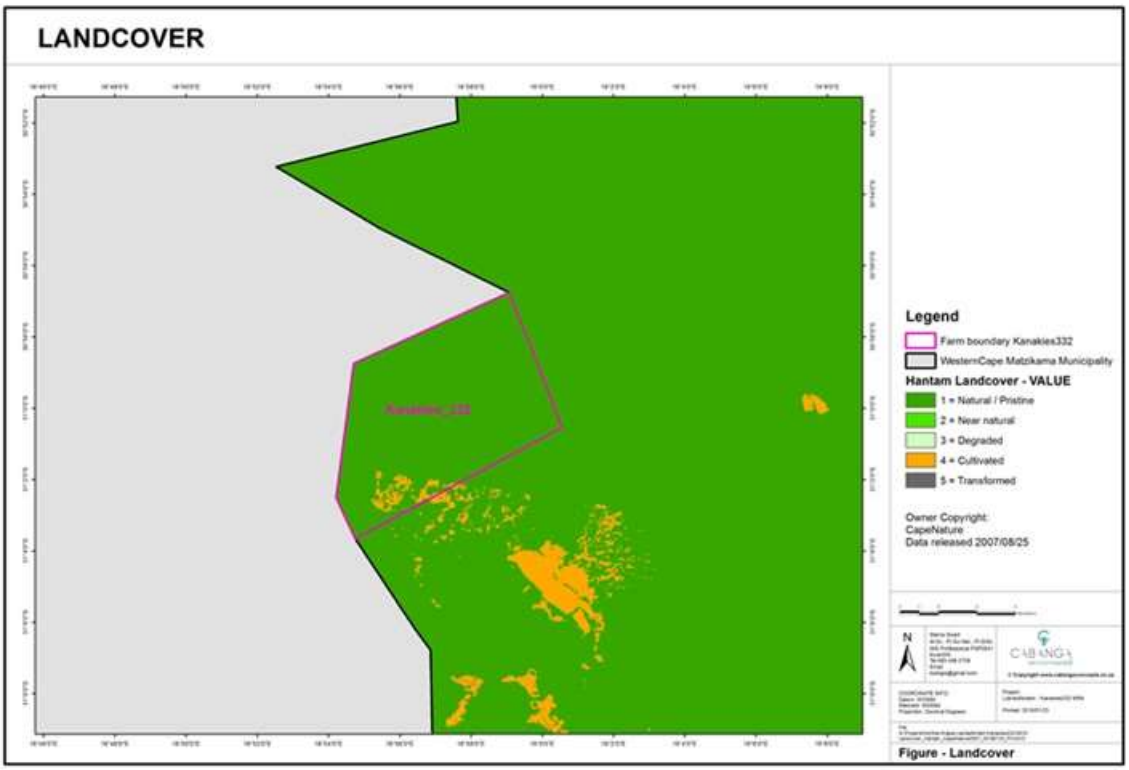
Dwelling Type	Northern Cape Province	Namakwa District Municipality	Hantam Local Municipality
Formal dwelling/house or brick/concrete block structure	77.12%	88.95%	81.25%
Traditional dwelling/hut/structure made of traditional matter	2.13%	1.31%	0.00%
Flat or apartment in a block of flats	0.65%	0.37%	0.00%
Cluster house in complex	0.10%	0.04%	0.00%
Townhouse (semi-detached house in a complex)	0.31%	0.08%	0.00%
Semi-detached house	1.79%	3.50%	13.21%
Formal dwelling/house/flat/room in backyard	4.88%	2.73%	1.04%
Informal dwelling/shack in backyard	3.77%	1.44%	2.84%
Informal dwelling/shack not in backyard	7.72%	0.34%	0.60%
Room/flatlet on a property or larger dwelling/servant's quarters	0.24%	0.07%	0.00%
Caravan/tent	0.07%	0.04%	0.13%
Other	1.20%	1.13%	0.93%
Unspecified	0.01%	0.02%	0.00%
Toilet Facilities	**Northern Cape Province**	**Namakwa District Municipality**	**Hantam Local Municipality**
Flush toilet connected to a public sewerage system	65.74%	71.08%	83.63%
Flush toilet connected to a septic tank or conservancy tank	5.44%	10.36%	7.45%
Chemical toilet	0.25%	0.21%	0.86%

Pit latrine/toilet with ventilation pipe	9.54%	7.63%	3.24%
Pit latrine/toilet without ventilation pipe	9.35%	4.79%	1.06%
Ecological toilet (e.g. urine diversion; enviroloo etc.)	0.31%	0.82%	0.00%
Bucket toilet (collected by municipality)	3.11%	0.92%	0.10%
Bucket toilet (emptied by household)	1.26%	1.69%	0.93%
Other	0.97%	0.67%	1.52%
None	4.02%	1.83%	1.20%

9.2 DESCRIPTION OF THE CURRENT LAND USES

The MRA is currently zoned for agricultural purposes, and land use activities are mainly grazing and wildlife/wilderness.

As seen below in Plan 33 the project largely consists of natural/pristine landcover and a small portion is cultivated.



Plan 33: Land cover types

9.3 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND

INFRASTRUCTURE ON THE SITE

The sensitive environmental features associated with the project area are as follows:

- A portion of the MRA has been declared CBA2 (terrestrial) and ESA (terrestrial). The project does not overlap any aquatic CBA or ESA.
- The south-western corner of the project area is considered Highest Biodiversity Importance according to the National Mining and Biodiversity Guideline.
- Fauna: SCC listed mammals encountered during the assessment are as follows; *Ardeotis kori* (Kori bustard), *Orycteropus afer* (Aardvark), *Otocyon megalotis* (Bat-eared fox) and *Brinckiella arboricola* (Tree Winter Katydid). It is anticipated that the following SCC will occur on site; *Felis nigripes* (Black-footed cat); *Homopus signatus* (Speckled tortoise); *Brinckiella mauerbergerorum* (Mauerberger's Winter Katydid) and *Brinckiella aptera* (Mute Winter Katydid).
- Flora: Intact Knersvlakte Vygieveld, Overgrazed Knersvlakte Vygieveld and Transformed areas occur on Kanakies farm (Scientific Terrestrial Services, July 2018c). There were several floral SCC noted during the summer and winter survey, these are protected under the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009). These include:
    - *Hoodia gordonii;*
    - *Mesembryanthum spp.;*
    - *Drosanthemum spp.;*
    - *Brownanthus spp.;*
    - *Lessertia frutescens;*
    - *Oxalis ambigua;*
    - *Oxalis luteola;*
    - *Lampranthus maximiliani;*
    - *Ornithogalum secundum;*
    - *Lapeirousia spinosa;*
    - *Tetragonia microptera*
    - *Malephora purpureo-corcea;*
    - *Ruschia robusta;*
    - *Gethyllis villosa;*
    - *Delosperma hisidium;*
    - *Bulbine torta;*
    - *Trachyandra falcata; and*
    - *Moraea collina.*
- Doring River and its associated floodplain traversing the south western corner of the MRA;
- Krom River traversing the eastern corner of the MRA;
- Unchannelled Valley Bottom (UVB), located south of the MRA area;
- Anabranching areas of the unnamed tributary of the Doring River; and
- Ephemeral drainage lines.

Existing infrastructure in the area include:

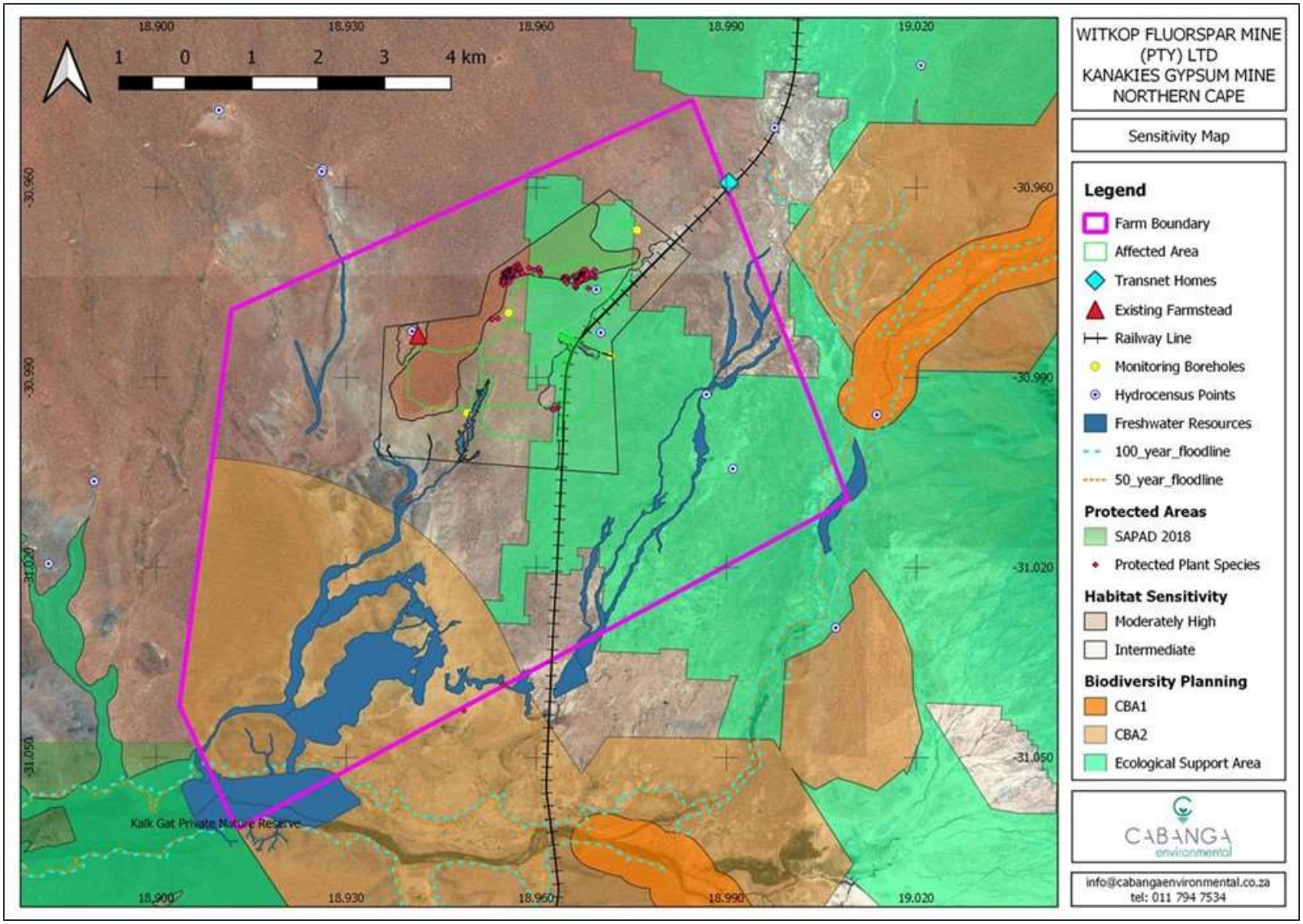
- Transnet Freight railway line;
- Transnet worker homes;
- Rail siding;
- Powerlines;
- Substation;
- Cellular tower; and
- Farmsteads and associated infrastructure.

9.4 SPECIFIC FEATURES IN RELATION TO BLASTING

No blasting will be undertaken for this operation.

9.5 ENVIRONMENTAL SENSITIVITY AND CURRENT LAND USE MAP

Plan 34 below depicts the environmentally sensitive areas, in relation to, the proposed project infrastructure.



Plan 34: Overall environmental sensitivity map

10 IMPACT ASSESSMENT PROCESS AND FINDINGS

The impact identification process commenced by identifying all environmental aspects on site, whether sensitive or not. Potential impacts that may occur to the various environmental aspects as a result of the proposed mine activities were identified during the Scoping Phase. As the specialist studies were completed, additional impacts identified through the specialist investigations were added.

Through the PPP, any issues or potential impacts identified by the I&APs were included in the impact assessment process.

All these impacts were then assessed as per the methodology described below and their significance determined. Impact identification for the Kanakies project was thus a consolidated approach, based on Cabanga's professional experience, specialist expertise and I&AP (including organs of state involved in the PPP) input.

10.1 IMPACT ASSESSMENT AND RANKING METHODOLOGY

Impact assessment methods were developed to: (1) identify the potential impacts of a proposed development on the social and natural environment; (2) predict the probability of these impacts and (3) evaluate the significance of the potential impacts. The methodology used by Cabanga is as follows:

Table 30: Impact Assessment methodology (Cabanga)

The status of the impact					
Status				Description	
Positive:				a benefit to the holistic environment	
Negative:				a cost to the holistic environment	
Neutral:				no cost or benefit	
The Significance				= Consequence x Likelihood.	
Likelihood = Frequency + Probability					
Likelihood	1	Impossible	Probability	Unlikely: Impact Could occur in extreme events. Less than 15% chance of the impact ever occurring.	1
	2	Highly Unlikely		Possible: possibility of impact occurring is very low. 16% - 30% chance of the impact occurring.	2
	3	Unlikely		Probable There is a distinct possibility of the impact occurring. 31% to 60% chance.	3
	4	Improbable		Highly Probable: The impact is expected to occur. Between 61% and 85 % chance.	4
	5	Possible		Definite: There are sound scientific reasons to expect that the impact will occur	5

	6	Probable	Frequency	Annually: The Impact is not expected to occur more than once per year.	1
	7	Likely		Quarterly: The Impact is expected to occur at least once every three months	2
	8	Highly Probable		Monthly: The impact is expected to occur at least once per month for the duration of the activity.	3
	9	Almost Certain		Weekly: The impact is expected to occur once a week for the duration of the activity.	4
	10	Definite		Daily: the impact is expected to occur daily for the duration of the activity.	5
Consequence = duration + scale + Intensity					
Duration	1			Short term: Less than 1 year and is reversible.	
	2			Short to medium term: 2 - 3 years	
	3			Medium term - 3 to 10 years	
	4			Long term: 11-20 years	
	5			Permanent: in excess of 20 years	
Scale	1			Isolated: Limited footprint within the site will be affected (less than 50% of the site)	
	2			Site Specific: The Entire Site will be affected	
	3			Local: Will affect the site and surrounding areas	
	4			Regional: Will affect the entire region / catchment / province	
	5			National: Will affect the country, and possibly beyond the borders of the country	
Intensity = Magnitude of the Impact + Sensitivity of the Aspect					
Intensity	1	-	Magnitude	Slight: Little effect, negligible disturbance / benefit	1
	2	Not significant		Slight to Moderate: Effects are observable but natural process continue	2
	3	Slight		Moderate: ecosystem processes / social dynamics are permanently altered, but functioning.	3
	4	Slight - Moderate		Moderate - High: natural / social processes are altered to the point where function is limited	4
	5	Moderate		High: The aspect is affected so that its functioning is compromised and this effect is irreversible	5
	6	Moderate - High	Sensitivity	Not sensitive: The aspect is not sensitive to change (No irreplaceable loss of resource)	1
	7	High		Somewhat sensitive: The affected aspect is of not of significant value but is sensitive to change	2

	8	Very High		Sensitive: The affected aspect is of moderate value and is slightly resilient to change	3
	9	Extremely High		Very Sensitive: The affected aspect is of significant value and only slightly resilient to change	4
	10	Fatal Flaw		Irreplaceable: The affected aspect is valued and sensitive to change. Irreplaceable loss of significant resource	5

The rating is described as follows:

Score out of 100	Significance	Management Options
1 to 40	Low	Continue to Monitor
41 to 80	Moderate	Avoid / Manage / Monitor
81 to 120	High	Avoid / Manage & Improve
121 to 160	Very High	Stringent management required
161 to 200	Extreme	Consider alternative design

10.2 IMPACT IDENTIFICATION

Initial impact identification was undertaken during the scoping phase. Impacts identified during this phase were rated on a preliminary basis to determine the need for specialist input during the EIA Phase. The following sections describe the impacts that were identified by the EAP, specialists and I&APs.

10.2.1 GENERAL IMPACTS IDENTIFIED

The following general impacts were identified for the proposed project during the scoping phase, and assessed by the EAP (no specialist studies specifically pertaining to these impacts were undertaken, however, they have been considered and management measures to address each impact included in the EMPr):

- Hydrocarbon spills;
- Increase in environmental Noise;
- Positive and negative Social Impacts, including Security issues and Safety incidences on site; and
- Unscrupulous non-mineral waste management.

10.2.1.1 HYDROCARBON POLLUTION

There will be hydrocarbons present on site during construction and operation. Should they spill this could cause impacts on soil, groundwater resources and surface water.

Hydrocarbon spills they can be mitigated if cleaned up in a timely manner but can cause contamination with is costly to remedy.

Hydrocarbons need to be kept in appropriately bunded areas and spills need to be avoided. If spills occur the Emergency Response Plan must be followed.

10.2.1.2 NOISE

The following activities associated with the proposed mine will contribute to noise levels and mitigation measures must be put in place:

- Construction activities;
- Operation of vehicles and machinery; and
- Operational mining activities.

Mitigation measures includes limiting operations to daylight hours (to limit disturbance to receptors) and ensuring that vehicles and machinery are serviced regularly to reduce the noise generated by vehicles in disrepair. With mitigation, the impact significance is considered to be low.

10.2.1.1 SOCIO-ECONOMIC

The following impacts are expected:

Negative impacts:

The environmental impacts associated with the proposed mining project potentially affect people's right to a healthy environment. Examples from the mining industry in general include respiratory issues from mining and other health issues leading them to not live a life as productive as prior to mining operations. Implementation of measures to limit pollution arising from the proposed Kanakies Mine will mean that people's health and livelihoods are not negatively affected.

Impacts on agricultural and tourism sectors through affecting the land use and sense of place are a socio-economic concern. It is noted that existing activity on the site such as grazing may continue within the MRA on areas not directly affected by mining.

Safety of mine employees will be managed in accordance with the Mine Health and Safety and Occupational Health and Safety Acts.

Positive impacts:

The mine will contribute to the support of the national and regional IDP, by supporting SA economic development. Direct benefit of employment through the implementation of the S&LP, albeit it minimum permanent employees but contractors will be utilized is also regarded as a positive impact.

Multiplier effects and benefit to local business have not been quantified by specialist assessment, but are regarded as having a low positive impact. The project purpose is the supply of gypsum for industrial and agricultural markets and the project will contribute positively to the sector.

10.2.1.1 IMPACTS OF NON-MINERALISED WASTE

Waste that could be generated on site includes; office and domestic waste, workshop waste, and waste from ablution facilities.

Waste is to be separated and hazardous waste to be disposed of at a licensed hazardous waste service provider.

Waste from ablution facilities will be managed by the service provider.

10.2.2 DISCUSSION OF IMPACTS AND RISKS ASSESSED BY THE SPECIALISTS

10.2.2.1 SOILS, LAND USE AND CAPABILITY

The identified potential impacts are summarised from the Soils, Land Use and Land Capability report (Scientific Aquatic Services, July 2018b)

Poor planning prior to the construction phase can lead to unnecessary clearing and removal of vegetation, and unnecessary placement of infrastructure and mining activity outside of the project area. Potential inadequate design of infrastructure could lead to risks of contamination of soils due to seepages and runoff.

The current mine design avoids areas of high sensitivity as far as possible and therefore the impact is sufficiently mitigated by proper planning.

During the construction phase site clearing, the removal of vegetation, and associated disturbances to soils, will lead to loss of land capability in cleared areas, increased runoff, erosion and consequent sedimentation of down gradient receiving environment, if not mitigated. Site clearing and removal of vegetation cause nutrient leaching, and an increased chance of erosion, runoff and sedimentation. Stockpiling can also cause increased runoff and erosion.

Heavy machinery and placement of machinery on soil can lead to soil compaction. The impact of soil compaction is regarded as low during the construction and operational phases (if mitigated), and it can be completely eliminated during rehabilitation.

Constant activity on soils during the operational phase could lead to the detachment of soil particles, reduction in soil quality (leaching of nutrients), erosion, soil compaction and sedimentation.

Stockpile maintenance may alter the terrestrial vegetation thus altering the quality and nutrient status of the soil. Seepage and runoff from mining infrastructure (e.g. overburden) to high potential agricultural soils within the mine footprint can lead to soil contamination and reduced soil qualities.

Seepage and machinery/vehicle leaks can increase the concentration of contaminants in the soil.

The impacts to soil and land capability due to compaction and/or contamination and direct loss are regarded as low (if managed) for the duration of the operational phase, whereafter rehabilitation has the potential to mitigate these impacts.

Ineffective rehabilitation can increase detachment of soil particles, erosion and soil compaction causing increased surface run off.

Decommissioning activities could introduce alien invasives, change the nutrient status and chemical composition of the soil. Soils can be compacted and contaminated during demolition and backfilling.

Disturbance of soils as part of closure as well as backfilling, may lead to the formation of Witbank soils (Anthrosols) which reduce long term land capability.

Overall the impacts were rated as a low significance, if managed.

10.2.2.2 SURFACE WATER

The identified potential impacts to the surface water resources are summarised from the Surface Water Report by SD Hydrological Services, 2018.

During the construction phase, the following impacts were assessed:

- Sedimentation of downstream drainage/watercourses.
- Contamination caused by hydrocarbon fuel spillage.
- Reduction of catchment yield.
- Flooding causing damage to infrastructure and trenches if not outside the 1:100-year floodline or 100m buffer.

The operational activities can lead to pollution of downstream watercourses. During decommissioning and Closure, siltation of water resources may still be a risk.

It is anticipated that with proper management measures in place, the impact significance throughout all phases will be low.

10.2.2.3 GROUNDWATER

The identified potential impacts to groundwater are summarised from the groundwater study (Future Flow: GPMS, July 2018).

The groundwater level will not be breached by trenching, stockpiles, the mobile crushing and screening plant, mobile offices and haul road and the associated impacts on aquifers, wetlands and stream flow volumes will not occur.

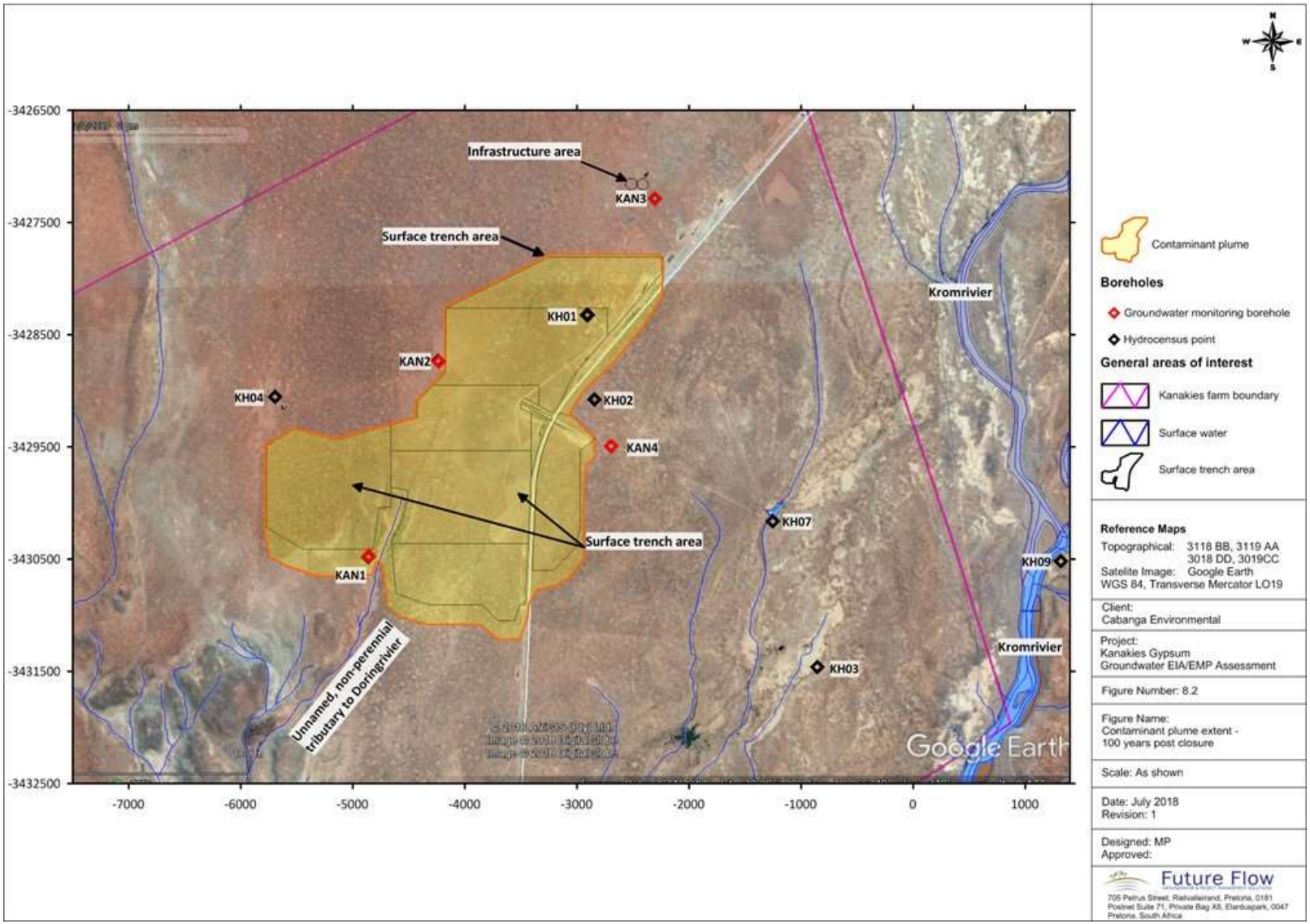
Acid mine drainage and salt concentrations (salt load concentration of 1.3kg/day) could affect groundwater qualities and could extend to surface water if there is sufficient rainfall.

There is a low possibility of localised seepage into the excavation, less than 50m³ a day. Impacts on surface water quality due to poor quality seepage from the pollution source areas are regarded as low.

The contamination plume, by calculations, shows the potential to migrate up to 250 m from the edge of the trench in a down gradient direction, as seen in Plan 35. No privately owned and used groundwater supply boreholes will be impacted by the plume migration.

There is a possibility that the contamination plume will impact on the non-perennial tributary to the Doringrivier. 550 metres of the stream falls within the zone of influence, equivalent to less than 1 percent of the stream network that comprises Doringrivier.

The implementation of management measures as per the EMPr reduces the potential impact significance to Low.



Plan 35: Contamination Plume (Future Flow: GPMS, July 2018)

10.2.2.4 FLORA

The identified potential impacts to flora are summarised from the Floral Ecological Assessment Report (Scientific Terrestrial Services, July 2018c) and include:

- Permanent loss of floral habitat.
- Permanent loss of and altered floral species diversity.
- Encroachment of Alien Invasive species which can lead to:
  - A decline in species diversity;
  - Local extinction of indigenous species;
  - Ecological imbalance;
  - Decreased productivity of grazing pastures; and
  - Increased agricultural input costs.
- Permanent loss of floral SCC and suitable habitat

Table 31: Floral Habitat Sensitivity (Scientific Terrestrial Services, July 2018c)

Habitat Unit	Sensitivity	Conservation Objective	Impact caused by mine
Intact Knersvlakte Vygieveld	Intermediate 3> and <4	Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.	The mine will not have a significant impact on the environment but the relocation of SCC will have to take place prior to construction.
Overgrazed Knersvlakte Vygieveld	Moderately Low 2> and <3	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.	Surface infrastructure of the mine has already been planned to be placed in an area that has undergone disturbance. No mining activities will take place in the ephemeral drainage line.
Transformed Areas	Low 1> and <2	Optimise development potential.	No significant impacts to be experienced by the mine as this area has already been transformed.
Ephemeral Drainage Line	Moderately Low 2> and <3	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.	No mining activities will take place in the ephemeral drainage line.

Even after the implementation of mitigation measures, impacts on Flora SCC during the operational phase are regarded as moderate, due to the removal of vegetation on site to accommodate mining activities. Appropriate rehabilitation, concurrent with mining has the potential to eliminate this impact during the decommissioning, closure and rehabilitation phases, though the difficulty of establishing vegetation in this climate is acknowledged.

10.2.2.5 FAUNA

The identified potential impacts to fauna are summarised from the Faunal Ecological Assessment Report (Scientific Terrestrial Services, July 2018c) and include:

The loss of biodiversity and habitat from construction activities, and incorrect management of waste.

Construction activities could lead to alien invasives entering the project area and impacting on the local floral and faunal species. If alien invasives are not removed regularly they could affect local floral communities and lead to loss of faunal species diversity.

If there has been ineffective rehabilitation, dust from exposed areas will impact on the vegetation thus impacting the faunal diversity.

The mining infrastructure and the dumping of construction and operational waste materials in the surrounding habitat could push local faunal species out into the greater MRA and beyond, causing competition for resources and decrease in abundance of species.

Earthworks may lead to increased runoff and erosion resulting in a further loss of faunal habitat.

Mining activities may result in the loss of faunal SCC within the impacted areas. Increased faunal mortality rates could arise due to higher human/animal conflicts. There may also be an increased risk of faunal and mine vehicle collisions as a result of the increased number of vehicles moving within the MRA.

As there will be an increase in people in the area the chance of poaching increases, resulting in decrease of faunal species.

Several small species are slow moving and will not be able to self-relocate once cleaning activities commence. These species seek refuge in dense vegetation and scrub bushes thus clearance activities will increase mortality rates.

After the implementation of mitigation measures there are still moderate to high impacts, this could be due to the slow-moving species and species that lay their eggs in plants that will be cleared. The sensitivity of fauna in the MRA and surrounding areas

add to the impact significance. The sensitivity of faunal classes found in the area is summarised in Table 32.

Table 32: Fauna Sensitivity (Scientific Terrestrial Services, July 2018c)

Faunal Class	Faunal Habitat Sensitivity
Mammals	Moderately High
Avifauna	Intermediate
Amphibians	Moderately Low
Reptiles	Moderately High
Insects	Intermediate
Arachnids	Intermediate

10.2.2.6 FRESHWATER ECOLOGICAL RESOURCES

The overall impacts to the freshwater ecology are potential loss of wetland habitat and ecological structure, changes to wetland ecological and sociocultural provision and wetland hydrological function and sediment balance. Freshwater ecological resources have been excluded from the directly impacted footprint of the proposed mining and associated activities, however edge effects and lack of proper demarcation could result in the impacts manifesting.

During the Pre-construction phase, mitigation of potential impacts includes mine design that implements appropriate buffers between activities and the ephemeral drainage line to reduce the potential impact on the freshwater features.

During Construction, Site clearing, the removal of vegetation, earthworks and associated disturbances to soils, could lead to increased runoff and erosion and consequent sedimentation of freshwater resources downgradient.

Potential movement of mine works within the ephemeral drainage lines could lead to soil particles being destabilized thus when rainfall occurs sediment will be transported in the drainage line.

Potential dumping of hazardous and non-hazardous waste, including waste material spills and refuse deposits into the soil and ephemeral drainage lines during construction, can lead to pollution.

Increased runoff volumes due to paved and other impervious surfaces will lead to altered hydrology of the drainages in the construction and operational phases.

During the Operational Phase, on-going disturbances to soils from mining, operational activities and maintenance, will result in increased sedimentation and risk of erosion and loosening of soil particles that could end up in the drainage lines.

Migration of contaminants in soil from hazardous chemical spillages in the unsaturated zone may cause pollution of freshwater resources if not managed.

Seepage from mining facilities has the potential to contaminate the groundwater environment which in turn could lead to contamination of surface water.

Decommissioning and Closure, including demolition activities and backfilling can lead to erosion and increase in sedimentation of the freshwater resources.

Ineffective rehabilitation may lead to further habitat transformation and increased encroachment of alien invasive species.

Appropriate management and mitigation reduce the impact significance to Low.

10.2.2.7 HERITAGE SITES AND PALAEONTOLOGICAL RESOURCES

No impacts are expected as there are no sites of heritage importance on site.

No impacts to the paleontological record of the area are expected.

A chance find procedure is recommended, to ensure no unintended impacts on resources that have not yet been discovered.

10.2.2.8 AIR QUALITY

Potential impacts on Air quality resulting from the proposed project were identified and assessed in the Air Quality Impact Assessment completed by Rayten Engineering, 2018.

The impacts include increased dust fallout levels, PM10 levels and PM2.5 levels as a result of the following activities:

- Heavy Construction Activities;
- Land clearing;
- Loading and offloading operations;
- Material handling operations;
- Conveying material;
- Transportation of material off site;
- Material storage: Stockpiling;
- Crushing and Screening;
- Wind erosion from exposed areas; and
- Vehicle-entrainment on unpaved roads due to hauling.

Increase in CO, NOx and SO2 from vehicle emissions are also expected.

Based on the modelling data, PM10 and PM2.5 dust fall out rates are expected to be low complying with the applicable standards. It is however anticipated that higher dust and particulates will occur near the surface trenching and construction.

Predicted emissions from truck exhausts for CO and SO_2 are low and fall below the applicable standards. The predicted emissions of NOx have exceedances near haul

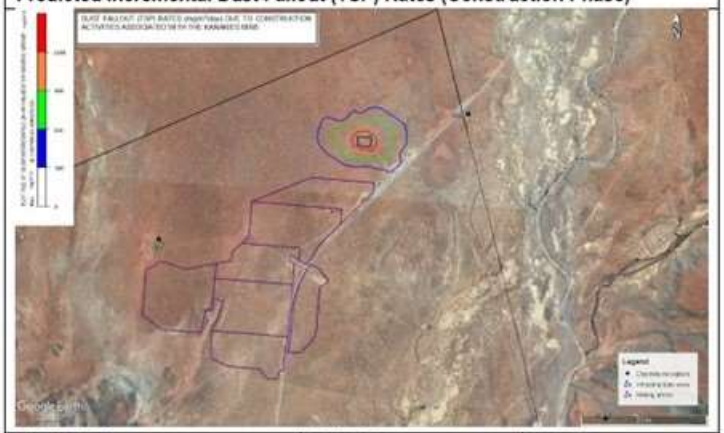
roads but in the MRA they are within the applicable standards. Predicted concentrations of CO and SO_2 associated with truck exhaust emissions are low, falling well below the applicable standards.

The emission rates used in the modelling are included in the Specialist Report (Appendix 10).

Seen below are predicted averages for TSP, PM10, PM2.5, CO, NOx and SO2 for both construction and operational phases.

The specialist study concluded that 24hour dust fallout and PM10, Daily PM2.5 and Annual PM10, as well as annual and hourly NOx may have a moderate significance, even with the implementation of mitigation measures. The specialist study did not consider mitigation apart from using water sprays on unpaved roads. With the implementation of a detailed dust management plan for the site, the impact significance is reduced to Low.

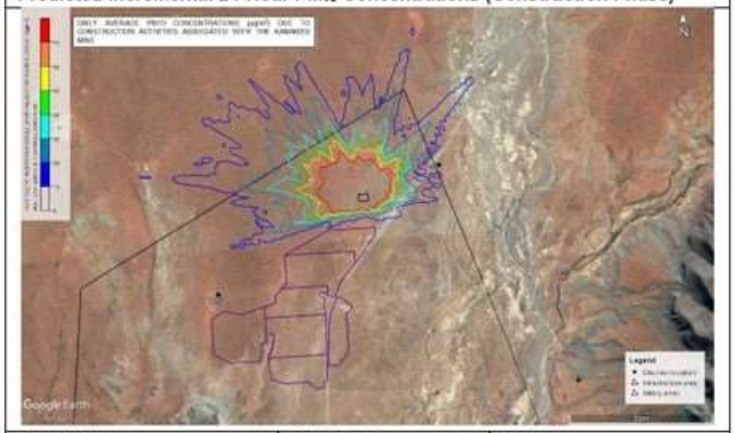
Predicted Incremental Dust Fallout (TSP) Rates (Construction Phase)



COMMENTS:	GRID SIZE:	MODEL:
Red band - exceedances of the non-residential area standard of 1200 mg/m²/day. Orange band - exceedances of the residential area standard of 600 mg/m²/day.	15 x 15 km	AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Deposition Rates
	NUMBER OF SOURCES: X 4 area	ASSUMPTIONS:
	DUST FALLOUT STANDARD: 1200 mg/m²/day (non-residential areas) 600 mg/m²/day (residential areas) DATE: 21/06/2018	

Plan 36: Construction TSP Rates (Rayten, 2018)

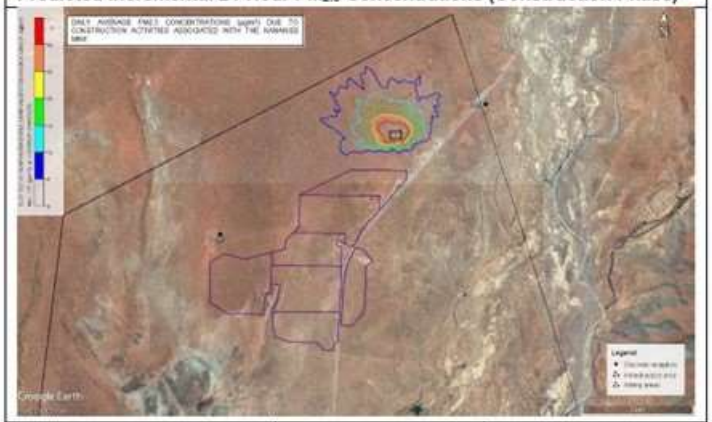
Predicted Incremental 24-Hour PM_{10} Concentrations (Construction Phase)



COMMENTS:	GRID SIZE:	MODEL:
Red band - exceedances SA 24-H PM_{10} standard of 75 µg/m³.	15 x 15 km	AERMOD View
	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 4 area	ASSUMPTIONS:
	AMBIENT STANDARD: 75 µg/m³ (SA 24-Hour standard) DATE: 21/06/2018	

Plan 37: Construction Daily PM10 (Rayten, 2018)

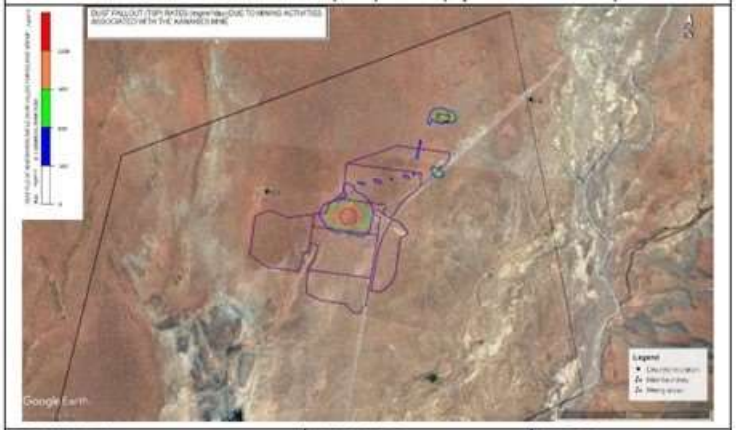
Predicted Incremental 24-Hour $PM_{2.5}$ Concentrations (Construction Phase)



COMMENTS: Red band - exceedances of the SA-24H $PM_{2.5}$ standard of 40 µg/m³.	**GRID SIZE:** 15 x 15 km	**MODEL:** AERMOD View
	GRID: Multi-tier – 3 tiers	**OUTPUT TYPE:** 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 4 area	**ASSUMPTIONS:**
	AMBIENT STANDARD: 40 µg/m³ (SA 24-Hour standard) (current) 25 µg/m³ (SA 24-Hour standard) (By 1 Jan 2030) **DATE:** 21/06/2018	

Plan 38: Construction Daily PM 2.5 (Rayten, 2018)

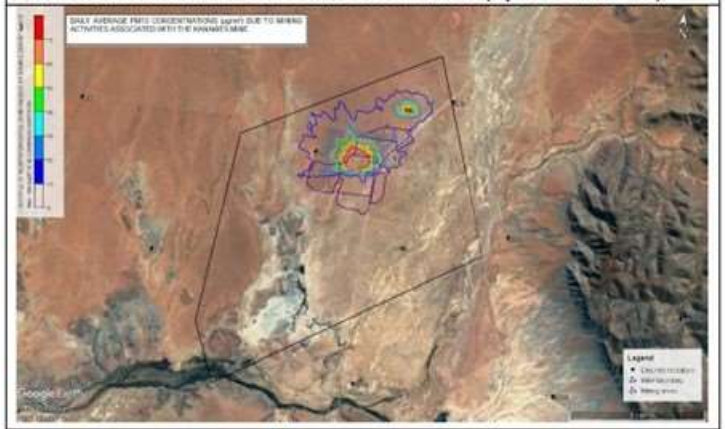
Predicted Incremental Dust Fallout (TSP) Rates (Operational Phase)



COMMENTS: Red band - exceedances of the non-residential area standard of 1200 mg/m²/day. Orange band - exceedances of the residential area standard of 600 mg/m²/day.	**GRID SIZE:** 15 x 15 km	**MODEL:** AERMOD View
	GRID: Multi-tier – 3 tiers	**OUTPUT TYPE:** 99th Percentile Deposition Rates
	NUMBER OF SOURCES: X 12 area X 1 line	**ASSUMPTIONS:** 50% control efficiency on unpaved road
	DUST FALLOUT STANDARD: 1200 mg/m²/day (non-residential areas) 600 mg/m²/day (residential areas) **DATE:** 21/06/2018	

Plan 39: Operational TSP Rates (Rayten, 2018)

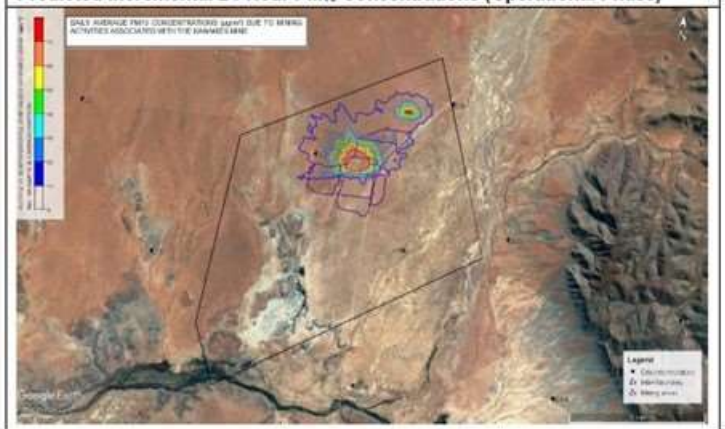
Predicted Incremental 24-Hour PM_{10} Concentrations (Operational Phase)



COMMENTS:	GRID SIZE: 15 x 15 km	MODEL: AERMOD View
Red band - exceedances SA 24-H PM_{10} standard of 75 µg/m³.	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 12 area X 1 line	ASSUMPTIONS: 50% control efficiency on unpaved road
	AMBIENT STANDARD: 75 µg/m³ (SA 24-Hour standard) DATE: 21/06/2018	

Plan 40: Operational Daily PM10 (Rayten, 2018)

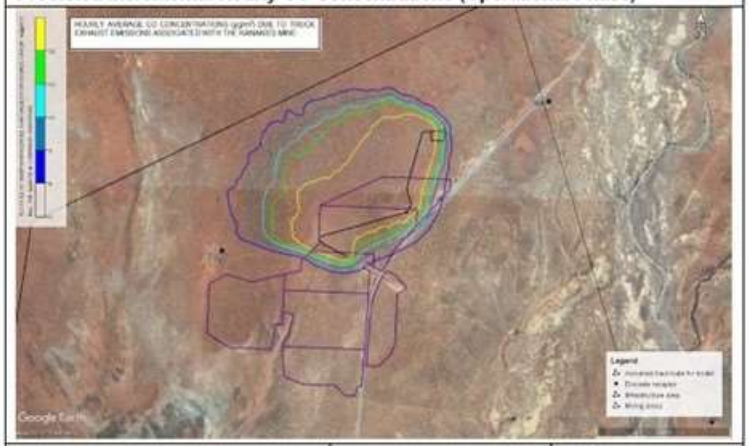
Predicted Incremental 24-Hour PM_{10} Concentrations (Operational Phase)



COMMENTS:	GRID SIZE: 15 x 15 km	MODEL: AERMOD View
Red band - exceedances SA 24-H PM_{10} standard of 75 µg/m³.	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 12 area X 1 line	ASSUMPTIONS: 50% control efficiency on unpaved road
	AMBIENT STANDARD: 75 µg/m³ (SA 24-Hour standard) DATE: 21/06/2018	

Plan 41: Operational Daily PM 2.5 (Rayten, 2018)

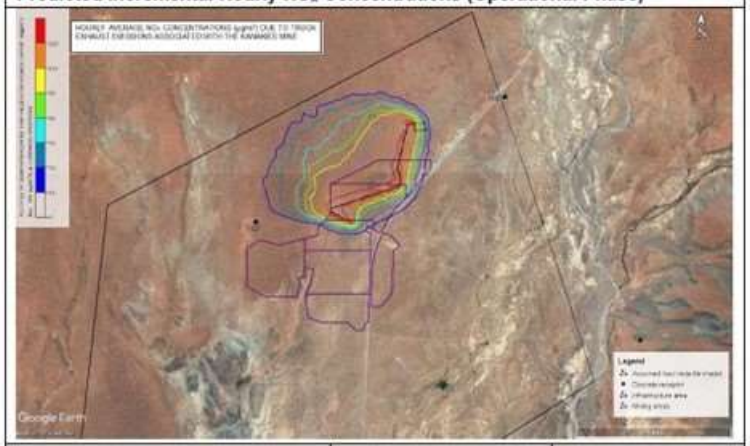
Predicted Incremental Hourly CO Concentrations (Operational Phase)



COMMENTS:	GRID SIZE: 15 x 15 km	MODEL: AERMOD View
No exceedances of the SA CO hourly standard of 30,000 µg/m³.	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 1 line	ASSUMPTIONS: Assumed truck haul route
	AMBIENT STANDARD: 30,000 µg/m³ (SA hourly standard) 10,000 µg/m³ (SA 8-hourly standard) DATE: 21/06/2018	

Plan 42: Operational Hourly CO (Rayten, 2018)

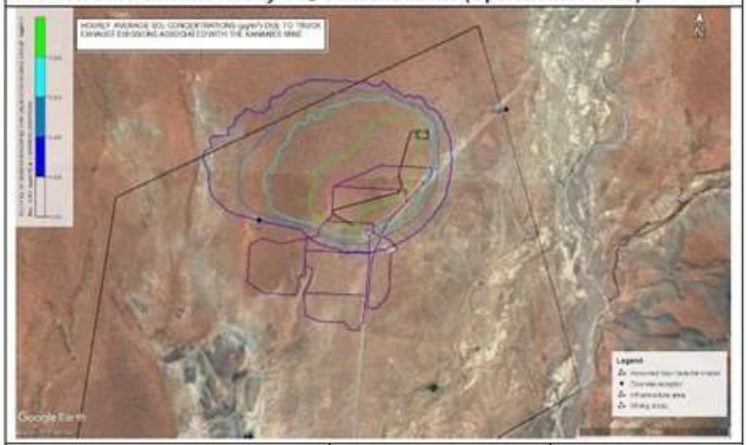
Predicted Incremental Hourly NO_x Concentrations (Operational Phase)



COMMENTS:	GRID SIZE: 15 x 15 km	MODEL: AERMOD View
Red band - exceedances of the SA NO_x hourly standard of 200 µg/m³.	GRID: Multi-tier – 3 tiers	OUTPUT TYPE: 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 1 line	ASSUMPTIONS: Assumed truck haul route
	AMBIENT STANDARD: 200 µg/m³ (SA hourly standard) 40 µg/m³ (SA annual standard) DATE: 21/06/2018	

Plan 43: Operational Hourly NOx (Rayten, 2018)

Predicted Incremental Hourly SO_2 Concentrations (Operational Phase)



COMMENTS: No exceedances of the SA SO_2 hourly standard of 350 µg/m³.	**GRID SIZE:** 15 x 15 km	**MODEL:** AERMOD View
	GRID: Multi-tier – 3 tiers	**OUTPUT TYPE:** 99th Percentile Ground Level Concentrations
	NUMBER OF SOURCES: X 1 line	**ASSUMPTIONS:** Assumed truck haul route
	AMBIENT STANDARD: 350 µg/m³ (SA hourly standard) 125 µg/m³ (SA daily standard) 50 µg/m³ (SA annual standard) **DATE:** 21/06/2018	

Plan 44: Operational Hourly SO2 (Rayten, 2018)

10.2.2.9 VISUAL

The following impacts are summarised from the Visual Impact Assessment (Scientific Terrestrial Services, July 2018e)

- Impact on landscape character and sense of place;
- Visual intrusion and visual absorption capacity (VAC) impacts;
- Visual exposure and visibility impacts; and
- Impacts due to night time lighting.

Sensitive visual receptors in the area were identified to include potential visitors to the Kalk Gat Nature Reserve, residents of the area and transient receptors using the roads and railway line passing through the area.

During the Pre-Construction phase, planning and placement of infrastructure further away from the visually sensitive receptors will reduce its visibility and visual intrusion.

Inefficient planning can lead to increased alien invasives and loss of floral diversity, affecting the visual aspects and the natural landscape being affected with placing of mining infrastructure in an area where limited disturbance has occurred.

The mine design has taken sensitive receptors into account.

During construction, site clearing, including the removal of topsoil and vegetation will result in altering the visual resource. Construction of general surface infrastructure including additional access roads, and transportation of materials and stockpiling will create visual intrusion. The creation of stockpiles higher than 3m will result in alteration to the topography of the area. Loss of vegetation, potential erosion and loss of topsoil may to higher visual contrast. Construction of mining infrastructure including offices, plant areas, creation of stockpiles and additional access roads will alter visual aspects.

During the Operational phase, on-going mining activities, including removal of gypsum, and potentially increasing the height of the stockpiles, potential increased introduction and proliferation of alien invasives leading to further change in landscape character and on-going vegetation clearing, scarring of the terrain and altering of landforms or contours are expected to create visual impacts. The presence and movement of vehicles and an increased level of human activity will alter the existing sense of place.

Upon Decommissioning, demolition and removal of infrastructure will lead to further dust generation, erosion and changes in the visual character of the project area.

Ineffective rehabilitation could lead to poor vegetation cover with bare areas remaining present, the surface trenches not being backfilled and surface infrastructure remaining. Such disturbance will be associated with the on-going proliferation of alien invasives.

Mitigation of visual impacts in the area is considered difficult due to the sparse vegetative cover, however the existing topography does limit the visibility of the project area to some degree, especially from the east. Only a very small portion of the Kalk Gat Nature Reserve falls within the viewshed.

Decommissioning, closure and rehabilitation negates the visual impacts in the long term.

10.2.2.10 TRAFFIC

The following impacts are summarised from the Transport Impact Assessment by Sturgeon Consulting, 2018.

- Increase in traffic from mini buses, private vehicles, and heavy vehicles.
- Degradation in road being utilized by the above-mentioned vehicles
- Increase in incidences on the road from more vehicles on the road.

The Construction workforce will not be permanent staff. It is envisaged that there will be 28 employees during the peak stage of construction, which equates to eight private transport trips per day, and eight public transport trips per day. With this low volume of traffic from construction it is not expected that the additional traffic will have a large impact on the surrounding road network.

Construction vehicles will leave their origins in the morning thus arriving after AM peak hour. The trucks will leave before the PM peak hour in order to be back in time. The effect of heavy construction vehicles during peak times is considered negligible on the surrounding road network.

During the construction phase there will not be regular movement of the vehicles, there will be a once off arrival of the equipment and this will be over a period of 6-12 months. In addition, a 34-ton truck will deliver infrastructure, this will occur over a six-month period, 2-3 loads per month and about 15 loads in total. Smaller construction vehicles will remain within the mine area.

It is anticipated that during the construction phase the heavy vehicles will have an impact on the pavement structure, especially the gravel roads. Currently the R355 gravel road is in a poor condition. Overall the roads and traffic from the mine activity will need to be monitored.

There will be 14 permanent employees during the operational phase of the mine. Management, skilled and semi-skilled labour will travel to work in private cars. Unskilled employees will rely on public transport or mine transport. Assuming Vehicle occupancy of 1.5 for private vehicles and 20 for buses these vehicles will add an additional 3 percent on the average daily traffic on the R355 which is currently 100 vehicles a day.

The minor increase in traffic is not anticipated to have a major impact on the road safety although there will be an increase in heavy vehicle traffic on the surrounding road network and the Transnet Servitude road. Heavy vehicles have been identified to be the major cause of accidents, incidents and fatalities on the roads.

The road network is able to accommodate the traffic generated during the construction and operational phases of the proposed Kanakies Gypsum Mine. The R355 and the R357 are able to accommodate 32 000 vehicles a day (3, 200 vehicles per hour) and the proposed project will add an additional 6 vehicles per hour during the construction phase and 3 vehicles per hour during the operational phase.

The mine will have to undertake regular maintenance of the service road and the R355 and contribute towards costs of the maintenance in agreement with Transnet and the Northern Cape Provincial Department of Transport.

It is anticipated that negotiations with Transnet will take 2-3 years before haulage of the product via rail will occur. During operation 134 truckloads of 34-ton trucks on the road will take place each month, 6-7 trips per day over 5 days (work week).

After mitigation measures have been applied such as safety measures and maintenance of roads the impact is anticipated as low. The minor increase in traffic during operation will cease once the end of life of mine has been reached.

10.2.3 I&AP IDENTIFIED IMPACTS

The following are potential impacts and concerns identified by I&APs:

Identified Impact	**Where has this impact been addressed?**
Wear and tear on roads	Traffic impact assessment has been undertaken and shows Low and moderate impacts to the road conditions, and prescribes mitigation (Appendix 11).
Potential Impacts on the Kalk Gat Nature Reserve	No contact details have been found to date. Attempts to obtain the details are in the relevant PPP section. Although the MRA borders the Kalk Gat Nature Reserve, the proposed mining area is in excess of 8 km from the Kalk Gat Nature Reserve. The various specialist studies have taken into consideration the proximity of the reserve.
The employment and procurement process	This will be guided by the mine's S&LP and preference will be given to local residents where possible.
Employment to be sourced locally	
Protected plants found in the area must be relocated within Loeriesfontein	Refer to Appendix 6 where this impact has been assessed.

Identified Impact	Where has this impact been addressed?
Potential impacts on CBAs and ESAs	No CBAs are directly affected by the proposed Project footprint. The ecological impact assessments (Appendix 6 and Appendix 7) provide further detail on the potential impacts to ESAs, as does the EMPr (Table 41)
Health impacts on mine personnel	The mine will operate in accordance with the Mine and Health Safety Act.
Safety as elderly live on neighbouring farms	Mine employees will be sourced locally, are limited in number and will be properly vetted.
Mining impacts on the Sishen-Saldanha railway	Appropriate buffers will be implemented. It must be further noted that no blasting is applicable to this project. Negotiations will occur between the mine and Transnet with regards to the use of the siding and rail line.

10.3 ADVANTAGES AND DISADVANTAGES OF PROPOSED ACTIVITY

A summary is provided in Table 33 in terms of advantages and disadvantages associated with the final project layout, and alternatives considered.

Table 33: Advantages and Disadvantages regarding the preferred project alternative

Description	Advantages	Disadvantages
Mining Method Alternatives		
Roll- over trenching (proposed method)	Economically viable as the mineral is shallow. Alternative land uses can continue on areas not directly impacted by surface activities (with rollover mining the entire area is not affected at the same time). No blasting applicable. Concurrent rehabilitation.	Potential decrease in groundwater quality (would also be a disadvantage of other mining methods involving backfill of material into the pits). Could potentially uncover a site of heritage importance, which other mining methods would also be associated with.
Site Access Alternatives		
Access to the site via R355 from N7 then R358	Direct access to the mine via gravel road on R355 via N7 then R358.	Damage gravel road. It is more time efficient to come from Loeriesfontein than from Bitterfontein or Nuwerus.

Description	Advantages	Disadvantages
Access to the site via R355 from R357 (proposed route if workers live in Loeriesfontein)	Direct access to the mine via gravel road on R355 via R357. Shorter distance from Loeriesfontein to the project area.	Damage gravel road.
Layout Alternatives		
Final Site Layout	No river crossings applicable. The current mine layout falls outside of the 1:100 year floodline of the Krom River and Doring River. Avoids the ephemeral drainage line	Light/noise can bother nearby Transnet home inhabitants and farmstead on farm.
Transportation of Gypsum Alternatives		
Transnet Rail (proposed method 40% (Sturgeon Consulting, June 2018))	No pressure on public roads. Potentially a cheaper alternative. Quicker for product to reach destination. Less production of dust.	Added pressure onto existing Transnet line.
Truck hauling (proposed method 60% (Sturgeon Consulting, June 2018))	Job creation for truck drivers. No need to wait for trains to arrive for loading and transportation to take place.	Pressure on roads causing more traffic and road degradation. Dangers of an increase of trucks on the roads. Protected flora/fauna species can be ridden over.

10.4 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

Properties are delimited by the properties available for prospecting and/or mining (i.e. not held by another company); and the geology of the area. Alternatives for the mining layout are limited by the extent of the gypsum resource. The type of mining to be conducted (surface trench mining) is further limited by the shallow depth of the resource.

10.5 STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION WITHIN THE OVERALL SITE

As stipulated in the above section, the extent of mining and type of mining is limited by the geology and depth of the gypsum.

The final site layout as depicted in Plan 3 and Plan 11 , and attached in Appendix 2 (A3 format) is based on (1) economic feasibility and (2) reducing social and environmental impacts associated with the project.

10.6 DETAILED ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

The full impact assessment table is presented in Appendix 15. Only impacts of negative moderate and high significance, without the implementation of mitigation, are summarised below:

Table 34: Summary impact assessment table

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Wetland**	Altered wetland hydrological functioning due to: increased runoff & erosion, sedimentation of wetlands, and altered flow patterns and volumes.	Neg	**Pre-mitigation**	**50**	**Moderate**
				Neg	**Post-mitigation**	**12**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Wetland**	Altered wetland hydrological functioning due to: increased runoff & erosion, sedimentation of wetlands, and altered flow patterns and volumes.	Neg	**Pre-mitigation**	**50**	**Moderate**
				Neg	**Post-mitigation**	**12**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Surface Water**	Sedimentation to downstream drainage lines/ watercourses.	Neg	**Pre-mitigation**	**66**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Surface Water**	Hydrocarbon fuel spillage and contamination of downstream surface water resources.	Neg	**Pre-mitigation**	**66**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Operational**	**Surface Water**	Flooding of infrastructure area and mining blocks.	Neg	**Pre-mitigation**	**90**	**High**
				Neg	**Post-mitigation**	**30**	**Low**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Surface Water**	Pollution of downstream surface water resources due to contaminated and sediment loaded storm water.	Neg	**Pre-mitigation**	**91**	**High**
				Neg	**Post-mitigation**	**36**	**Low**
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Surface Water**	Siltation of water resources due to erosion of post-mining landscape.	Neg	**Pre-mitigation**	**78**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Air Quality**	Dust generation	Neg	**Pre-mitigation**	**56**	**Moderate**
				Neg	**Post-mitigation**	**35**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Air Quality**	Particulates- PM10 & PM 2.5	Neg	**Pre-mitigation**	**80**	**Moderate**
				Neg	**Post-mitigation**	**35**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Air Quality**	Dust generation	Neg	**Pre-mitigation**	**72**	**Moderate**
				Neg	**Post-mitigation**	**32**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Air Quality**	Particulates- PM10 & PM 2.5	Neg	**Pre-mitigation**	**96**	**High**
				Neg	**Post-mitigation**	**36**	**Low**
Decommissioning & Rehabilitation	**Decommissioning**	**Air Quality**	Dust generation	Neg	**Pre-mitigation**	**48**	**Moderate**
				Neg	**Post-mitigation**	**21**	**Low**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Decommissioning & Rehabilitation	**Decommissioning**	**Air Quality**	Emissions	Neg	**Pre-mitigation**	**56**	**Moderate**
				Neg	**Post-mitigation**	**24**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Traffic**	Increase in traffic	Neg	**Pre-mitigation**	**54**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Traffic**	Wear and tear on road	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Construction & Operation**	**Heritage**	Heritage site discovered and potentially destroyed	Neg	**Pre-mitigation**	**57**	**Moderate**
				Neg	**Post-mitigation**	**20**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment. Rehabilitation and Closure of mine areas.	**Construction, Operation & Decommissioning**	**Safety & Security**	Crime & security/safety incidences	Neg	**Pre-mitigation**	**40**	**Moderate**
				Neg	**Post-mitigation**	**24**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and	**Construction, Operation & Decommissioning**	**Noise**	Noise pollution and damage of hearing to workers near loud machinery	Neg	**Pre-mitigation**	**40**	**Moderate**
				Neg	**Post-mitigation**	**27**	**Low**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
continued disturbance to soils and surrounding environment. Rehabilitation and Closure of mine areas.							
Non-mineral waste management	**Construction, Operation & Decommissioning**	**Waste**	Pollution	Neg	**Pre-mitigation**	**56**	**Moderate**
				Neg	**Post-mitigation**	**25**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Groundwater**	Impacts on groundwater quality due to poor quality seepage from the operational area	Neg	**Pre-mitigation**	**65**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Rehabilitation	**Post-Operational**	**Groundwater**	Impacts on groundwater quality due to poor quality seepage from the trench area	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**24**	**Low**
Rehabilitation	**Post-Operational**	**Groundwater**	Impacts on groundwater quality due to poor quality seepage from the operational area	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**20**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Impact on landscape character and sense of place due to: alteration of topography, increased vehicular activity and dust.	Neg	**Pre-mitigation**	**66**	**Moderate**
				Neg	**Post-mitigation**	**48**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Impact on landscape character and sense of place due to: alteration of topography through the growth in stockpiles, erosion + AIPs altering the landscape, and continued	Neg	**Pre-mitigation**	**78**	**Moderate**
				Neg	**Post-mitigation**	**66**	**Moderate**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
			earthworks and vehicular activity leading to generation of dust.				
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Impact on landscape character and sense of place due to: erosion, AIPs and dust generation from rehabilitated landscape.	Neg	**Pre-mitigation**	**48**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Visual Intrusion and VAC Impacts due to: alteration of topography, landscape scarring, and increased vehicular activity.	Neg	**Pre-mitigation**	**66**	**Moderate**
				Neg	**Post-mitigation**	**54**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Visual Intrusion and VAC Impacts due to: alteration of topography through the growth in stockpiles, erosion + AIPs scarring the landscape, with continued earthworks and vehicular activity.	Neg	**Pre-mitigation**	**90**	**High**
				Neg	**Post-mitigation**	**72**	**Moderate**
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Visual Intrusion and VAC Impacts due to: rehabilitated landscape resulting in erosion, AIPs and bare ground scarring the landscape.	Neg	**Pre-mitigation**	**65**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Visual exposure and Visibility Impacts due to: alteration of topography, erosion, AIPs and vehicular activity leading to site in contrast to the landscape.	Neg	**Pre-mitigation**	**72**	**Moderate**
				Neg	**Post-mitigation**	**40**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Visual exposure and Visibility Impacts due to: alteration of topography, erosion, AIPs, continued earthworks and vehicular activity leading to site in contrast to the landscape.	Neg	**Pre-mitigation**	**90**	**High**
				Neg	**Post-mitigation**	**55**	**Moderate**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Visual exposure and Visibility Impacts due to: rehabilitated landscape resulting in erosion, AIPs and bare ground scarring the landscape.	Neg	**Pre-mitigation**	**48**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Impacts due to Night time lighting resulting in light pollution.	Neg	**Pre-mitigation**	**90**	**High**
				Neg	**Post-mitigation**	**39**	**Low**
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Impacts due to Night time lighting resulting in light pollution.	Neg	**Pre-mitigation**	**65**	**Moderate**
				Neg	**Post-mitigation**	**27**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Impact on landscape character and sense of place due to: alteration of topography, increased vehicular activity and dust.	Neg	**Pre-mitigation**	**66**	**Moderate**
				Neg	**Post-mitigation**	**48**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Impact on landscape character and sense of place due to: alteration of topography through the growth in stockpiles, erosion + AIPs altering the landscape, and continued earthworks and vehicular activity leading to generation of dust.	Neg	**Pre-mitigation**	**78**	**Moderate**
				Neg	**Post-mitigation**	**66**	**Moderate**
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Impact on landscape character and sense of place due to: erosion, AIPs and dust generation from rehabilitated landscape.	Neg	**Pre-mitigation**	**48**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
	Construction	**Visual**	Visual Intrusion and VAC Impacts due to: alteration of topography,	Neg	**Pre-mitigation**	**66**	**Moderate**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.			landscape scarring, and increased vehicular activity.	Neg	**Post-mitigation**	**54**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Visual Intrusion and VAC Impacts due to: alteration of topography through the growth in stockpiles, erosion + AIPs scarring the landscape, with continued earthworks and vehicular activity.	Neg	**Pre-mitigation**	**90**	**High**
				Neg	**Post-mitigation**	**72**	**Moderate**
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Visual Intrusion and VAC Impacts due to: rehabilitated landscape resulting in erosion, AIPs and bare ground scarring the landscape.	Neg	**Pre-mitigation**	**65**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Visual exposure and Visibility Impacts due to: alteration of topography, erosion, AIPs and vehicular activity leading to site in contrast to the landscape.	Neg	**Pre-mitigation**	**72**	**Moderate**
				Neg	**Post-mitigation**	**40**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Visual exposure and Visibility Impacts due to: alteration of topography, erosion, AIPs, continued earthworks and vehicular activity leading to site in contrast to the landscape.	Neg	**Pre-mitigation**	**90**	**High**
				Neg	**Post-mitigation**	**55**	**Moderate**
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Visual exposure and Visibility Impacts due to: rehabilitated landscape resulting in erosion, AIPs and bare ground scarring the landscape.	Neg	**Pre-mitigation**	**48**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
	Operation	**Visual**	Impacts due to Night time lighting resulting in light pollution.	Neg	**Pre-mitigation**	**90**	**High**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.				Neg	**Post-mitigation**	**39**	**Low**
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Impacts due to Night time lighting resulting in light pollution.	Neg	**Pre-mitigation**	**65**	**Moderate**
				Neg	**Post-mitigation**	**27**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil compaction	Neg	**Pre-mitigation**	**52**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**33**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**33**	**Low**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil compaction	Neg	**Pre-mitigation**	**52**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**70**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**70**	**Moderate**
				Neg	**Post-mitigation**	**24**	**Low**
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**48**	**Moderate**
				Neg	**Post-mitigation**	**33**	**Low**
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**52**	**Moderate**
				Neg	**Post-mitigation**	**27**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil compaction	Neg	**Pre-mitigation**	**52**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**33**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**33**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil compaction	Neg	**Pre-mitigation**	**52**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**70**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**70**	**Moderate**
				Neg	**Post-mitigation**	**24**	**Low**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**48**	**Moderate**
				Neg	**Post-mitigation**	**33**	**Low**
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**52**	**Moderate**
				Neg	**Post-mitigation**	**27**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Intact Vygieveld	Neg	**Pre-mitigation**	**112**	**High**
				Neg	**Post-mitigation**	**66**	**Moderate**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Overgrazed Vygieveld	Neg	**Pre-mitigation**	**104**	**High**
				Neg	**Post-mitigation**	**66**	**Moderate**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Ephemeral Drainage Lines	Neg	**Pre-mitigation**	**80**	**Moderate**
				Neg	**Post-mitigation**	**48**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Intact Vygieveld	Neg	**Pre-mitigation**	**105**	**High**
				Neg	**Post-mitigation**	**48**	**Moderate**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Overgrazed Vygieveld	Neg	**Pre-mitigation**	**98**	**High**
				Neg	**Post-mitigation**	**60**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Ephemeral Drainage Lines	Neg	**Pre-mitigation**	**72**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Intact Vygieveld	Neg	**Pre-mitigation**	**65**	**Moderate**
				Neg	**Post-mitigation**	**14**	**Low**
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Overgrazed Vygieveld	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**36**	**Low**
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Ephemeral Drainage Lines	Neg	**Pre-mitigation**	**40**	**Moderate**
				Neg	**Post-mitigation**	**24**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Intact Vygieveld	Neg	**Pre-mitigation**	**112**	**High**
				Neg	**Post-mitigation**	**84**	**High**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Overgrazed Vygieveld	Neg	**Pre-mitigation**	**80**	**Moderate**
				Neg	**Post-mitigation**	**56**	**Moderate**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Ephemeral Drainage Lines	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**40**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Intact Vygieveld	Neg	**Pre-mitigation**	**75**	**Moderate**
				Neg	**Post-mitigation**	**56**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Overgrazed Vygieveld	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**40**	**Moderate**
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Ephemeral Drainage Lines	Neg	**Pre-mitigation**	**60**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Intact Vygieveld	Neg	**Pre-mitigation**	**52**	**Moderate**
				Neg	**Post-mitigation**	**30**	**Low**
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Overgrazed Vygieveld	Neg	**Pre-mitigation**	**40**	**Moderate**
				Neg	**Post-mitigation**	**24**	**Low**
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Ephemeral Drainage Lines	Neg	**Pre-mitigation**	**40**	**Moderate**
				Neg	**Post-mitigation**	**16**	**Low**

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)	
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Construction & Operation**	**Heritage**	Heritage site discovered and potentially destroyed	Neg	**Pre-mitigation**	**57**	**Moderate**
				Neg	**Post-mitigation**	**20**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment. Rehabilitation and Closure of mine areas.	**Construction, Operation & Decommissioning**	**Safety & Security**	Crime & security/safety incidences	Neg	**Pre-mitigation**	**40**	**Moderate**
				Neg	**Post-mitigation**	**24**	**Low**
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment. Rehabilitation and Closure of mine areas.	**Construction, Operation & Decommissioning**	**Noise**	Noise pollution and damage of hearing to workers near loud machinery	Neg	**Pre-mitigation**	**40**	**Moderate**
				Neg	**Post-mitigation**	**27**	**Low**
Non-mineral waste management	**Construction, Operation & Decommissioning**	**Waste**	Pollution	Neg	**Pre-mitigation**	**56**	**Moderate**
				Neg	**Post-mitigation**	**25**	**Low**

The supporting impact rating assessment conducted by the EAP, and detailing all impacts, is attached as Appendix 15.

10.7 SUMMARY OF SPECIALIST REPORT RECOMMENDATIONS

All the relevant mitigation and management measures stipulated by specialists have been incorporated into the various tables of the EMPr as well as the overall management plan. Only specific recommendations from specialists are detailed below.

Table 35: Summary Specific Specialist Recommendations

Applicable Study	Specialist Recommendation	Reference to Applicable Section in Report
Soil, Land Use and Land Capability Assessment, Scientific Aquatic Services, 2018 Appendix 3	• If the proposed infrastructure encroaches on the Kimberly/Plooysburg soils rehabilitation would need to be enforced as these soils are ideal for cattle farming. The rehabilitation can occur concurrently. • Implementation of rehabilitation and the proposed integrated mitigation measures is recommended to reinstate the natural topography of the area post mining. • Ripping and re-vegetation, if necessary, can be implemented concurrently on the subsections where construction works are complete;	• Section 19 • Section 10.2.2.1 • Section 19.1.4
Surface Water Hydrology Report, SD Hydrological Services, 2018 Appendix 4	• The water balance should be updated during the operational phase once more data becomes available as the areas of the clean and dirty water infrastructure footprints may change.	• Section 4.2.4
Groundwater Impact Assessment Appendix 5	• Monitoring to occur monthly during the first year. Ideally, the monitoring program should start a year before mining starts in order to be able to build a database that is not impacted by the mining activities. • Once the monthly database is established monitoring should change to quarterly. • Streams to be monitored during the times of stream flow. • The groundwater monitoring program to be continued for a period of at least 5 years after mine closure to monitor the contaminant migration. • Recommended parameters and elements to be monitored: • General chemistry such as pH, Total Dissolved Solids (TDS) and Electrical Conductivity (EC);	• Section 19.1.3 • Section 19.1.3 • Section 19.1.4 • Section 19.1.4 • Section 21

Applicable Study	Specialist Recommendation	Reference to Applicable Section in Report
	• Major elements such as calcium, magnesium, sodium, potassium, sulphate, nitrate, fluoride, chloride, phosphate; • An Inductively Coupled Plasma (ICP) scan of minor elements including aluminium, arsenic, barium, boron, bismuth, cadmium, copper, chrome (total), cyanide, iron, manganese, mercury, molybdenum, nickel, lead, antimony, selenium, vanadium and zinc.	
Floral Ecological Assessment, Scientific Terrestrial Services. 2018 Appendix 6	• A nursery to be constructed on site to grow and maintain while mining activities take place. As concurrent rehabilitation takes place within the phased mining process, these species maintained within the nursery can be replanted to reinstate the areas back to its original state prior to mining. • Permits for the removal or relocation of all floral SCC protected in terms of the Northern Cape Nature Conservation Act (NCNCA; Act 9 of 2009), must be obtained. • Transformed areas form part of the rehabilitation actions to reinstate these areas where possible, and form a link between the intact and overgrazed Vygieveld. • The disturbance timeframes and footprint must be minimised, and care must be taken to limit edge effects on the surrounding sensitive areas.	• Section 19.1.4 • Section 19.1.2 • Section 19.1.2
Faunal Ecological Assessment, Scientific Terrestrial Services. 2018 Appendix 6	• Mining footprint is kept as small as possible, whilst concurrent rehabilitation activities are implemented in order to ensure that as far as possible the habitat availability, for fauna, of the focus area is not significantly compromised over the period of mining activities. • Vegetation clearance to take place in a phased manner to allow for any faunal species present to move away from the focus area. • Suitable mitigation measures are in place to minimise surface water runoff and erosional activities which could negatively impact fauna habitat. • *Brinckiella arboricola*, lay eggs within the ground or plant stems, with only one egg laying event per year and adults usually living for one year. Prior to vegetation clearance activities it is highly recommended that a search be conducted in order to locate and move adults out of the area	• Section 19.1.2 • Section 19.1.3 • Section 19.1.2

Applicable Study	Specialist Recommendation	Reference to Applicable Section in Report
	to be cleared. Cleared vegetation must be stored for a period of a year in order to allow for any eggs to hatch. • Slow moving small species such as harmless reptiles, scorpions and insects are to be relocated. Large venomous snakes to be handled and relocated by a trained individual.	
Heritage Impact Assessment Archaetnos Culture & Cultural Resource Consultants, 2018 Appendix 8	• The subterranean presence of archaeological and/or historical sites, features or artefacts is always a distinct possibility. In certain areas it also is possible that some sites may only become known later. Operating controls and monitoring should therefore be aimed at the possible unearthing of such features. Care should therefore be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence.	• Table 41
Air Quality Impact Assessment (Rayten Engineering Solutions, 2018) Appendix 10	• A dust management plan will need to be developed for onsite activities. • Dust control measures need to be assessed in detail and incorporated into the plan.	• Section 21 and Section 19.1.3
Transport Impact Assessment study, Sturgeon Consulting, 2018. Appendix 11	• Regular Road Maintenance agreement between the Applicant, Transnet and the Northern Cape Provincial Department of Transport for the service road and the R355. This will include the re-cutting and cleaning of side-drains and pipes and grading and shaping as well as dust suppression (where required).	• Section 19.1.1 • Section 19.1.2
Visual Impact Assessment, Scientific Terrestrial Services, 2018 Appendix 12	• Mitigation measures will have to be implemented in order to minimise the visual impacts, with specific reference to concurrent revegetation, alien and invasive species management throughout the construction and operational project phases, as well as consideration of material selection, effective management of lighting and dust suppression and implementing good housekeeping measures.	Section 19.1.2.
Freshwater Resource Assessment, Scientific Aquatic Services, 2018	• All mining infrastructure should remain far from the ephemeral drainage lines located in close proximity to the footprint area. A 100m buffer is recommended by the hydrologist.	Table 41

Applicable Study	Specialist Recommendation	Reference to Applicable Section in Report
Appendix 7		

11 ENVIRONMENTAL IMPACT STATEMENT

11.1 SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT AND POSITIVE AND NEGATIVE IMPACTS IDENTIFIED

The impact assessment in Section 10.6 provides a summary of the impact assessment process, the full detail impact assessment table is attached as Appendix 15. Although some impacts of high significance have been identified (without consideration of mitigation measures), no fatal flaws have been identified for the project. Impacts of high significance without the consideration of mitigation measures included visual impacts, impacts to surface water resources, increased atmospheric emissions and impacts to the biodiversity on site.

Although not further detailed here, other impacts of moderate or lower significance must be managed in accordance with the EMPr.

If it is assumed that the management and mitigation measures proposed for each impact are implemented successfully, the only impacts that remain of high significance after mitigation is the impact on faunal SCC, faunal habitat and species diversity in the Intact Vygieveld.

Speed limits should be controlled as high speeds could increase the mortality rate of fauna, the speed limit to be 40 km/h. No hunting or trapping is to be tolerated unless the trapping is to relocate the species by a qualified specialist causing no harm to the species.

The footprint area is to be kept as small as possible so no unnecessary deaths of fauna occur.

The species of *Brinckiella arboricola*, lays its eggs within the ground or plant stems, with only one egg laying event per year and adults usually living for a year. As such, it is highly recommended that prior to vegetation clearing activities a search be conducted to locate and move adults out of the area to be cleared. Furthermore, cleared vegetation must be stored for a period of a year in order to allow for any eggs to hatch.

Should any small scorpion species, insects and harmless reptiles be observed on the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint.

For larger venomous snakes, a suitably trained mine official should be contacted to affect the relocation of the species, should it not move off on its own.

Implementation of the EMPr reduces the impact significance of the identified impacts to acceptable levels of significance.

11.2 FINAL SITE MAP

Please refer to Plan 3 and Plan 4 for an overview of the proposed layout, and Appendix 2 for more A3 plans.

12 IMPACT MANAGEMENT OBJECTIVES AND IMPACT MANAGEMENT OUTCOMES

The general objectives of impact mitigation and management are to:

- Primarily pre-empt impacts and prevent the realisation of these impacts - PREVENTION.
- To ensure activities that are expected to impact on the environment are undertaken and controlled in such a way so as to minimise their impacts – MODIFY and/or CONTROL.
- To ensure a system is in place for treating and/or rectifying any significant impacts that will occur due to the proposed activity – REMEDY.
- Implement an adequate monitoring programme to:
    - Ensure that mitigation and management measure are effective.
    - Allow quick detection of potential impacts, which in turn will allow for quick response to issue/impacts.
    - Reduce duration of any potential negative impacts.

Environmental management outcomes and related management statements specific to the proposed Kanakies Mine are to:

- Protect the biophysical environment as far as possible.
    - Minimise impacts to the biophysical environment.
    - Ensure relevant legislation is applied on site including but not limited to alien invasive management and protection of ecologically sensitive species and environments.
    - Permits for any activities related to protected species on site will be sought prior to these species being affected.
- Protect the water resources in the area.
    - Ensure clean and dirty water separation systems are established on site from the onset and are in line with GN704 principals.
    - Use water responsibly and recycle water as much as possible.
    - Ensure relevant legislation is applied on site.

    - Ensure water authorisation in terms of the NWA is obtained prior to activities commencing on site.
    - Annually update the IWWMP with updated data recorded from site.
- Ensure atmospheric emissions are legally compliant:
    - Manage dust generation and greenhouse gas emissions
    - Monitor and report on emissions
    - Revegetate all bare soil.
- Ensure operation is compliant with legislative requirements.
    - Ensure an adequate rehabilitation model is compiled and annually updated throughout the LoM.
    - Conduct annual EMPr and IWUL audits and complete the necessary amendment process where this is deemed necessary.
- Obtain and Maintain Social License to Operate:
    - Ensure the targets and objectives set out in the SLP are followed and adhered to.
    - Provide a safe environment for people to work in:
        - Ensure safety, health and environmental policies are established on site in line with national policy.
        - Ensure adequate PPE for staff, contractors and visitors to the site.
    - Provide a safe environment for people to live in.
        - Ensure environmental objectives are followed.
        - Provide open and transparent communication opportunity with all I&APs.

13 ASPECTS FOR INCLUSION AS CONDITIONS OF THE AUTHORISATION

As this EIA/EMPr comprehensively covers impacts and mitigation of impacts, the only condition recommended is that the EMPr is fully adhered to, annually audited and amended where necessary based on future audit findings.

14 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

All specialist studies are conducted to certain levels of confidence, and in all instances known and accepted methodologies have been used and confidence levels are generally high. This means that in most cases the situation described in the pre-mining environment is accurate at high certainty levels, but there exists a low probability that some issues have not been identified during the studies. Such situations cannot be avoided simply due to the nature of field work and have therefore not been further discussed below.

In situations where species sampling or sensitive site assessment is conducted (fauna, flora, aquatic ecosystems and wetland assessments), it must be understood that time limitation and conditions on site means that not all species can be identified during the surveys. Again, as accepted methodologies are used, this is not deemed to be a fatal flaw. Therefore this is not re-iterated below for each specialist study. It must be stressed that this has been considered within the EMPr, where measures are proposed to reduce impact on specifically protected species and heritage sites should these be discovered in addition to those identified during surveys.

There are inherent errors in GPS and mapping programmes which must be considered when transferring plans to on-site activities.

Furthermore, statistical analyses and mathematical models are merely tools that assist the researcher in assessing field observations and have innate assumptions which can reduce objectivity of the results obtained. This is not seen as a major flaw but should always be considered when assessing results. This is not reiterated below for each specialist who has formulated impact assessment based on modelling.

Lastly, impact assessment is a predictive tool to identify aspects of a development that need to be prevented, altered or controlled in a manner to reduce the impact to the receiving environment, or determine where remediation activities will need to be incorporated into the overall development plan. This does not mean that the impact will occur at the predicted significance, but provides guidance on the formulation of the management and monitoring requirements which need to be incorporated into the EMPr.

Specific knowledge gaps identified by the various specialists and the appointed EAP include:

- Soil and Land Capability (Scientific Aquatic Services, July 2018b) - Sampling by definition means that not all areas are assessed, and therefore some aspects of soil and land capability may have been overlooked in this assessment. However, it is the opinion of the specialist that this assessment was carried out with sufficient sampling and in sufficient detail to enable the proponent, the Environmental Assessment Practitioner (EAP) and the regulating authorities to make an informed decision regarding the proposed mining activities.
- Surface Water (SD Hydrological Services, April 2018)- No storage facilities were modelled and no flood protection infrastructure was modelled.
- Groundwater (Future Flow: GPMS, July 2018)- due to the operation not breaching groundwater level no 3D modelling was undertaken.
- Flora (Scientific Terrestrial Services, July 2018c) - The field assessment of the terrestrial ecology was undertaken during the summer season from 31st of January to the 2nd of February 2018 and during the winter season from the 18th – 20th of July 2018, to determine the ecological status of the focus area.

Although the second field assessment was conducted during the flowering season, poor winter rainfall in the area was still a limiting factor for identification of annual flora and geophytes and determining species diversity within the focus area. The floral field assessment is confined to the focus area and does not include the adjacent properties, nor the entire MRA; these were considered as part of the desktop assessment.

- Fauna (Scientific Terrestrial Services, July 2018c) - The faunal assessment is confined to the focus area and does not include the adjacent properties nor the entire MRA; these were however considered as part of the desktop assessment.
- Heritage (Archaetnos Culture & Cultural Resource Consultants, March 2018) certain areas which are clearly disturbed are also seen as very low risk areas and were therefore not surveyed in detail and sometimes just driven through.
- Air Quality, (Rayten Engineering Solutions, June 2018)
    - A cumulative assessment could not be conducted as there is no background air quality data available for the project site.
    - Activities that are not associated with the project and occur outside the project area were not included in the assessment. These may include any potential background emission sources. Background sources are excluded as detailed information for these is required for input into the model and is not readily available. Furthermore, the assessment focused on the impact of emissions attributable to emission source activities associated with the project specifically.
- Visual (Scientific Terrestrial Services, July 2018e)-
    - No specific national legal requirements for VIAs currently exist in South Africa. However, the assessment of visual impacts is required by implication when the provisions of relevant acts governing environmental management are considered and when certain characteristics of either the receiving environment or the proposed project indicate that visibility and aesthetics are likely to be significant issues and that visual input is required.
    - Due to a lack of visual specialist guidelines within the Northern Cape Province, the "Guidelines for Involving Visual and Aesthetic Specialists in the EIA Process", prepared for the Western Cape Department of Environmental Affairs & Development Planning, was used.
- Freshwater Resource Assessment (Scientific Aquatic Services, July 2018a) –
    - The determination of the freshwater resource boundaries and the assessment, is confined to the MRA. All freshwater resources identified within 500m of the MRA were delineated in fulfilment of Regulation GN509 of the NWA using desktop methods, however these resources were not assessed individually. The general surroundings were, however, considered in the desktop assessment of the MRA;

    - With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked.
- Traffic Impact Assessment (Sturgeon Consulting, June 2018)- At the time of the site visit on 14 February 2018, there were adverse weather conditions, which made several of the routes (R355, Transnet service road, etc.) un-passable due to flooding.

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

The sections above provide a compact summary of pertinent findings, all of which can be mitigated by varying degrees depending on the type of mitigation measure applied. The EIA/EMPr is a comprehensive document with information provided through the specialist studies, none of which identified fatal flaws. Upon review of all specialist input, the project could go ahead with the recommended mitigation measures contained herein.

It is therefore Cabanga Environmental's reasoned opinion that the activity be authorised on condition that the EMPr is fully adhered to, annually audited and amended where necessary based on audit findings.

16 PROJECT LIFE CYCLE

It is anticipated that construction activities will take six (6) months, the life of mine is expected to be in excess of thirty (30) years. Decommissioning and closure activities are estimated at one (1) year.

Thus the entire project life cycle is anticipated to be 39 years.

17 DEVIATIONS FROM THE APPROVED SCOPING REPORT, AND MOTIVATION

A new methodology was used for the impact assessment and ratings in the impact tables (Appendix 15).

The Draft National Guideline on Minimum Information Requirements for Preparing Environmental Impact Assessments for Mining Activities that Require Environmental Authorisation (DEA, 2018) was published in February 2018. Cabanga has since updated our impact assessment methodology to more firmly align with the Draft Guideline.

18 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

To comply with the Provisions of Sections 24(4)(a) and (b) read with Section 24 (3) (a) and (7) of NEMA, the EIA Report must include the:

- Impact on the Socio-Economics of any directly affected person; and
- Impact on any National Estate referred to in Section 3(2) of the National Heritage Resources Act

In general, positive impacts will be experienced with job creation and economic development through the life of mine. The main I&APs that may experience direct impact are:

- Noise, visual and dust from the mine affecting the Transnet worker homes and the existing farmstead on the Kanakies Farm.
- The landowner of Kanakies farm (PPC).
- Current land users.
- Transnet.

The proposed mining operation will not affect the socio-economic conditions of the land owner or users negatively – current land uses can continue on the remainder of the MRA not directly affected by the mining activities. The land owner may experience positive impacts from the project through lease agreements and maintenance that may be relevant to the land and access road.

There are no sites of heritage or cultural importance in the project area, according to the survey undertaken (Archaetnos Culture & Cultural Resource Consultants, March 2018) and a chance find procedure has been included in the EMPr to ensure that no heritage resources are damaged by the proposed Mine, should any of these be present on site.

Section 24(4) (b) (i) of the NEMA specifies "investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity".

The alternatives assessed and the impacts associated with the alternatives assessed have been fully presented in Section 7 and the final layout has been motivated in this report. This final layout has formed the basis for the impact assessment in the EIA Report (Part A of this report) and the EMPr (Part B of this report), which reports specific management and monitoring that will be required in terms of the final layout presented.

All information committed to in the scoping report and as requested by the DMR to date has been incorporated in the EIA/EMPr.

Comments on the Scoping Report were received from the DMR on 11 May 2018. All of the comments have been addressed in this EIA.

A3 size locality map is included in Appendix 2.

PART B: ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

As seen below are the requirements for the structure of the EMPr.

Table 36: Structure of the EMPr

Regulatory Requirement for EIA Reports	Relevant Section of this report
1. (1) An EMPr must comply with section 24N of the Act and include —	
(a) details of— (i) the EAP who prepared the EMPr; and (ii) the expertise of the EAP, including a curriculum vitae.	Please refer to Section 2.2, Section 2.3 and Appendix 1: EAP CV's.
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Please refer to Section 4 of Part A.
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Please refer to Appendix 2.
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including— (i) planning and design; (ii) pre construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities	Please refer to Section 12.
(e) a description and identification of impact management outcomes required for the aspects contemplated in (d)	Please refer to Section 12.
(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to — (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Please see Appendix 15: Impact Assessment Tables.

Regulatory Requirement for EIA Reports	Relevant Section of this report
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Please see Section 21
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Please see Section 21
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	Please see Section 21
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Please see Section 21
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Please see Section 21
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Please see Section 21
(m) an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Please see Section 23.
(n) any specific information that may be required by the competent authority.	Please seen Section 19.

19 DETERMINATION OF CLOSURE OBJECTIVES

Closure objectives must be met with regards to:

- Topography
  - To ensure that the final elevation will result in the site being free draining.
- Soil, Land Capability and Land Use
  - To ensure post-mining land capability is at least similar to pre-mining which is grazing.
  - To ensure that the land capability is self-sustaining.
  - To ensure that pre-mining land uses can continue.
- Surface Water
  - Ensure that the surface profile is rehabilitated to promote natural runoff drainage and avoid ponding of water within the rehabilitated area.
  - Surface inspection should be continuously undertaken to ensure clean runoff drains into the downstream drainage/rivers.
  - All rehabilitated areas must be established with vegetation.
- Groundwater
  - Remediation of physical activity- roll over rehabilitation to occur as each trench is complete. Waste material used to backfill the trench area. Final

product stockpiles will be remediated during the decommissioning phase.
    - Remediation of storage facilities- surface storage facilities will be removed and remediated.
    - Remediation of environmental impacts- groundwater monitoring to occur for at least five years after mine closure to monitor the contaminant migration, as the backfill material may be potentially acid-generating. Based on results a remediation plan will need to be put in place such as flow management by cut off-trenches located down gradient of the pollution sources and management of seepage.
- Flora
    - Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a suitable specialist. This rehabilitation plan should consider all development phases of the project indicating rehabilitation actions to be undertaken during and once construction has been completed, on-going rehabilitation during the operational phase of the project as well as rehabilitation actions to be undertaken during closure.
    - Any post-development re-vegetation or landscaping exercise should use locally indigenous species as far as possible.
    - As much vegetation growth as possible should be promoted within the rehabilitated areas in order to protect the soils;
    - Monitor the success of rehabilitation efforts of open cast mining areas and access roads seasonally; and
    - Continue with and update the alien invasive management plan accordingly.
- Fauna
    - Concurrent rehabilitation to take place, this will alleviate loss of habitat and food resources.
- Visual
    - Vast extent and percentage of vegetation recovery as well no mining infrastructure or traces thereof being present.
- Freshwater Resources
    - Demolition footprint must be clearly demarcated and no related activities, including the movement of vehicles, must be permitted to occur outside of the footprint area;
    - All related waste and rubble must be removed from site and disposed of according to relevant SABS standards. No waste must be permitted to enter wetland resources;
    - Edge effects such as erosion must be monitored and managed;
    - All areas affected by stockpiling during the operational phase of the mine should be rehabilitated and stabilised using suitable grass mix to prevent sedimentation of the freshwater resources in the area;

    - All areas should be resloped and topsoiled where necessary and reseeded with indigenous grasses;
    - It is critical that on-going monitoring of alien invasives is maintained post-closure, as proliferation of alien vegetation in the demolition areas is expected; and
- Air Quality
    - Concurrent rehabilitation will ensure that dust fall out, PM10 and PM2.5 will be limited.

19.1 THE PROCESS FOR MANAGING ANY ENVIRONMENTAL IMPACTS

The management plan is detailed below for each aspect during each mining phase. Several measures are relevant to more than one aspect. These are not reiterated for each aspect.

19.1.1 DESIGN AND PLANNING PHASE

- All applications that are required will be completed and approval obtained prior to any activities taking place.
- Written approvals that may be necessary in terms of structures and activities on site will be obtained prior to activities being carried out. Amongst others this includes:
    - Written authorisation from the Chief Fire Inspectorate for diesel storage facilities and firefighting facilities/infrastructure on site.
- Sensitive areas occurring on the property include an ephemeral floodplain in which the following is relevant:
    - Fence the mine off so that the mine area does not encroach onto the 100m buffer of the ephemeral floodplain.
    - Pre-activity photos of each of the site must be taken; each photo must be geo-tagged, date and time stamped prior to commencing with any activity to allow for photographic comparisons post-development to ensure rehabilitation is successful.
    - This data must be supplied to the Department of Agriculture, Rural Development, Land, and Environmental Affairs.
- A soils, land use and land capability study has been undertaken on the farm portion earmarked for disturbance.
- When purchasing equipment, consideration must be given to quieter equipment, to assist in noise level management.
- Keep to existing paths surrounding the site before the commencement of the construction phase in order to prevent unnecessary changes to the site.
- Optimal design of infrastructure in order to prevent excessive environmental or visual impacts where feasible, and ensure maximum maintenance of vegetation on site.

- Implement dust management measures upon commencement of onsite activities.
- The storm water management plan indicating dirty water containment and management must be implemented before commencement of the construction phase.

Detailed below are the management measures for the environmental impacts for all the phases from each of the specialist studies. Several management measures have been extracted from the specialist studies.

19.1.2 CONSTRUCTION

Table 37: Construction- managing environmental impacts

Soil and Land Capability	Flora	Visual	Socio-economic
• Footprint of mine to be demarcated and restrict vegetation clearing to be within this area. • The vegetation clearance and construction to coincide low rainfall conditions when the erosive stormwater and wind are anticipated to be low and when soil moisture is low therefore less prone to compaction. • Unnecessary surface disturbance of the identified Kimberly/Plooysburg soil forms can be avoided where possible to minimise the intensity of compaction due to their loamy sand texture. • Spill prevention, emergency spill response plan, dust suppression, and fire prevention plans to be compiled during construction. • An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress. • Burying waste (domestic, rubble, empty containers) is prohibited. Waste to be disposed of at a licensed facility. • Project footprint should be minimised so that grazing is still supported.	• Access routes to make use of existing roads as far as possible. • Edge effects (erosion and alien invasives) to be managed in adjacent natural areas. • Floral SCC that will be affected by surface infrastructure must be marked and where possible, relocated to suitable habitat (or kept in a nursery) surrounding the disturbance footprint. This is to be overseen by a qualified botanist. The relevant permits must be applied for within the relevant province as indicated in the baseline floral assessment, prior to the construction phase. • Floral SCC relocation to be kept to a minimum and no vegetation to be destroyed without reason. • Rehabilitation trials must be continuously undertaken from the commencement of construction in order to determine the efficiency of rehabilitation methods and the suitability of flora propagated in the nursery for rehabilitation.	• Good housekeeping must be practised on site. No littering or dumping permitted, and rubbish bins to be provided for every phase of the project. • Cleared vegetation areas to be kept to a minimum. • The extent of all infrastructure footprint areas and permanent/ temporary structures must be limited to what is essential. • New or additional roads to follow natural contours. • Buildings to blend in with the environments colours and no infrastructure to be placed on ridgelines, near freshwater resources or other locations where they would be silhouetted against the sky. • No highly reflective material to be used, all metal to be painted. White paint should not be used. • The identification of appropriate colours (olive greens, tans and light grey) and textures to be considered for both summer and winter. Darker colours will be more noticeable therefore do not use dark colours. • The surface infrastructure area should be screened through the use of a clearVU fence or, equally approved. • Existing vegetation on periphery of MRA to be maintained. • It must be ensured, wherever possible, that existing natural vegetation is to be retained during the construction and operational phases of the project and incorporated into the concurrent site rehabilitation. • An ecological approach to introducing vegetation. • Construction activities should be restricted to daylight hours as far as possible, in order to limit the need for bright floodlighting and the potential for skyglow.	• Source employment from the local communities.

Surface Water	Fauna	Freshwater Resources	Groundwater

• Vehicles to be serviced regularly to ensure no hydrocarbon leaks. Drip trays to be used where necessary.
• The loss of catchment area as a result of the associated infrastructure cannot be mitigated. The only way to mitigate the above mentioned impacts is to not proceed with the mining option. It should also be noted that the project footprint area makes up less than 1% of the total quaternary catchment area of E33A (1355 km2) and will therefore result in a negligible loss in runoff.
• The infrastructure area falls outside of the 1:100 year floodline. All infrastructures should also be placed outside of the 100 m stream centreline buffer of all minor streams.
	• Vegetation clearing to take place in phases so that fauna can move out of the project area.
	• No fauna are allowed to be trapped, hunted or collected during any phases unless the intent is to rescue and relocate them.
	• No fires are permitted in the MRA.
	• Edge effect control needs to be implemented within construction areas.
	• Upon completion of construction activities, it must be ensured that no bare areas remain and that indigenous karoo species are reintroduced.
	• Mining footprint to be kept as small as possible, whilst concurrent rehabilitation activities are implemented in order to ensure that as far as possible the habitat availability, for fauna, of the focus area is not significantly compromised over the period of mining activities.
	• *Brinckiella arboricola*, this species lays its eggs within the ground or plant stems, with only one egg laying event per year and adults usually living for a year. As such, it is highly recommended that prior to vegetation clearing activities a search be conducted in order to locate and move adults out of the area to be cleared. Furthermore, cleared vegetation must be stored for a period of a year in order to allow for any eggs to hatch.
	• Should any small scorpion species, insects and harmless reptiles be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint.
	• For larger venomous snakes, a suitably trained mine official should be contacted to effect the relocation of the species, should it not move off on its own.
		• All mining infrastructure should remain far from the ephemeral drainage lines located in close proximity to the footprint area.
		• Runoff from paved surfaces should be slowed down by the strategic placement of berms.
		• All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities.
		• Adequate stormwater management must be incorporated into the design of the proposed development in order to prevent erosion and the associated sedimentation of the riparian and instream areas.
		• Implement measures to contain seepage as far as possible to prevent contamination of the groundwater regime.
		• Limit the footprint area of the construction activities to what is absolutely essential in order to minimise the loss of clean water runoff areas which recharge the receiving aquatic environment.
		• No vehicles to be permitted to drive through wetlands and riparian systems, vehicles to stay on permitted roads.
		• Erosion berms should be installed on roadways to prevent gully formation and siltation of the wetland resources, particularly since the soils in the focus area are naturally prone to erosion.
		• The following points should serve to guide the placement of erosion berms:
		  ○ Where the track has slope of less than 2%, berms every 50m should be installed;
		  ○ Where the track slopes between 2% and 10%, berms every 25m should be installed;
		  ○ Where the track slopes between 10%-15%, berms every 20m should be installed; and
		  ○ Where the track has slope greater than 15%, berms every 10m should be installed.
			• Leaky equipment to have a drip dray located below it.

Air Quality	Traffic	General (All Phases)	Noise (All Phases)
• Water sprays.	• Enforce speed limits. • Follow road rules. • Trucks to not over take. • Trucks drivers to undertake a driving safety course. • Developer/client negotiate a chartered contract with existing minibus taxi or bus operators to transport the majority of the workers during the different stages of the development. • The contractor is required to monitor the condition of the roads used and repair the road where it becomes damaged due to construction traffic.	• Dangerous goods to be stored within a roofed locked store and only opened when in use. • Hydrocarbons to be stored within appropriately lined and bunded facility. • When hydrocarbons are transported protocols to be followed to ensure safety. • Material Safety Data Sheets (MSDS's) to be kept on site. • Ensure waste is separated and there is no littering on site. • Ensure hazardous waste is disposed of at a reputable hazardous waste service provider. • Ensure sewage is collected for treatment at a licensed waste treatment facility.	• Sound mufflers to be used on vehicles. • Reverse beeping to have a reverse flashing light if vehicles used at night. • Workers to wear PPE (ear plugs) when near loud machinery.

Heritage/Palaeontological (All Phases)
• Immediately contact a qualified archaeologist if there is any suspicion that a heritage site may have been uncovered. 'Chance find Procedure' should be followed: ▪ Upon finding any archaeological or historical material all work at the affected area must cease. ▪ The area should be demarcated to prevent any further work there until an investigation has been completed. ▪ An archaeologist should be contacted immediately to provide advice on the matter. ▪ If needed the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist. ▪ The removal of such archaeological material will only be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter. ▪ Work on site will only continue after the archaeologist/ SAHRA has agreed to such continuance. • If any evidence of archaeological sites and remains are identified SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted. • If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately.

19.1.3 OPERATIONAL

Table 38: Operational- managing environmental impacts

Soil and Land Capability	**Flora**	**Visual**	**Socioeconomic**
• Clean and dirty water area separation must take place in compliance with Regulation GN704 as it pertains to the NWA. • Surface runoff must be captured from the mining activities and infrastructure areas to adhere to Regulation GN704 as it pertains to the NWA in order to protect the soil and drainage lines. • Discharge of potentially contaminated stormwater into the environment should be strictly prohibited on site. • Contamination prevention measures should demonstrate how to limit the contaminants entering drainage lines, soil and ground water. This could detail how to capture waste water and how to treat it. • Contaminated soils can be treated onsite using suitable soil ameliorants determined by a qualified soil scientist after a soil contamination assessment has been conducted. • The product may be stockpiled but it may not stand for too long as erosion of the stockpiles could affect the receiving environment and sensitive receptors.	• All soils compacted as a result of construction activities falling outside of development footprint areas should be ripped and profiled. Compacted soils to be ripped 25cm and revegetated to combat compaction. • Edge effect control needs to be implemented to ensure no further degradation and potential loss of floral SCC outside of the proposed project footprint area.	• Vehicle-mounted lights or portable light towers are preferred for night time use. Lights to face downward with hoods to avoid sky glow. Upward facing lights to be avoided. • "Full cut-off" light fixtures that direct light only below the horizontal is to be used on buildings. • The use of low-pressure sodium lamps, yellow LED lighting, or an equivalent reduces sky glow and wildlife impacts where possible and practical. • Motion detector lights to be utilised so that the area is not permanently lit up at night. • All vehicles to be maintained and waste storage areas to be screened from view. • Stockpiles to be a maximum height of 3m. • The use of permanent signs and project construction signs should be in accordance with the requirements of the project and mining regulations. • Maintenance works to not take place during night or weekends. • Low level lights or limiting light heights is recommended. • High light masts and high pole top security lighting should be avoided along the periphery of the focus area. • No naked / unshielded light sources are to be directly visible from a distance. Only reflected light should be visible from outside the focus area.	• Any retrenchment and employment to be done in accordance with the Social and Labour Plan. • Ensure environmental management measures are conscientiously applied. • Adaptive management is applied by way of taking appropriate actions to any issues identified through the monitoring plan to ensure environmental impact is contained. • Ensure an environment that is not harmful to surrounding land owners and users.
Surface Water	**Fauna**	**Freshwater Resources**	**Groundwater**

• To reduce the risk of sedimentation to downstream drainages/watercourses from dirty water areas (overburden/ material stockpile areas/overburden areas etc.) and any additional dirty water areas, a temporary storm water management plan should be implemented. This will include construction of temporary ditches and runoff containment areas, such that all runoff emanating from the topsoil/material stockpile areas, overburden, proposed infrastructure areas, together with any additional dirty water areas are conveyed and contained within the site area.	• 40km/h speed limit on dirt roads must be implemented to lower the possibility for faunal species to collide with vehicles. • Gravel road used by mining vehicles to transport must be treated in such a way as to lower dust pollution within the surrounding areas.	• Ensure that all spills are immediately cleaned up. • All hazardous chemicals must be stored on specified surfaces. • Ensure that the mine process water system is managed in such a way as to prevent discharge to the receiving environment and to prevent discharge of dirty water; • All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available and that the water balance is managed to prevent decant if a large rainfall event occurs. • Monitor all drainage systems for erosion and incision. • Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed.	• Storage of potentially hazardous material will be within properly constructed and lined or paved areas. Oil traps will be sized, operated and maintained to contain all discarded oil from working areas. • Groundwater monitoring monthly, ideally the monitoring program should start a year before mining starts in order to be able to build a database that is not impacted by the mining activities. • After first year of operation monitoring to occur quarterly.
Air Quality	**Traffic**	**General**	**Heritage/Palaeontological (All Phases)**

• Implementation of dust management plan.
• Variable height stacker for loading stockpiles.
• Telescopic chute with sprays.
• Total enclosure of stockpiles and material product transported.
• Wind breaks.
• Enclosure and use of fabric filters.
• Water sprays with chemicals
  o Level 1 watering (2 litres/m2/hr)
  o Level 2 watering (>2 litres/m2/hr)
• Sealed or salt encrusted roads.
• Rock armour and/or topsoil applied.
• Clearly defined hauling routes/vehicle access areas. They should be paved or coated in bitumen.
• Regular cleaning and sweeping of paved roads to avoid dust accumulation.
• Regular maintenance and checks for haul road surfaces.
• Immediate clean-up of any material spillage.
• All material that is being transported should be covered during transport (where possible).
• Control the number of trucks on the road, weight of trucks and the travelling speed.
• Use more modern, fuel efficient trucks/vehicles which have improved exhaust emission control devices/systems in place.
• Switch off engines whilst not in use.
• Determine desired emission rates and measure/monitor truck exhaust emissions against these desired levels.
• Establish a maintenance schedule to ensure proper maintenance of the trucks & mobile equipment.
	• The mine will have to undertake regular maintenance of the service road and the R355 and will contribute towards the costs of the maintenance in agreement with Transnet and the Northern Cape Provincial Department of Transport. This will include the re-cutting and cleaning of side-drains and pipes and grading and shaping as well as dust suppression (where required).	• Sign in upon entering site.
		• Breathalyzer tests to be given to all entering site.
		• Complaints register to be available at security.
		• Visitors to be inducted before going on site.
		• Mine and dangerous areas to be fenced off for safety.
		• All employees and visitors to wear PPE on site.
			• Immediately contact a qualified archaeologist if there is any suspicion that a heritage site may have been uncovered. 'Chance find Procedure' should be followed:
			▪ Upon finding any archaeological or historical material all work at the affected area must cease.
			▪ The area should be demarcated to prevent any further work there until an investigation has been completed.
			▪ An archaeologist should be contacted immediately to provide advice on the matter.
			▪ If needed the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist.
			▪ The removal of such archaeological material will only be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter.
			▪ Work on site will only continue after the archaeologist/ SAHRA has agreed to such continuance.
			• If any evidence of archaeological sites and remains are identified SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted.
			• If unmarked human burials are uncovered, the SAHRA Burial Grounds

• Ensure optimal fuel combustion efficiency. • Create an integrated emission control strategy.			and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately.

19.1.4 DECOMMISSIONING, CLOSURE AND POST-CLOSURE

Table 39: Decommissioning, closure and Post Closure- managing environmental impacts

Soil and Land Capability	**Surface Water**	**Visual**	**Socioeconomic**
• The recommended ripping and re-vegetation, if necessary, can be implemented concurrently on the subsections where construction works are complete. • Recovered soils should be re-used to rehabilitate the mine footprint following mine closure. • Cleared vegetation should be nourished at a nursery for use during rehabilitation phase. • All disturbed areas can be re-vegetated with indigenous vegetation to re-establish a protective cover, to minimize soil erosion.	• Ensure that the surface profile is rehabilitated to promote natural runoff drainage and avoid ponding of water within the rehabilitated area. • Surface inspection should be continuously undertaken to ensure runoff drains into the downstream drainage/rivers.	• Concurrent/ progressive rehabilitation must be implemented and disturbed areas must be revegetated with indigenous vegetation as per the applicable vegetation rehabilitation and management plan, as soon as areas become available. • Upon decommissioning when the surface trenches are backfilled, it is vital that vegetation be reinstated to blend with the natural environment. • Existing vegetation to aid with rehabilitation.	• Should any new contracts be created during the decommissioning phase, then local contractors should be sought first. • All Social and Labour Plan initiatives and commitments should be applied particularly with regard to retrenchment. • Employ staff at other operations if feasible.
Flora	**Fauna**	**Freshwater Resources**	**Groundwater**
• Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a suitable specialist. • Any post-development re-vegetation or landscaping exercise should use locally indigenous species and as far as possible. • Development of a nursery may be considered where indigenous/endemic plant species and SCC must be propagated with focus on rehabilitation in conjunction with a suitably qualified specialist. • A floral SCC relocation, monitoring and management plan must be designed and implemented by a suitably qualified specialist and should address all species which can be successfully rescued and relocated.	• Concurrent rehabilitation should be undertaken with mining activities, this will help alleviate the loss of habitat and food resources to a degree.	• The landscape should be resurfaced and resloped in a manner that allows water to freely drain to the downgradient receiving environment post closure to avoid water ponding. • Upon closure all mining infrastructure should be removed in order to minimise the impacts on the aquatic resources of the area beyond the life of mine. • Demolition footprint must be clearly demarcated and no related activities, including the movement of vehicles, must be permitted to occur outside of the footprint area. • All related waste and rubble must be removed from site and disposed of according to relevant SABS standards. No waste must be permitted to enter wetland resources. • Edge effects such as erosion must be monitored and managed. • All areas affected by stockpiling during the operational phase of the mine should be rehabilitated and stabilised using suitable grass mix to	• Proper removal of, and rehabilitation of, surface stockpiles during decommissioning. • Roll over rehabilitation to occur as each trench is complete. Waste material used to backfill the trench area. Final product stockpiles will be remediated during the decommissioning phase. • Surface storage facilities will be removed and remediated. • Groundwater monitoring to occur for at least five years after mine closure to monitor the contaminant migration. Based on results a remediation plan will need to be put in place. • Material handled on site is expected to form AMD conditions therefore streams, when flowing, are to be monitored. Flow management such as cut off-trenches located down gradient of the pollution sources and management of seepage.

		prevent sedimentation of the freshwater resources in the area. • All areas should be resloped and topsoiled where necessary and reseeded with indigenous grasses. • It is critical that on-going monitoring of alien vegetation is maintained post-closure, as proliferation of alien vegetation in the demolition areas is expected.	
Air Quality			
• Primary rehabilitation. • Secondary rehabilitation. • Vegetation. • Fully rehabilitated.			

19.1.5 POSSIBLE MITIGATION MEASURES FOR I&AP IDENTIFIED IMPACTS

The proposed mitigation measures or alterations that could be implemented specifically to address issues and concerns raised by I&APs are summarised below and discussed in terms of overall risks if these mitigation measures are implemented on site.

Table 40: Mitigation measures for impacts identified by I&APs

Issue raised	Mitigation measures considered including alternatives
Wear and tear on roads. Municipality will be affected.	The possibility of railing product to market exists. Short distance from trenches to rail siding. This will reduce the number of haulage trucks. The mine will have to undertake regular maintenance of the service road and the R355 and will contribute towards the costs of the maintenance in agreement with Transnet and the Northern Cape Provincial Department of Transport. This will include the re-cutting and cleaning of side-drains and pipes and grading and shaping as well as dust suppression (where required).
Potential Impacts on the Kalk Gat Nature Reserve	No contact details have been found to date. Attempts to obtain the details are in the relevant PPP section. The reserve is however recognised as a sensitive receptor and impacts on the reserve (visual, ecological edge effects etc.) assessed and mitigated.
The employment and procurement process	Job vacancies and procurement opportunities will be advertised as per the Social & Labour Plan. Witkop Fluorspar Mine to employ locals as far as possible.
Employment to be sourced locally	
Certain areas have been mapped as areas of biodiversity importance and some biodiversity features require buffers of natural habitat to ensure its persistence	100 metre buffer for ephemeral drainage line. 5km buffer from the proclaimed boundary Kalk Gat Nature Reserve.
Protected plants found in the area must be relocated within Loeriesfontein	Mitigation measures have been proposed in Table 37 under flora.
Health impacts on mine personnel	Medical taken at start of employment, afterwards it is done annually and then at the end of employment there is an exit medical. PPE will be provided in dusty areas, chemical storage and handling areas. The proposed project is not associated with major risks. On-going monitoring is important to ensure compliance with the relevant standards and to ensure mitigation is efficient.

Issue raised	Mitigation measures considered including alternatives
Safety as elderly live on neighbouring farms.	Employees to undergo an intense screening process prior to employment.
Mining impacts on the Sishen-Saldanha railway	It is not expected that the rail line will be directly impacted on by mining activities. Mine activities will remain outside the regulated 100m distance from the rail line.

20 IMPACT MANAGEMENT MEASURES

Table 41 provides a summary of the impacts identified in Section 10.2, along with mitigation measures that address impact significance.

Table 41: Summary of Impacts, Mitigation Measures and Standards to be achieved (moderate to high impacts)

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Wetland**	Altered wetland hydrological functioning due to: increased runoff & erosion, sedimentation of wetlands, and altered flow patterns and volumes.	Neg	**Pre-mitigation**	**50**	**Moderate**	AVOID: Wetland areas and regulatory buffers must be avoided. Wetland areas must be designated on the ground as no go areas. MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. Mining activities and infrastructure must remain out of the ephemeral drainage lines and wetlands. Vehicles must not be allowed to drive in or around wetland areas; vehicles must remain in designated areas and roads. Storm water management must be designed to protect wetlands and put in place as soon as possible to separate clean and dirty areas, where dirty water can be contaminated or loaded with sediment. REMEDY: Ensure all spills (hydrocarbon or other) are cleaned and remedied immediately.	Design and Construction phase. However, measures are continued throughout LOM.	Inspection that wetlands are designated correctly as no-go areas. Monitoring of construction activities and potential residual impacts.	Once off inspection of designated wetlands.	Wetland specialist.	NEMA; NWA; GN 509 GG 40229 of 2016 as it relates to the NWA and Requirements of the GN 704.
				Neg	**Post-mitigation**	**12**	**Low**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Wetland**	Altered wetland hydrological functioning due to: increased runoff & erosion, sedimentation of wetlands, and altered flow patterns and volumes.	Neg	**Pre-mitigation**	**50**	**Moderate**	AVOID: Wetland areas and regulatory buffers must continue to be avoided by all mining activities. Wetland areas must be designated on the ground as no go areas. MINIMIZE/ CONTROL: Storm water management must be operational throughout LOM. Berms must be used to prevent sedimentation of downstream environment and wetlands. Implement an Alien Invasive Plant management plan throughout the life of mine. Waste storage areas must be managed to minimize impact to surface and groundwater resources. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) are cleaned and the area rehabilitated immediately. Trench mining area must be rehabilitated as the mining progresses according to the rehabilitation plan and recommendations of the floral specialist.	Continuous or as needed through Operational phase of mine.	Ongoing monitoring of: AIPs, Wetlands and Rehabilitated areas.	Annually.	External EAP	NEMA; NWA; GN 509 GG 40229 of 2016 as it relates to the NWA and Requirements of the GN 704.
				Neg	**Post-mitigation**	**12**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Surface Water**	Sedimentation to downstream drainage lines/ watercourses.	Neg	**Pre-mitigation**	**66**	**Moderate**	AVOID: Regulatory buffers of surface water resources including wetlands must be avoided. MINIMIZE/ CONTROL: Construction should take place in dry conditions. Footprint area must be kept to the smallest possible area. Storm water management must be implemented as per specialist recommendations. REMEDY: None	Design and Construction phase. However, measures are continued throughout LOM.	Visual inspection of demarcation of sensitive areas Visual inspection of Stormwater management infrastructure	Weekly Weekly Annually	ECO ECO Independent Auditor	NEMA; NWA; GN 509 GG 40229 of 2016 as it relates to the NWA and Requirements of the GN 704.
				Neg	**Post-mitigation**	**36**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Surface Water**	Hydrocarbon fuel spillage and contamination of downstream surface water resources.	Neg	**Pre-mitigation**	**66**	**Moderate**	AVOID: Regulatory buffers of surface water resources including wetlands must be avoided. MINIMIZE/ CONTROL: Storm water management must be implemented as per specialist recommendations to ensure dirty water is captured. Vehicles must be services timeously to prevent leakages. Good housekeeping for parking areas including use drip trays. REMEDY: Ensure all spills (hydrocarbon or other) are cleaned and remedied immediately.	Continuous or as needed through Operational phase of mine.	Visual inspection of demarcation of sensitive areas Visual inspection of Stormwater management infrastructure	Weekly Weekly Annually	ECO ECO Independent Auditor	NEMA; NWA; GN 509 GG 40229 of 2016 as it relates to the NWA and Requirements of the GN 704.
				Neg	**Post-mitigation**	**36**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Operational**	**Surface Water**	Flooding of infrastructure area and mining blocks.	Neg	**Pre-mitigation**	**90**	**High**	AVOID: Regulatory buffers of surface water resources including wetlands, rivers and drainage lines must be avoided and all activities must be outside the 1:100 year floodline. MINIMIZE/ CONTROL: Construction should take place in dry conditions. Storm water management must be implemented as per specialist recommendations.	Design and Construction phase. However, measures are continued throughout LOM.	GN 704 Audits (simultaneous with WUL Audit and/or Annual EMPr compliance audit)	Annually	Independent Auditor	NEMA; NWA; GN 509 GG 40229 of 2016 as it relates to the NWA and Requirements of the GN 704.
				Neg	**Post-mitigation**	**30**	**Low**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Surface Water**	Pollution of downstream surface water resources due to contaminated and sediment loaded storm water.	Neg	**Pre-mitigation**	**91**	**High**	AVOID: Regulatory buffers of surface water resources must be avoided. MINIMIZE/ CONTROL: Storm water management plan must be implemented as per specialist recommendations to ensure dirty water is captured. Vehicles must be services timeously to prevent leakages. Good housekeeping must be employed for all areas for example all hydrocarbon areas to be bunded and roofed. REMEDY: Ensure all spills (hydrocarbon, sediment loaded or other) are cleaned and remedied immediately. Concurrent rehabilitation of mining areas to be undertaken as per the rehabilitation plan.	Continuous or as needed through Operational phase of mine.	GN704 audits Annual EMPr Compliance Audits	Annually	Independent Auditor	NEMA; NWA; GN 509 GG 40229 of 2016 as it relates to the NWA and Requirements of the GN 704.
				Neg	**Post-mitigation**	**36**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Surface Water**	Siltation of water resources due to erosion of post-mining landscape.	Neg	**Pre-mitigation**	**78**	**Moderate**	AVOID: None MINIMIZE/ CONTROL: Rehabilitation footprint must not exceed that of the designated footprint of the mining areas. REMEDY: Final rehabilitation of mining areas as well as infrastructure areas must be done according to the final closure and rehabilitation plan with recommendations from a floral and soil specialist. Rehabilitation must promote natural runoff of areas. Ensure all spills (hydrocarbon, gypsum, sediment or other) are cleaned and the area rehabilitated immediately.	Decommissioning and rehabilitation phase.	Post-rehabilitation monitoring on all rehabilitated areas annually with update of rehabilitation / closure plan and financial provision	Annually (per concurrent rehabilitation) and upon closure	Independent EAP	NEMA; NWA; GN 509 GG 40229 of 2016 as it relates to the NWA and Requirements of the GN 704.
				Neg	**Post-**	**36**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Air Quality**	Dust generation	Neg	**Pre-mitigation**	**56**	**Moderate**	AVOID: None MINIMIZE/ CONTROL: Limit the use of untreated roads as far as possible. REMEDY: Have clearly defined hauling routes/vehicle access areas. All main hauling roads should be treated for dust suppression. Conduct regular cleaning/sweeping of paved road surfaces to prevent the accumulation of dust. Conduct regular maintenance and checks for haul road surfaces. Immediate clean-up of any spillage. All material that is being transported should be covered during transport.	Continuous or as needed through Operational phase of mine.	Dust fallout monitoring as per the National Dust Control Regulations (2013) and reporting. NAIES Reporting	Monthly dust fallout monitoring NAIES Reporting (annual)	External EAP or on site ECO	National Environmental Management: Air Quality Act National Dust Control Regulations (2013). National Atmospheric Emissions Reporting Regulations Gazette No 38633 of 2015 and associated regulations.
				Neg	**Post-mitigation**	**35**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Air Quality**	Particulates- PM10 & PM 2.5	Neg	**Pre-mitigation**	**80**	**Moderate**	AVOID: None MINIMIZE/ CONTROL: Limit the use of untreated roads as far as possible. REMEDY: Have clearly defined hauling routes/vehicle access areas. All main hauling roads should be treated for dust suppression. Conduct regular cleaning/sweeping of paved road surfaces to prevent the accumulation of dust. Conduct regular maintenance and checks for haul road surfaces. Immediate clean-up of any spillage. All material that is being transported should be covered during transport.	Continuous or as needed through Operational phase of mine.	PM10 & PM2.5 ambient monitoring and reporting. NAIES Reporting	Continuous PM10 and PM2.5 monitoring, with annual reporting. NAIES Reporting (annual)	External EAP or on site ECO	National Environmental Management: Air Quality Act National Dust Control Regulations (2013). National Atmospheric Emissions Reporting Regulations Gazette No 38633 of 2015 and associated regulations.
				Neg	**Post-mitigation**	**35**	**Low**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Air Quality**	Dust generation	Neg	**Pre-mitigation**	**72**	**Moderate**	AVOID: None MINIMIZE/ CONTROL: Limit the use of untreated roads as far as possible. REMEDY: Enforce speed limits. Dust suppression. Cover stockpiles. Reduce tipping heights.	Continuous or as needed through Operational phase of mine.	Dust fallout monitoring as per the National Dust Control Regulations (2013) and reporting. NAIES Reporting	Monthly dust fallout monitoring NAIES Reporting (annual)	External EAP or on site ECO	National Environmental Management: Air Quality Act National Dust Control Regulations (2013). National Atmospheric Emissions Reporting Regulations Gazette No 38633 of 2015 and associated regulations.
				Neg	**Post-mitigation**	**32**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Air Quality**	Particulates- PM10 & PM 2.5	Neg	**Pre-mitigation**	**96**	**High**	AVOID: None MINIMIZE/ CONTROL: Limit the use of untreated roads as far as possible. REMEDY: Have clearly defined hauling routes/vehicle access areas. All main hauling roads should be treated for dust suppression. Conduct regular cleaning/sweeping of paved road surfaces to prevent the accumulation of dust. Conduct regular maintenance and checks for haul road surfaces. Immediate clean-up of any spillage. All material that is being transported should be covered during transport.	Continuous or as needed through Operational phase of mine.	PM10 & PM2.5 ambient monitoring and reporting. NAIES Reporting	Continuous PM10 and PM2.5 monitoring, with annual reporting. NAIES Reporting (annual)	External EAP or on site ECO	National Environmental Management: Air Quality Act National Dust Control Regulations (2013). National Atmospheric Emissions Reporting Regulations Gazette No 38633 of 2015 and associated regulations.
				Neg	**Post-mitigation**	**36**	**Low**						
Decommissioning & Rehabilitation	**Decommissioning**	**Air Quality**	Dust generation	Neg	**Pre-mitigation**	**48**	**Moderate**	AVOID: None MINIMIZE/ CONTROL: Limit the use of untreated roads as far as possible. REMEDY: Have clearly defined hauling routes/vehicle access areas. All main hauling roads should be treated for dust suppression. Conduct regular cleaning/sweeping of paved road surfaces to prevent the accumulation of dust. Conduct regular maintenance and checks for haul road surfaces. Immediate clean-up of any spillage. All material that is being transported should be covered during transport (where possible).	Continuous or as needed through Operational phase of mine.	Monitor truck exhaust emissions where possible	Only if required as per internal emission control strategy	Air Quality Specialist	National Environmental Management: Air Quality Act National Dust Control Regulations (2013). National Atmospheric Emissions Reporting Regulations Gazette No 38633 of 2015 and associated regulations.
				Neg	**Post-mitigation**	**21**	**Low**					Air Quality Specialist	
Decommissioning & Rehabilitation	**Decommissioning**	**Air Quality**	Emissions	Neg	**Pre-mitigation**	**56**	**Moderate**	AVOID: Speeding, overloading trucks and non-fuel efficient vehicles. MINIMIZE/CONTROL: The number of trucks on the road, weight of trucks and the travelling speed. REMEDY: Implement strict vehicle speed limits. Consider use of cleaner fuel types and more fuel-efficient vehicles/mobile equipment/trucks. Make use of more modern, fuel efficient trucks/vehicles; which have improved exhaust emission control devices/systems in place; Switch off engines whilst not in use; Determine desired emission rates and measure/monitor truck exhaust emissions against these desired levels (if practical). Establish a maintenance schedule to ensure proper maintenance of the trucks & mobile equipment; Conduct regular maintenance and quality checks (engines/tyres) for all heavy mobile equipment/trucks. Ensure optimal fuel combustion efficiency; Develop an integrated emission control strategy that involves all departments of mine (i.e. management, production, maintenance and environment, health & safety).	Continuous or as needed through Operational phase of mine.	Monitor truck exhaust emissions where possible	Only if required as per internal emission control strategy	Air Quality Specialist	National Environmental Management: Air Quality Act National Dust Control Regulations (2013). National Atmospheric Emissions Reporting Regulations Gazette No 38633 of 2015 and associated regulations.
				Neg	**Post-mitigation**	**24**	**Low**					Air Quality Specialist	

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Traffic**	Increase in traffic	Neg	Pre-mitigati	54	Moderate	AVOID: Speeding will not be allowed MINIMIZE/ CONTROL: None Unnecessary trips to and from the mine will be minimised REMEDY: ▪Enforce speed limits	Continuous	Internal inspections External EMPr Audit	Weekly/monthly Annual	ECO EAP	National Road Traffic Act 93 of 1996 the National Land Transport Act (Act No 5 of 2009) Section 35
				Neg	Post -	36	Low					ECO EAP	
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Traffic**	Wear and tear on road	Neg	Pre-mitigation	60	Moderate	AVOID: Speeding will not be allowed. MINIMIZE/ CONTROL: None REMEDY: ▪Enforce speed limits ▪Follow road rules ▪The mine will have to undertake regular maintenance of the service road and the R355 and will contribute towards the costs of the maintenance in agreement with Transnet and the Northern Cape Provincial Department of Transport. This will include the re-cutting and cleaning of side-drains and pipes and grading and shaping as well as dust suppression (where required).	Continuous	Monitor the traffic conditions on the roads which are used by the mine-generated-traffic by means of sample traffic counts	Every three years	Traffic engineer	National Road Traffic Act 93 of 1996 the National Land Transport Act (Act No 5 of 2009) Section 35
				Neg	Post-mitigation	36	Low					Traffic engineer	
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Construction & Operation**	**Heritage**	Heritage site discovered and potentially destroyed	Neg	Pre-mitigation	57	Moderate	AVOID: Areas that could have heritage significance such as grave sites if any are discovered on or around the site. MINIMIZE/ CONTROL: None. REMEDY: Immediately contact a qualified archaeologist if there is any suspicion that a heritage site may have been uncovered. 'Chance find Procedure' should be followed: ▪ Upon finding any archaeological or historical material all work at the affected area must cease. ▪ The area should be demarcated to prevent any further work there until an investigation has been completed. ▪ An archaeologist should be contacted immediately to provide advice on the matter. ▪ If needed the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist. ▪ The removal of such archaeological material will only be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter. ▪ Work on site will only continue after the archaeologist/ SAHRA has agreed to such continuance. ▪If any evidence of archaeological sites and remains are identified SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted. ▪If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately.	Throughout life of mine / as relevant if / when potential sites of heritage significance are uncovered	Official monitoring will not occur but as a site is come across an archaeologist will be contacted	Official monitoring will not occur if a site is identified / suspected an archaeologist will be contacted	If heritage site is discovered an archaeologist will assess	National Heritage Resources Act (Act 25 of 1999)
				Neg	Post-mitigation	20	Low						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment. Rehabilitation and Closure of mine areas.	**Construction, Operation & Decommissioning**	**Safety & Security**	Crime & security/safety incidences	Neg	**Pre-mitigation**	**40**	**Moderate**	AVOID: None MINIMIZE/ CONTROL: Sign in upon entering site. Breathalyzer tests to be given to all entering site. Complaints register to be available at security. Visitors to be inducted before going on site. Mine and dangerous areas to be fenced off for safety. All employees and visitors to wear PPE on site. REMEDY: None	Throughout life of mine	Monitoring of complaints register and if complaints have been addressed. Monitoring to ensure that fences are all intact and that visitors are undergoing induction. Monitoring to ensure that all employees and visitors are wearing PPE. Monitoring to ensure that all employees and visitors are wearing PPE.	Weekly/monthly inspections of complaints register and mine fencing Ongoing inspections of PPE being worn on site Annual internal EMPr audit Ongoing inspections of PPE being worn on site Annual internal EMP audit Annual external EMPr audit	Internal ECO undertaking inspections EAP undertaking annual EMPr audit	Mine Health and Safety Act (Act 29 of 1996) as amended
				Neg	**Post-mitigation**	**24**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment. Rehabilitation and Closure of mine areas.	**Construction, Operation & Decommissioning**	**Noise**	Noise pollution and damage of hearing to workers near loud machinery	Neg	**Pre-mitigation**	**40**	**Moderate**	AVOID: Use of loud machinery at night- latest operating hours are until 7pm. MINIMIZE/ CONTROL: Sound mufflers to be used on vehicles. Reverse beeping to have a reverse flashing light if vehicles used at night. Workers to wear PPE (ear plugs) when near loud machinery. REMEDY: None	Throughout life of mine	Inspection of usage of PPE	Ongoing inspections of PPE being worn on site	Internal ECO	Mine Health and Safety Act (Act 29 of 1996) as amended
				Neg	**Post-mitigation**	**27**	**Low**						
Non-mineral waste management	**Construction, Operation & Decommissioning**	**Waste**	Pollution	Neg	**Pre-mitigation**	**56**	**Moderate**	AVOID: Littering MINIMIZE/CONTROL: Waste to be separated and hazardous waste to be disposed of at a reputable hazardous waste service provider REMEDY: Weekly inspections of littering/hazardous spills	Continuous or as needed through Operational phase of mine.	Monitoring of site to ensure no hazardous spills or littering Inspections that there are safety disposal certificates	Weekly	ECO	NEMA; NWA; GN 509 GG 40229 of 2016 as it relates to the NWA and Requirements of the GN 704.
				Neg	**Post-**	**25**	**Low**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Groundwater**	Impacts on groundwater quality due to poor quality seepage from the operational area	Neg	**Pre-mitigation**	**65**	**Moderate**	AVOID: Use of hydrocarbons and hazardous chemicals on bare soil MINIMIZE/ CONTROL: None REMEDY: Refuelling and hydrocarbon stores to be cemented floors so that no seepage can occur. Leaking machinery to have drip trays beneath them. Monitor groundwater quality.	Continuous	Inspection of fuel storage, hydrocarbon storage and that spill kits are used Groundwater sampling	Weekly Groundwater sampling to occur on a monthly basis during the first year of	ECO/EAP	NEMA:WA, GN 634, GN 635 & GN 640

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
				Neg	Post-mitigation	36	Low	Implement management measures as necessary The product stockpile will continuously be removed when the product is sold and transported off site. Rainfall in the area is low and intermittent and it is not expected that there will be significant seepage from the product stockpile towards the underlying aquifers			operation and quarterly after the first year of operation		
Rehabilitation	**Post-Operational**	**Groundwater**	Impacts on groundwater quality due to poor quality seepage from the trench area	Neg	Pre-mitigation	60	Moderate	Calculations show that the contaminant plume will migrate up to 250 m from the edge of the trench in a down gradient direction. Plume migration must be monitored for a period of at least 5 years post-closure and mitigation (cut-off trenches or intercepting drains) implemented if required	Continuous	Groundwater monitoring	Quarterly for 5 years post closure	ECO/EAP	NEMA:WA, GN 634, GN 635 & GN 644
				Neg	Post-mitigation	24	Low						
Rehabilitation	**Post-Operational**	**Groundwater**	Impacts on groundwater quality due to poor quality seepage from the operational area	Neg	Pre-mitigation	60	Moderate	AVOID: Use of hydrocarbons on bare soil MINIMIZE/ CONTROL: None REMEDY: Refuelling and hydrocarbon stores to be cemented floors so that no seepage can occur. Leaking machinery to have drip trays beneath them. Monitor groundwater quality. Implement management measures as necessary	Continuous	Inspection of fuel storage, hydrocarbon storage and that spill kits are used Groundwater sampling	Weekly Groundwater sampling to occur on a monthly basis during the first year of operation and quarterly after the first year of operation	ECO/EAP	NEMA:WA, GN 634, GN 635 & GN 644
				Neg	Post-mitigation	20	Low						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Impact on landscape character and sense of place due to: alteration of topography, increased vehicular activity and dust.	Neg	Pre-mitigation	66	Moderate	AVOID: Fires must be prevented. Uplighting and unshielded lighting must be avoided. MINIMIZE/ CONTROL: Footprint area must be made to be the smallest possible area. Activities must be restricted to daylight hours. Colours of buildings must match surrounding landscape as far as possible. Vehicles must stick to speed limit on site. Stockpiles must not exceed 3m in height. Good housekeeping must be in place for all areas, keeping the project site neat and orderly. REMEDY: Ensure all litter or disorderly areas are cleaned and remedied immediately.	Design and Construction phase. However, measures are continued throughout LOM.	Visual Monitoring Plan must be designed and implemented as per specialist recommendations.	Weekly	ECO	NEMA; 2014 NEMA EIA regulations as amended (published in General Notice (GN) No. R.982 as well as R 983 Listing Notice 1, R 984 Listing Notice 2 and R 985 Listing Notice 3). National Environmental Management: Protected Areas Act (Act 57 of 2003)NEM:PAA National Heritage Resources Act (Act 25 of 1999)NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	Post-mitigation	48	Moderate						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Impact on landscape character and sense of place due to: alteration of topography through the growth in stockpiles, erosion + AIPs altering the landscape, and continued earthworks and vehicular activity leading to generation of dust.	Neg	**Pre-mitigation**	**78**	**Moderate**	AVOID: Fires must be prevented. Uplighting and unshielded lighting must be avoided. MINIMIZE/ CONTROL: Vehicles must not be allowed to drive around site or around sensitive areas; they must remain in designated areas and roads. Stockpiles must not exceed 3m in height and must be shaped to match undulating landscape. Good housekeeping must be in place for all areas, keeping the project site neat and orderly at all times. Alien Invasive Plant management plan must be implemented. Waste storage areas must be screened if needed. Dust management plan must be implemented. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) and litter incidents are cleaned and the area rehabilitated immediately. Erosion must be rehabilitated as soon as it is observed. Trench mining area must be rehabilitated as the mining progresses according to the rehabilitation plan and recommendations of the floral specialist.	Continuous or as needed through Operational phase of mine.	Visual Monitoring Plan must be implemented as per specialist recommendations. Visual impact must be included as part of annual external environmental audit.	Monthly monitoring. Annual external audit.	ECO for monthly (ongoing) monitoring. External EAP for annual audit of EMPr.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**66**	**Moderate**						
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Impact on landscape character and sense of place due to: erosion, AIPs and dust generation from rehabilitated landscape.	Neg	**Pre-mitigation**	**48**	**Moderate**	AVOID: Fires must be prevented. MINIMIZE/ CONTROL: Rehabilitation footprint must not exceed that of the designated footprint of the mining areas. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment, litter or other) are cleaned and the area rehabilitated immediately. Final rehabilitation of mining areas as well as infrastructure areas must be done according to the rehabilitation plan and recommendations of the floral specialist with visual appeal in mind.	Decommissioning and rehabilitation phase.	Visual impact monitoring can continue with assessment of rehabilitation success as per rehabilitation plan.	Biannually for three years post-closure. Thereafter annually or as required for closure.	Rehabilitation specialist.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**36**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Visual Intrusion and VAC Impacts due to: alteration of topography, landscape scarring, and increased vehicular activity.	Neg	**Pre-mitigation**	**66**	**Moderate**	AVOID: Fires must be prevented. MINIMIZE/ CONTROL: Footprint area must be made to be the smallest possible area. Activities must be restricted to daylight hours. Colours of buildings must match surrounding landscape as far as possible. Mining activities and vehicles must remain out of sensitive areas. Vehicles must stick to speed limit on site. Stockpiles must not exceed 3m in height. Good housekeeping must be in place for all areas, keeping the project site neat and orderly. REMEDY: Ensure all litter or disorderly areas are cleaned and remedied immediately.	Design and Construction phase. However, measures are continued throughout LOM.	Visual Monitoring Plan must be designed and implemented as per specialist recommendations.	Weekly	ECO	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**54**	**Moderate**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Visual Intrusion and VAC Impacts due to: alteration of topography through the growth in stockpiles, erosion + AIPs scarring the landscape, with continued earthworks and vehicular activity.	Neg	**Pre-mitigation**	**90**	**High**	AVOID: Fires must be prevented. MINIMIZE/ CONTROL: Vehicles must not be allowed to drive around site or around sensitive areas unnecessarily; they must remain in designated areas and roads. Stockpiles must not exceed 3m in height and must be shaped to match undulating landscape. Good housekeeping must be in place for all areas, keeping the project site neat and orderly at all times. Alien Invasive Plant management plan must be implemented. Waste storage areas must be screened if needed. Dust management plan must be implemented. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) and litter incidents are cleaned and the area rehabilitated immediately. Erosion must be rehabilitated as soon as it is observed. Trench mining area must be rehabilitated as the mining progresses according to the rehabilitation plan and recommendations of the floral specialist.	Continuous or as needed through Operational phase of mine.	Visual Monitoring Plan must be implemented as per specialist recommendations. Visual impact must be included as part of annual external environmental audit.	Monthly monitoring. Annual external audit.	ECO for monthly (ongoing) monitoring. External EAP for annual audit of EMPr.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**72**	**Moderate**						
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Visual Intrusion and VAC Impacts due to: rehabilitated landscape resulting in erosion, AIPs and bare ground scarring the landscape.	Neg	**Pre-mitigation**	**65**	**Moderate**	AVOID: Fires must be prevented. Uplighting and unshielded lighting must be avoided. MINIMIZE/ CONTROL: Rehabilitation footprint must not exceed that of the designated footprint of the mining areas. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) are cleaned and the area rehabilitated immediately. Final rehabilitation of mining areas as well as infrastructure areas must be done according to the rehabilitation plan and recommendations of the floral specialist with visual appeal in mind.	Decommissioning and rehabilitation phase.	Visual impact monitoring can continue with assessment of rehabilitation success as per rehabilitation plan.	Biannually for three years post-closure. Thereafter annually or as required for closure.	Rehabilitation specialist.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**36**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Visual exposure and Visibility Impacts due to: alteration of topography, erosion, AIPs and vehicular activity leading to site in contrast to the landscape.	Neg	**Pre-mitigation**	**72**	**Moderate**	AVOID: Fires must be prevented. MINIMIZE/ CONTROL: Footprint area must be made to be the smallest possible area. Activities must be restricted to daylight hours. Colours of buildings must match surrounding landscape as far as possible. Mining activities and vehicles must remain out of sensitive areas. Vehicles must stick to speed limit ton site. Stockpiles must not exceed 3m in height. Good housekeeping must be in place for all areas, keeping the project site neat and orderly. REMEDY: Ensure all litter or disorderly areas are cleaned and remedied immediately.	Design and Construction phase. However, measures are continued throughout LOM.	Visual Monitoring Plan must be designed and implemented as per specialist recommendations.	Weekly	ECO	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**40**	**Moderate**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Visual exposure and Visibility Impacts due to: alteration of topography, erosion, AIPs, continued earthworks and vehicular activity leading to site in contrast to the landscape.	Neg	**Pre-mitigation**	**90**	**High**	AVOID: Fires must be prevented. MINIMIZE/ CONTROL: Vehicles must not be allowed to drive outside of designated areas and must stick to speed limit. Stockpiles must not exceed 3m in height and must be shaped to match undulating landscape. Good housekeeping must be in place for all areas, keeping the project site neat and orderly at all times. Alien Invasive Plant management plan must be implemented. Waste storage areas must be screened if needed. Dust management plan must be implemented. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) and litter incidents are cleaned and the area rehabilitated immediately. Erosion must be rehabilitated as soon as it is observed. Trench mining area must be rehabilitated as the mining progresses according to the rehabilitation plan and recommendations of the floral specialist.	Continuous or as needed through Operational phase of mine.	Visual Monitoring Plan must be implemented as per specialist recommendations. Visual impact must be included as part of annual external environmental audit.	Monthly monitoring. Annual external audit.	ECO for monthly (ongoing) monitoring. External EAP for annual audit of EMPr.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**55**	**Moderate**						
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Visual exposure and Visibility Impacts due to: rehabilitated landscape resulting in erosion, AIPs and bare ground scarring the landscape.	Neg	**Pre-mitigation**	**48**	**Moderate**	AVOID: Sensitive areas must continue to be avoided. MINIMIZE/ CONTROL: Rehabilitation footprint must not exceed that of the designated footprint of the mining areas. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) are cleaned and the area rehabilitated immediately. Final rehabilitation of mining areas as well as infrastructure areas must be done according to the rehabilitation plan and recommendations of the floral specialist with visual appeal in mind.	Decommissioning and rehabilitation phase.	Visual impact monitoring can continue with assessment of rehabilitation success as per rehabilitation plan.	Biannually for three years post-closure. Thereafter annually or as required for closure.	Rehabilitation specialist.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**36**	**Low**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Impacts due to Night time lighting resulting in light pollution.	Neg	**Pre-mitigation**	**90**	**High**	AVOID: Uplighting and unshielded lighting must be avoided. MINIMIZE/ CONTROL: Activities must be restricted to daylight hours. Lighting must be: low-level, of limited height and lumen/wattage and designed as per specialist recommendations.	Continuous or as needed through Operational phase of mine.	Visual Monitoring Plan must be implemented as per specialist recommendations. Visual impact must be included as part of annual external environmental audit.	Monthly monitoring. Annual external audit.	ECO for monthly (ongoing) monitoring. External EAP for annual audit of EMPr.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**39**	**Low**						
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Impacts due to Night time lighting resulting in light pollution.	Neg	**Pre-mitigation**	**65**	**Moderate**	AVOID: Uplighting and unshielded lighting must be avoided. MINIMIZE/ CONTROL: Activities must be restricted to daylight hours. Lighting must be: low-level, of limited height and lumen/wattage and designed as per specialist recommendations.	Decommissioning and rehabilitation phase.	Visual impact monitoring can continue with assessment of rehabilitation success as per rehabilitation plan.	Biannually for three years post-closure. Thereafter annually or as required for closure.	Rehabilitation specialist.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**27**	**Low**						

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Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Impact on landscape character and sense of place due to: alteration of topography, increased vehicular activity and dust.	Neg	**Pre-mitigation**	**66**	**Moderate**	AVOID: Fires must be prevented. Uplighting and unshielded lighting must be avoided. MINIMIZE/ CONTROL: Footprint area must be made to be the smallest possible area. Activities must be restricted to daylight hours. Colours of buildings must match surrounding landscape as far as possible. Vehicles must stick to speed limit on site. Stockpiles must not exceed 3m in height. Good housekeeping must be in place for all areas, keeping the project site neat and orderly. REMEDY: Ensure all litter or disorderly areas are cleaned and remedied immediately.	Design and Construction phase. However, measures are continued throughout LOM.	Visual Monitoring Plan must be designed and implemented as per specialist recommendations.	Weekly	ECO	NEMA; 2014 NEMA EIA regulations as amended (published in General Notice (GN) No. R.982 as well as R 983 Listing Notice 1, R 984 Listing Notice 2 and R 985 Listing Notice 3). National Environmental Management: Protected Areas Act (Act 57 of 2003)NEM:PAA National Heritage Resources Act (Act 25 of 1999)NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**48**	**Moderate**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Impact on landscape character and sense of place due to: alteration of topography through the growth in stockpiles, erosion + AIPs altering the landscape, and continued earthworks and vehicular activity leading to generation of dust.	Neg	**Pre-mitigation**	**78**	**Moderate**	AVOID: Fires must be prevented. Uplighting and unshielded lighting must be avoided. MINIMIZE/ CONTROL: Vehicles must not be allowed to drive around site or around sensitive areas; they must remain in designated areas and roads. Stockpiles must not exceed 3m in height and must be shaped to match undulating landscape. Good housekeeping must be in place for all areas, keeping the project site neat and orderly at all times. Alien Invasive Plant management plan must be implemented. Waste storage areas must be screened if needed. Dust management plan must be implemented. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) and litter incidents are cleaned and the area rehabilitated immediately. Erosion must be rehabilitated as soon as it is observed. Trench mining area must be rehabilitated as the mining progresses according to the rehabilitation plan and recommendations of the floral specialist.	Continuous or as needed through Operational phase of mine.	Visual Monitoring Plan must be implemented as per specialist recommendations. Visual impact must be included as part of annual external environmental audit.	Monthly monitoring. Annual external audit.	ECO for monthly (ongoing) monitoring. External EAP for annual audit of EMPr.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**66**	**Moderate**						
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Impact on landscape character and sense of place due to: erosion, AIPs and dust generation from rehabilitated landscape.	Neg	**Pre-mitigation**	**48**	**Moderate**	AVOID: Fires must be prevented. MINIMIZE/ CONTROL: Rehabilitation footprint must not exceed that of the designated footprint of the mining areas. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment, litter or other) are cleaned and the area rehabilitated immediately. Final rehabilitation of mining areas as well as infrastructure areas must be done according to the rehabilitation plan and recommendations of the floral specialist with visual appeal in mind.	Decommissioning and rehabilitation phase.	Visual impact monitoring can continue with assessment of rehabilitation success as per rehabilitation plan.	Biannually for three years post-closure. Thereafter annually or as required for closure.	Rehabilitation specialist.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**36**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Visual Intrusion and VAC Impacts due to: alteration of topography, landscape scarring, and increased vehicular activity.	Neg	**Pre-mitigation**	**66**	**Moderate**	AVOID: Fires must be prevented. MINIMIZE/ CONTROL: Footprint area must be made to be the smallest possible area. Activities must be restricted to daylight hours. Colours of buildings must match surrounding landscape as far as possible. Mining activities and vehicles must remain out of sensitive areas. Vehicles must stick to speed limit on site. Stockpiles must not exceed 3m in height. Good housekeeping must be in place for all areas, keeping the project site neat and orderly. REMEDY: Ensure all litter or disorderly areas are cleaned and remedied immediately.	Design and Construction phase. However, measures are continued throughout LOM.	Visual Monitoring Plan must be designed and implemented as per specialist recommendations.	Weekly	ECO	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**54**	**Moderate**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Visual Intrusion and VAC Impacts due to: alteration of topography through the growth in stockpiles, erosion + AIPs scarring the landscape, with continued earthworks and vehicular activity.	Neg	**Pre-mitigation**	**90**	**High**	AVOID: Fires must be prevented. MINIMIZE/ CONTROL: Vehicles must not be allowed to drive around site or around sensitive areas unnecessarily; they must remain in designated areas and roads. Stockpiles must not exceed 3m in height and must be shaped to match undulating landscape. Good housekeeping must be in place for all areas, keeping the project site neat and orderly at all times. Alien Invasive Plant management plan must be implemented. Waste storage areas must be screened if needed. Dust management plan must be implemented. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) and litter incidents are cleaned and the area rehabilitated immediately. Erosion must be rehabilitated as soon as it is observed. Trench mining area must be rehabilitated as the mining progresses according to the rehabilitation plan and recommendations of the floral specialist.	Continuous or as needed through Operational phase of mine.	Visual Monitoring Plan must be implemented as per specialist recommendations. Visual impact must be included as part of annual external environmental audit.	Monthly monitoring. Annual external audit.	ECO for monthly (ongoing) monitoring. External EAP for annual audit of EMPr.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**72**	**Moderate**						
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Visual Intrusion and VAC Impacts due to: rehabilitated landscape resulting in erosion, AIPs and bare ground scarring the landscape.	Neg	**Pre-mitigation**	**65**	**Moderate**	AVOID: Fires must be prevented. Uplighting and unshielded lighting must be avoided. MINIMIZE/ CONTROL: Rehabilitation footprint must not exceed that of the designated footprint of the mining areas. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) are cleaned and the area rehabilitated immediately. Final rehabilitation of mining areas as well as infrastructure areas must be done according to the rehabilitation plan and recommendations of the floral specialist with visual appeal in mind.	Decommissioning and rehabilitation phase.	Visual impact monitoring can continue with assessment of rehabilitation success as per rehabilitation plan.	Biannually for three years post-closure. Thereafter annually or as required for closure.	Rehabilitation specialist.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	**Post-mitigation**	**36**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Visual**	Visual exposure and Visibility Impacts due to: alteration of topography, erosion, AIPs and vehicular activity leading to site	Neg	**Pre-mitigation**	**72**	**Moderate**	AVOID: Fires must be prevented. MINIMIZE/ CONTROL: Footprint area must be made to be the smallest possible area. Activities must be restricted to daylight hours. Colours of buildings must match surrounding landscape as far as possible. Mining activities and vehicles must remain out of sensitive areas. Vehicles must	Design and Construction phase. However, measures are continued throughout LOM.	Visual Monitoring Plan must be designed and implemented as per specialist recommendations.	Weekly	ECO	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940)

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
			in contrast to the landscape.	Neg	Post-mitigation	40	Moderate	stick to speed limit ton site. Stockpiles must not exceed 3m in height. Good housekeeping must be in place for all areas, keeping the project site neat and orderly. REMEDY: Ensure all litter or disorderly areas are cleaned and remedied immediately.					Municipal Systems Act (Act 32 of 2000)
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Visual exposure and Visibility Impacts due to: alteration of topography, erosion, AIPs, continued earthworks and vehicular activity leading to site in contrast to the landscape.	Neg	Pre-mitigation	90	High	AVOID: Fires must be prevented. MINIMIZE/ CONTROL: Vehicles must not be allowed to drive outside of designated areas and must stick to speed limit. Stockpiles must not exceed 3m in height and must be shaped to match undulating landscape. Good housekeeping must be in place for all areas, keeping the project site neat and orderly at all times. Alien Invasive Plant management plan must be implemented. Waste storage areas must be screened if needed. Dust management plan must be implemented. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) and litter incidents are cleaned and the area rehabilitated immediately. Erosion must be rehabilitated as soon as it is observed. Trench mining area must be rehabilitated as the mining progresses according to the rehabilitation plan and recommendations of the floral specialist.	Continuous or as needed through Operational phase of mine.	Visual Monitoring Plan must be implemented as per specialist recommendations. Visual impact must be included as part of annual external environmental audit.	Monthly monitoring. Annual external audit.	ECO for monthly (ongoing) monitoring. External EAP for annual audit of EMPr.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	Post-mitigation	55	Moderate						
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Visual exposure and Visibility Impacts due to: rehabilitated landscape resulting in erosion, AIPs and bare ground scarring the landscape.	Neg	Pre-mitigation	48	Moderate	AVOID: Sensitive areas must continue to be avoided. MINIMIZE/ CONTROL: Rehabilitation footprint must not exceed that of the designated footprint of the mining areas. REMEDY: Ensure all spills (hydrocarbon, gypsum, sediment or other) are cleaned and the area rehabilitated immediately. Final rehabilitation of mining areas as well as infrastructure areas must be done according to the rehabilitation plan and recommendations of the floral specialist with visual appeal in mind.	Decommissioning and rehabilitation phase.	Visual impact monitoring can continue with assessment of rehabilitation success as per rehabilitation plan.	Biannually for three years post-closure. Thereafter annually or as required for closure.	Rehabilitation specialist.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	Post-mitigation	36	Low						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operation**	**Visual**	Impacts due to Night time lighting resulting in light pollution.	Neg	Pre-mitigation	90	High	AVOID: Uplighting and unshielded lighting must be avoided. MINIMIZE/ CONTROL: Activities must be restricted to daylight hours. Lighting must be: low-level, of limited height and lumen/wattage and designed as per specialist recommendations.	Continuous or as needed through Operational phase of mine.	Visual Monitoring Plan must be implemented as per specialist recommendations. Visual impact must be included as part of annual external environmental audit.	Monthly monitoring. Annual external audit.	ECO for monthly (ongoing) monitoring. External EAP for annual audit of EMPr.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
				Neg	Post-mitigation	39	Low						
Decommissioning, Rehabilitation and Closure of mine areas.	**Decommissioning**	**Visual**	Impacts due to Night time lighting resulting in light pollution.	Neg	Pre-mitigation	65	Moderate	AVOID: Uplighting and unshielded lighting must be avoided. MINIMIZE/ CONTROL: Activities must be restricted to daylight hours. Lighting must be: low-level, of limited height and	Decommissioning and rehabilitation phase.	Visual impact monitoring can continue with assessment of rehabilitation	Biannually for three years post-closure. Thereafter annually or as	Rehabilitation specialist.	NEMA ; 2014 NEMA EIA regulations as amended NEM:PAA NHRA Advertising on Roads

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
				Neg	Post-mitigatio	27	Low	lumen/wattage and designed as per specialist recommendations.		success as per rehabilitation plan.	required for closure.		and Ribbons Act (Act 21 of 1940) Municipal Systems Act (Act 32 of 2000)
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: None. MINIMIZE/ CONTROL: The footprint of the proposed mining area and associated infrastructure area should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint. - Infrastructure sites should be accessed through existing road network, if feasible. REMEDY: The Overburden must be stockpiled according to the required process and adequate measures will be in place to protect the surrounding environmental receptors. Stockpiled material should not stand for too long to avoid erosion to the downgradient receiving environment Recovered soils should be re-used to rehabilitate the mine footprint concurrently as rollover mining progresses; Cleared vegetation should be protected at a nursery for use during rehabilitation phase; All disturbed areas must be re-vegetated with indigenous vegetation to re-establish a protective cover and to minimize the risk of soil erosion. All disturbed areas can be re-vegetated with indigenous vegetation to re-establish a protective cover, to minimize soil erosion.	Construction Demarcation of site should occur prior to construction commencing	Once off assessment undertaken during EIA phase Demarcation to be visually inspected weekly	n/a	Soil Specialist	Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**30**	**Low**				Weekly	ECO	
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil compaction	Neg	**Pre-mitigation**	**52**	**Moderate**	AVOID: Unnecessary surface disturbance of the identified Kimberly/Plooysburg soil forms must be avoided where possible to minimise the intensity of compaction due to their loamy sand texture. MINIMIZE/CONTROL: None. REMEDY: All vehicular traffic should be restricted to the existing service roads as far as practically possible; Vegetation clearance and commencement of construction activities can be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low, such that the soils are less prone to compaction; Soil that have been compacted must be ripped up to 25 cm upon rehabilitation of each section.	Construction	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**30**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: Burying of any waste including rubble, domestic waste, empty containers etc. on the site is strictly prohibited, all construction rubble waste must be removed to an approved disposal site. - Unauthorized discharge of potentially contaminated water should be strictly prohibited on site. MINIMIZE/ CONTROL: None. REMEDY: Clean and dirty water area separation must take place in compliance with Regulation GN704 of the NWA; The potentially contaminated surface runoff must be captured in the vicinity of the mining activities and infrastructure areas in compliance with Regulation GN704, to minimise runoff and/or leaching on to the surrounding soils, and to prevent ingress of potentially contaminated water into the drainage lines within the proposed focus area. this EMPr should be implemented and made available and accessible at all times to the contractors and construction crew conducting the works on site for reference; A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled to guide the construction works; An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress; and Contaminated soils can be ameliorated onsite using suitable soil ameliorants determined by a qualified soil scientist after a soil contamination assessment has been conducted. This will potentially reinstate the natural soil chemistry post mine closure, which will therefore allow for current land use to commence post closure. For small spills the contaminated soils are to be removed off site and disposed of as hazardous waste, and replaced with healthy soils at the contractor's cost Small spills- contaminated soils be removed off site and disposed of as hazardous waste, and replaced with healthy soils at the contractor's cost.	Construction	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**33**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: Construction during wet season should be avoided where possible. MINIMIZE/ CONTROL: Project footprint should be minimised/ restricted to the approved areas, to ensure that there are sufficient soil resources for the duration of mining activities to support potential grazing	Construction	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
				Neg	Post-mitigation	36	Low	REMEDY: Disturbed soils can be lightly ripped to at least 25 cm, where feasible to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion. The recommended ripping and re-vegetation must be implemented concurrently on the subsections where construction works are complete;					
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil erosion	Neg	Pre-mitigation	60	Moderate	AVOID: None. MINIMIZE/ CONTROL: The footprint of the proposed mining area and associated infrastructure area should be clearly demarcated to restrict vegetation clearing activities to within the approved infrastructure footprint. - Infrastructure sites should be accessed through existing road network, if feasible. REMEDY: The materials should be stockpiled as needed according to the required process and adequate measures will be in place to protect the surrounding environmental receptors. Stockpiled material should not stand for too long to minimise the potential for erosion to the downgradient receiving environment Recovered soils should be re-used to rehabilitate the mine footprint following mine closure; Cleared vegetation (SCC/indigenous) should be preserved at a nursery for use during rehabilitation phase; All disturbed areas must be re-vegetated with indigenous vegetation to re-establish a protective cover, to minimize soil erosion.	Continuous or as needed through Operational phase of mine.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	Post-mitigation	33	Low						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil compaction	Neg	Pre-mitigation	52	Moderate	AVOID: Unnecessary surface disturbance of the identified Kimberly/Plooysburg soil forms must be avoided where possible to minimise the intensity of compaction due to their loamy sand texture. MINIMIZE/CONTROL: None. REMEDY: All vehicular traffic should be restricted to the existing service roads as far as practically possible; Disturbed soils should be lightly ripped to at least 25 cm, where feasible to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion	Continuous or as needed through Operational phase of mine.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	Post-mitigation	30	Low						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**70**	**Moderate**	AVOID: Burying of any waste including rubble, domestic waste, empty containers etc. on the site will be strictly prohibited, all operational waste must be removed to an approved disposal site. - Unauthorized discharge of potentially contaminated stormwater should be strictly prohibited on site. MINIMIZE/ CONTROL: None. REMEDY: Clean and dirty water area separation must take place in compliance with Regulation GN704 as it pertains to the NWA; The potentially contaminated surface runoff must be captured in the vicinity of the mining activities and infrastructure areas in compliance with Regulation GN704 as it pertains to the NWA, to minimise runoff and/or leaching on to the surrounding soils, and to prevent ingress of potentially contaminated water into the drainage lines within the proposed focus area. Contamination prevention measures contained in this Environmental Management Programme Report (EMPr) for the proposed development should be implemented and made available and accessible at all times to the contractors and construction crew conducting the works on site for reference; A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled to guide the operations; An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress; and Contaminated soils must be ameliorated onsite using suitable soil ameliorants determined by a qualified soil scientist after a soil contamination assessment has been conducted. This will potentially reinstate the natural soil chemistry post mine closure, which will allow for current landuse to commence post closure	Continuous or as needed through Operational phase of mine.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**36**	**Low**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**70**	**Moderate**	AVOID: none MINIMIZE/ CONTROL: Project footprint should be minimised, where feasible, to ensure that there are sufficient soil resources for the duration of mining activities to support potential grazing REMEDY: Disturbed soils should be lightly ripped to at least 25 cm, to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion. The recommended ripping and re-vegetation will be implemented concurrently on the subsections where construction works are complete;	Continuous or as needed through Operational phase of mine.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**24**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: None. MINIMIZE/ CONTROL: - The footprint of the proposed mining area and associated infrastructure area should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint. - Infrastructure sites should be accessed through existing road network, if feasible. REMEDY: Recovered soils should be re-used to rehabilitate the mine footprint following mine closure; Vegetation from the nursery should be used during the rehabilitation phase; All disturbed areas must be re-vegetated with indigenous vegetation to re-establish a protective cover, to minimize soil erosion.	Decommissioning and rehabilitation phase.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**30**	**Low**						
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**48**	**Moderate**	AVOID: Burying of any waste including rubble, domestic waste, empty containers etc. on the site will be strictly prohibited, all construction / demolition rubble waste must be removed to an approved disposal site. Contractors during the decommissioning phase must keep records of waste disposal and make these available to the authorities and Environmental Officer.- Unauthorized discharge of potentially contaminated stormwater should be strictly prohibited on site. MINIMIZE/ CONTROL: None. REMEDY: Contamination prevention measures addressed in this EMPr should be implemented and made available and accessible at all times to the contractors and construction crew conducting the works on site for reference; A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled to guide the construction works; An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress; and Contaminated soils can be ameliorated onsite using suitable soil ameliorants determined by a qualified soil scientist after a soil contamination assessment has been conducted. This will potentially reinstate the natural soil chemistry post mine closure, which will therefore allow for current landuse to commence post closure	Decommissioning and rehabilitation phase.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**33**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**52**	**Moderate**	AVOID: None MINIMIZE/ CONTROL: Project footprint should be minimised – vehicles / machinery associated with the decommissioning activities will not be allowed to access surrounding areas but will be restricted to approved areas. REMEDY: Disturbed soils will be lightly ripped to at least 25 cm, to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion. The recommended ripping and re-vegetation must be implemented concurrently on the subsections where construction works are complete;	Decommissioning and rehabilitation phase.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**27**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: None. MINIMIZE/ CONTROL: The footprint of the proposed mining area and associated infrastructure area should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint. - Infrastructure sites should be accessed through existing road network, if feasible. REMEDY: The Overburden must be stockpiled according to the required process and adequate measures will be in place to protect the surrounding environmental receptors. Stockpiled material should not stand for too long to avoid erosion to the downgradient receiving environment Recovered soils should be re-used to rehabilitate the mine footprint concurrently as rollover mining progresses; Cleared vegetation should be protected at a nursery for use during rehabilitation phase; All disturbed areas must be re-vegetated with indigenous vegetation to re-establish a protective cover and to minimize the risk of soil erosion. All disturbed areas can be re-vegetated with indigenous vegetation to re-establish a protective cover, to minimize soil erosion.	Construction Demarcation of site should occur prior to construction commencing	Once off assessment undertaken during EIA phase Demarcation to be visually inspected weekly	n/a	Soil Specialist	Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**30**	**Low**				Weekly	ECO	
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil compaction	Neg	**Pre-mitigation**	**52**	**Moderate**	AVOID: Unnecessary surface disturbance of the identified Kimberly/Plooysburg soil forms must be avoided where possible to minimise the intensity of compaction due to their loamy sand texture. MINIMIZE/CONTROL: None. REMEDY: All vehicular traffic should be restricted to the existing service roads as far as practically possible;	Construction	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
				Neg	Post-mitigation	30	Low	Vegetation clearance and commencement of construction activities can be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low, such that the soils are less prone to compaction; Soil that have been compacted must be ripped up to 25 cm upon rehabilitation of each section.					
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Soil contamination	Neg	Pre-mitigation	**60**	**Moderate**	AVOID: Burying of any waste including rubble, domestic waste, empty containers etc. on the site is strictly prohibited, all construction rubble waste must be removed to an approved disposal site. - Unauthorized discharge of potentially contaminated water should be strictly prohibited on site. MINIMIZE/ CONTROL: None. REMEDY: Clean and dirty water area separation must take place in compliance with Regulation GN704 of the NWA; The potentially contaminated surface runoff must be captured in the vicinity of the mining activities and infrastructure areas in compliance with Regulation GN704, to minimise runoff and/or leaching on to the surrounding soils, and to prevent ingress of potentially contaminated water into the drainage lines within the proposed focus area. this EMPr should be implemented and made available and accessible at all times to the contractors and construction crew conducting the works on site for reference; A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled to guide the construction works; An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress; and Contaminated soils can be ameliorated onsite using suitable soil ameliorants determined by a qualified soil scientist after a soil contamination assessment has been conducted. This will potentially reinstate the natural soil chemistry post mine closure, which will therefore allow for current land use to commence post closure. For small spills the contaminated soils are to be removed off site and disposed of as hazardous waste, and replaced with healthy soils at the contractor's cost Small spills- contaminated soils be removed off site and disposed of as hazardous waste, and replaced with healthy soils at the contractor's cost.	Construction	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	Post-mitigation	**33**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: Construction during wet season should be avoided where possible. MINIMIZE/ CONTROL: Project footprint should be minimised/ restricted to the approved areas, to ensure that there are sufficient soil resources for the duration of mining activities to support potential grazing REMEDY: Disturbed soils can be lightly ripped to at least 25 cm, where feasible to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion. The recommended ripping and re-vegetation must be implemented concurrently on the subsections where construction works are complete;	Construction	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**36**	**Low**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: None. MINIMIZE/ CONTROL: The footprint of the proposed mining area and associated infrastructure area should be clearly demarcated to restrict vegetation clearing activities to within the approved infrastructure footprint. - Infrastructure sites should be accessed through existing road network, if feasible. REMEDY: The materials should be stockpiled as needed according to the required process and adequate measures will be in place to protect the surrounding environmental receptors. Stockpiled material should not stand for too long to minimise the potential for erosion to the downgradient receiving environment Recovered soils should be re-used to rehabilitate the mine footprint following mine closure; Cleared vegetation (SCC/indigenous) should be preserved at a nursery for use during rehabilitation phase; All disturbed areas must be re-vegetated with indigenous vegetation to re-establish a protective cover, to minimize soil erosion.	Continuous or as needed through Operational phase of mine.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**33**	**Low**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil compaction	Neg	**Pre-mitigation**	**52**	**Moderate**	AVOID: Unnecessary surface disturbance of the identified Kimberly/Plooysburg soil forms must be avoided where possible to minimise the intensity of compaction due to their loamy sand texture. MINIMIZE/CONTROL: None. REMEDY: All vehicular traffic should be restricted to the existing service roads as far as practically possible; Disturbed soils should be lightly ripped to at least 25 cm, where feasible to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion	Continuous or as needed through Operational phase of mine.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**30**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**70**	**Moderate**	AVOID: Burying of any waste including rubble, domestic waste, empty containers etc. on the site will be strictly prohibited, all operational waste must be removed to an approved disposal site. - Unauthorized discharge of potentially contaminated stormwater should be strictly prohibited on site. MINIMIZE/ CONTROL: None. REMEDY: Clean and dirty water area separation must take place in compliance with Regulation GN704 as it pertains to the NWA; The potentially contaminated surface runoff must be captured in the vicinity of the mining activities and infrastructure areas in compliance with Regulation GN704 as it pertains to the NWA, to minimise runoff and/or leaching on to the surrounding soils, and to prevent ingress of potentially contaminated water into the drainage lines within the proposed focus area. Contamination prevention measures contained in this Environmental Management Programme Report (EMPr) for the proposed development should be implemented and made available and accessible at all times to the contractors and construction crew conducting the works on site for reference; A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled to guide the operations; An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress; and Contaminated soils must be ameliorated onsite using suitable soil ameliorants determined by a qualified soil scientist after a soil contamination assessment has been conducted. This will potentially reinstate the natural soil chemistry post mine closure, which will allow for current landuse to commence post closure	Continuous or as needed through Operational phase of mine.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**36**	**Low**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**70**	**Moderate**	AVOID: none MINIMIZE/ CONTROL: Project footprint should be minimised, where feasible, to ensure that there are sufficient soil resources for the duration of mining activities to support potential grazing REMEDY: Disturbed soils should be lightly ripped to at least 25 cm, to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion. The recommended ripping and re-vegetation will be implemented concurrently on the subsections where construction works are complete;	Continuous or as needed through Operational phase of mine.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**24**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Soil erosion	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: None. MINIMIZE/ CONTROL: - The footprint of the proposed mining area and associated infrastructure area should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint. - Infrastructure sites should be accessed through existing road network, if feasible. REMEDY: Recovered soils should be re-used to rehabilitate the mine footprint following mine closure; Vegetation from the nursery should be used during the rehabilitation phase; All disturbed areas must be re-vegetated with indigenous vegetation to re-establish a protective cover, to minimize soil erosion.	Decommissioning and rehabilitation phase.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**30**	**Low**						
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Soil contamination	Neg	**Pre-mitigation**	**48**	**Moderate**	AVOID: Burying of any waste including rubble, domestic waste, empty containers etc. on the site will be strictly prohibited, all construction / demolition rubble waste must be removed to an approved disposal site. Contractors during the decommissioning phase must keep records of waste disposal and make these available to the authorities and Environmental Officer.- Unauthorized discharge of potentially contaminated stormwater should be strictly prohibited on site. MINIMIZE/ CONTROL: None. REMEDY: Contamination prevention measures addressed in this EMPr should be implemented and made available and accessible at all times to the contractors and construction crew conducting the works on site for reference; A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled to guide the construction works; An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress; and Contaminated soils can be ameliorated onsite using suitable soil ameliorants determined by a qualified soil scientist after a soil contamination assessment has been conducted. This will potentially reinstate the natural soil chemistry post mine closure, which will therefore allow for current landuse to commence post closure	Decommissioning and rehabilitation phase.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).
				Neg	**Post-mitigation**	**33**	**Low**						
Decommissioning, Rehabilitation and Closure of mine areas	**Decommissioning and rehabilitation**	**Soil and land capability**	Loss of agricultural land capability	Neg	**Pre-mitigation**	**52**	**Moderate**	AVOID: None MINIMIZE/ CONTROL: Project footprint should be minimised – vehicles / machinery associated with the decommissioning activities will not be allowed to access surrounding areas but will be restricted to approved areas. REMEDY: Disturbed soils will be lightly ripped to	Decommissioning and rehabilitation phase.	Once off assessment undertaken during EIA phase	n/a		Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983).

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
				Neg	Post-mitigation	27	Low	at least 25 cm, to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion. The recommended ripping and re-vegetation must be implemented concurrently on the subsections where construction works are complete;					
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Intact Vygieveld	Neg	Pre-mitigation	112	High	AVOID: Harming/destroying vegetation without reason MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. Floral SCC that will be affected by surface infrastructure must be marked and avoided where possible, or relocated to suitable habitat under the required permits (or kept in a nursery) surrounding the disturbance footprint. REMEDY: SCC to be kept in a nursery (removal from natural habitat may only be done under the required permits) and used for rehabilitation as areas are closed and rehabilitated.	Design and Construction phase. However, measures are continued throughout LOM.	Inspections of areas ear marked with SCC Inspections of SCC relocation/nursery	Ongoing Monthly	EAP/ECO Botanist	Threatened or Protected Species (TOPS) Regulations (GN 255 of 2015) under Section 56 (1) of the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) and the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009).
				Neg	Post-mitigation	66	Moderate						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Overgrazed Vygieveld	Neg	Pre-mitigation	104	High	AVOID: Harming/destroying vegetation without reason MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. Floral SCC that will be affected by surface infrastructure must be marked and avoided where possible, or relocated to suitable habitat under the required permits (or kept in a nursery) surrounding the disturbance footprint. REMEDY: SCC to be kept in a nursery (removal from natural habitat may only be done under the required permits) and used for rehabilitation as areas are closed and rehabilitated.	Design and Construction phase. However, measures are continued throughout LOM.	Inspections of areas ear marked with SCC Inspections of SCC relocation/nursery	Ongoing Monthly	EAP/ECO Botanist	TOPS GN 255, NEMA:BA & NCNC
				Neg	Post-mitigation	66	Moderate						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Ephemeral Drainage Lines	Neg	Pre-mitigation	80	Moderate	AVOID: Harming/destroying vegetation without reason MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. Floral SCC that will be affected by surface infrastructure must be marked and where possible, relocated to suitable habitat (or kept in a nursery) surrounding the disturbance footprint. Permits needed for relocation. REMEDY: SCC to be kept in a nursery	Design and Construction phase. However, measures are continued throughout LOM.	Inspections of areas ear marked with SCC Inspections of SCC relocation/nursery	Ongoing Monthly	EAP/ECO Botanist	TOPS GN 255, NEMA:BA & NCNC
				Neg	Post-mitigati	48	Moderate						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Intact Vygieveld	Neg	Pre-mitigation	105	High	AVOID: Further degradation and potential loss of floral SCC outside of the proposed project footprint area. MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. Floral SCC that will be affected by surface infrastructure must be marked and relocated to suitable habitat (or kept in a nursery) surrounding the disturbance footprint (removal to be done under the required permits). REMEDY: SCC to be kept in a nursery and used in rehabilitation of mined areas as trenches are backfilled and rehabilitated with the rollover mining method.	Continuous or as needed through Operational phase of mine.	Inspection of SCC relocations/nursery	Quarterly	Botanist	TOPS GN 255, NEMA:BA & NCNC
				Neg	Post-mitigatio	48	Moderate						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Overgrazed Vygieveld	Neg	**Pre-mitigation**	**98**	**High**	AVOID: Further degradation and potential loss of floral SCC outside of the proposed project footprint area. MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. Floral SCC that will be affected by surface infrastructure must be marked and where possible, relocated to suitable habitat (or kept in a nursery) surrounding the disturbance footprint. REMEDY: SCC to be kept in a nursery and used in concurrent rehabilitation activities.	Decommissioning and rehabilitation phase.	Inspection of SCC relocations/nursery	Quarterly	Botanist	TOPS GN 255, NEMA:BA & NCNC
				Neg	**Post-mitigatio**	**60**	**Moderate**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Ephemeral Drainage Lines	Neg	**Pre-mitigation**	**72**	**Moderate**	AVOID: Further degradation and potential loss of floral SCC outside of the proposed project footprint area. Demarcate the approved mining area clearly and ensure that activities to dot affect areas beyond the approved footprint (such as the drainage lines) MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. Floral SCC that will be affected by surface infrastructure must be marked and relocated to suitable habitat under the required permits (or kept in a nursery) surrounding the disturbance footprint. REMEDY: SCC to be kept in a nursery and used for rehabilitation in mined out areas, concurrently with mining.	Design and Construction phase. However, measures are continued throughout LOM.	Inspection of SCC relocations/nursery	Quarterly	Botanist	TOPS GN 255, NEMA:BA & NCNC
				Neg	**Post-mitigation**	**30**	**Low**						
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Intact Vygieveld	Neg	**Pre-mitigati**	**65**	**Moderate**	Concurrent rehabilitation should be undertaken with mining activities. Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a suitable specialist.	Decommissioning	Ongoing monitoring of: AIPs, Wetlands and Rehabilitated areas.	Annually.	Wetland / Ecological specialist.	TOPS GN 255, NEMA:BA & NCNC
				Neg	**P o**	**14**	**Low**						
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Overgrazed Vygieveld	Neg	**Pre-mitigatio**	**60**	**Moderate**	Concurrent rehabilitation should be undertaken with mining activities. Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a suitable specialist.	Decommissioning	Monitoring of: Wetlands and Rehabilitated areas.	Biannually for three years post-closure. Thereafter annually or as required for closure.	Wetland / Ecological specialist.	TOPS GN 255, NEMA:BA & NCNC
				Neg	**Post-mitiga**	**36**	**Low**						
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Flora**	Impact on floral SCC, floral habitat and species diversity in the Ephemeral Drainage Lines	Neg	**Pre-mitigati**	**40**	**Moderate**	Concurrent rehabilitation should be undertaken with mining activities. Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a suitable specialist.	Decommissioning	Inspection that wetlands are designated correctly as no-go areas. Monitoring of construction activities and potential residual impacts.	Once off inspection of designated wetlands.	Wetland specialist.	TOPS GN 255, NEMA:BA & NCNC
				Neg	**Post-mitigation**	**24**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Intact Vygieveld	Neg	**Pre-mitigation**	**112**	**High**	AVOID: Speeding as this could increase mortality rate of fauna (speed of 40 km/h). Ensure no hunting or trapping unless trapping to relocate causing no harm. MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. REMEDY: Brinckiella arboricola, this species lays its eggs within the ground or plant stems, with only one egg laying event per year and adults usually living for a year. As such, it is highly recommended that prior to vegetation clearing activities a search be conducted to locate and move adults out of the area to be cleared. Furthermore, cleared vegetation must be stored for a period of a year in order to allow for any eggs to hatch. Should any small scorpion species, insects and harmless reptiles be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. For larger venomous snakes, a suitably trained mine official should be contacted to effect the relocation of the species, should it not move off on its own.	Design and Construction phase. However, measures are continued throughout LOM.	Inspection for faunal species/eggs	As per clearing schedule, before clearing	EAP	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); National Water Act, 1998 (Act 36 of 1998) (NWA); General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998); and Requirements of the Government Notice 704 in Government Gazette 20119.
				Neg	**Post-mitigation**	**84**	**High**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Overgrazed Vygieveld	Neg	**Pre-mitigation**	**80**	**Moderate**	AVOID: Speeding as this could increase mortality rate of fauna (speed of 40 km/h). Ensure no hunting or trapping unless trapping to relocate causing no harm. MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. REMEDY: Brinckiella arboricola, this species lays its eggs within the ground or plant stems, with only one egg laying event per year and adults usually living for a year. As such, it is highly recommended that prior to vegetation clearing activities a search be conducted to locate and move adults out of the area to be cleared. Furthermore, cleared vegetation must be stored for a period of a year in order to allow for any eggs to hatch. Should any small scorpion species, insects and harmless reptiles be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. For larger venomous snakes, a suitably trained mine official should be contacted to effect the relocation of the species, should it not move off on its own.	Design and Construction phase. However, measures are continued throughout LOM.	Inspection for faunal species/eggs	As per clearing schedule, before clearing	EAP	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); National Water Act, 1998 (Act 36 of 1998) (NWA); General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998); and Requirements of the Government Notice 704 in Government Gazette 20119.
				Neg	**Post-mitigation**	**56**	**Moderate**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles.	**Construction**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Ephemeral Drainage Lines	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: Speeding as this could increase mortality rate of fauna (speed of 40 km/h). Ensure no hunting or trapping unless trapping to relocate causing no harm. MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. REMEDY: Brinckiella arboricola, this species lays its eggs within the ground or plant stems, with only one egg laying event per year and adults usually living for a year. As such, it is highly recommended that prior to vegetation clearing activities a search be conducted to locate and move adults out of the area to be cleared. Furthermore, cleared vegetation must be stored for a period of a year in order to allow for any eggs to hatch. Should any small scorpion species, insects and harmless reptiles be observed on the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. For larger venomous snakes, a suitably trained mine official should be contacted to effect the relocation of the species, should it not move off on its own.	Design and Construction phase. However, measures are continued throughout LOM.	Inspection for faunal species/eggs	As per clearing schedule, before clearing	EAP	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); National Water Act, 1998 (Act 36 of 1998) (NWA); General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998); and Requirements of the Government Notice 704 in Government Gazette 20119.
				Neg	**Post-mitigation**	**40**	**Moderate**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Intact Vygieveld	Neg	**Pre-mitigation**	**75**	**Moderate**	AVOID: Speeding as this could increase mortality rate of fauna (speed of 40 km/h). Ensure no hunting or trapping unless trapping to relocate causing no harm. MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. REMEDY: Brinckiella arboricola, this species lays its eggs within the ground or plant stems, with only one egg laying event per year and adults usually living for a year. As such, during operation it is highly recommended that prior to vegetation clearing activities a search be conducted in order to locate and move adults out of the area to be cleared. Furthermore, cleared vegetation must be stored for a period of a year in order to allow for any eggs to hatch. Should any small scorpion species, insects and harmless reptiles be observed on site, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. For larger venomous snakes, a suitably trained mine official should be contacted to effect the relocation of the species, should it not move off on its own.	Continuous or as needed through Operational phase of mine.	Inspection for faunal species/eggs	As per trenching schedule, before trenches are excavated	EAP	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); National Water Act, 1998 (Act 36 of 1998) (NWA); General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998); and Requirements of the Government Notice 704 in Government Gazette 20119.
				Neg	**Post-mitigation**	**56**	**Moderate**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Overgrazed Vygieveld	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: Speeding as this could increase mortality rate of fauna (speed of 40 km/h). Ensure no hunting or trapping unless trapping to relocate causing no harm. MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. REMEDY: Brinckiella arboricola, this species lays its eggs within the ground or plant stems, with only one egg laying event per year and adults usually living for a year. As such, during operation it is highly recommended that prior to vegetation clearing activities a search be conducted in order to locate and move adults out of the area to be cleared. Furthermore, cleared vegetation must be stored for a period of a year in order to allow for any eggs to hatch. Should any small scorpion species, insects and harmless reptiles be observed on site, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. For larger venomous snakes, a suitably trained mine official should be contacted to effect the relocation of the species, should it not move off on its own.	Decommissioning and rehabilitation phase.	Inspection for faunal species/eggs	As per trenching schedule, before trenches are excavated	EAP	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); National Water Act, 1998 (Act 36 of 1998) (NWA); General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998); and Requirements of the Government Notice 704 in Government Gazette 20119.
				Neg	**Post-mitigation**	**40**	**Moderate**						
Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Operational**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Ephemeral Drainage Lines	Neg	**Pre-mitigation**	**60**	**Moderate**	AVOID: Speeding as this could increase mortality rate of fauna (speed of 40 km/h). Ensure no hunting or trapping unless trapping to relocate causing no harm. MINIMIZE/ CONTROL: Footprint area must be kept to the smallest possible area. The ephemeral drainage line is outside of the demarcated mining footprint and no activity should be allowed in those areas. REMEDY: Should any small scorpion species, insects and harmless reptiles be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. The ephemeral drainage line is not within the footprint and should be avoided. For larger venomous snakes, a suitably trained mine official should be contacted to effect the relocation of the species, should it not move off on its own.	Design and Construction phase. However, measures are continued throughout LOM.	Inspection for faunal species/eggs	As per trenching schedule, before trenches are excavated	EAP	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); National Water Act, 1998 (Act 36 of 1998) (NWA); General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998); and Requirements of the Government Notice 704 in Government Gazette 20119.
				Neg	**Post-mitigation**	**30**	**Low**						
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Intact Vygieveld	Neg	**Pre-mitigation**	**52**	**Moderate**	Concurrent rehabilitation should be undertaken with mining activities so that the fauna will be able to return.	Continuous or as needed through Operational phase of mine.	Inspection of rehabilitated areas to ensure that previous habitat is recreated for the fauna to recolonize the area	Continuous	EAP	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); National Water Act, 1998 (Act 36 of 1998) (NWA); General Notice 509 as published in the

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
				Neg	Post-mitigation	30	Low						Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998); and Requirements of the Government Notice 704 in Government Gazette 20119.
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Overgrazed Vygieveld	Neg	Pre-mitigation	40	Moderate	Concurrent rehabilitation should be undertaken with mining activities so that the fauna will be able to return.	Decommissioning and rehabilitation phase.	Inspection of rehabilitated areas to ensure that previous habitat is recreated for the fauna to recolonize the area	Continuous	EAP	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); National Water Act, 1998 (Act 36 of 1998) (NWA); General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998); and Requirements of the Government Notice 704 in Government Gazette 20119.
				Neg	Post-mitigation	24	Low						
Rehabilitation and Closure of mine areas.	**Decommissioning**	**Fauna**	Impact on faunal SCC, faunal habitat and species diversity in the Ephemeral Drainage Lines	Neg	Pre-mitigation	40	Moderate	Concurrent rehabilitation should be undertaken with mining activities so that the fauna will be able to return.	Design and Construction phase. However, measures are continued throughout LOM.	Inspection of rehabilitated areas to ensure that previous habitat is recreated for the fauna to recolonize the area	Continuous	EAP	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); National Water Act, 1998 (Act 36 of 1998) (NWA); General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998); and Requirements of the Government Notice 704 in Government Gazette 20119.
				Neg	Post-mitigation	16	Low						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment.	**Construction & Operation**	**Heritage**	Heritage site discovered and potentially destroyed	Neg	**Pre-mitigation**	**57**	**Moderate**	AVOID: Areas that could have heritage significance such as grave sites if any are discovered on or around the site. MINIMIZE/ CONTROL: None. REMEDY: Immediately contact a qualified archaeologist if there is any suspicion that a heritage site may have been uncovered. 'Chance find Procedure' should be followed: ▪ Upon finding any archaeological or historical material all work at the affected area must cease. ▪ The area should be demarcated to prevent any further work there until an investigation has been completed. ▪ An archaeologist should be contacted immediately to provide advice on the matter. ▪ If needed the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist. ▪ The removal of such archaeological material will only be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter. ▪ Work on site will only continue after the archaeologist/ SAHRA has agreed to such continuance. ▪If any evidence of archaeological sites and remains are identified SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted. ▪If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately.	Throughout life of mine / as relevant if / when potential sites of heritage significance are uncovered	Official monitoring will not occur but as a site is come across an archaeologist will be contacted	Official monitoring will not occur if a site is identified / suspected an archaeologist will be contacted	If heritage site is discovered an archaeologist will assess	National Heritage Resources Act (Act 25 of 1999)
				Neg	**Post-mitigation**	**20**	**Low**						
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment. Rehabilitation and Closure of mine areas.	**Construction, Operation & Decommissioning**	**Safety & Security**	Crime & security/safety incidences	Neg	**Pre-mitigation**	**40**	**Moderate**	AVOID: None MINIMIZE/ CONTROL: Sign in upon entering site. Breathalyzer tests to be given to all entering site. Complaints register to be available at security. Visitors to be inducted before going on site. Mine and dangerous areas to be fenced off for safety. All employees and visitors to wear PPE on site. REMEDY: None	Throughout life of mine	Monitoring of complaints register and if complaints have been addressed. Monitoring to ensure that fences are all intact and that visitors are undergoing induction. Monitoring to ensure that all employees and visitors are wearing PPE. Monitoring to ensure that all employees and visitors are wearing PPE.	Weekly/monthly inspections of complaints register and mine fencing Ongoing inspections of PPE being worn on site Annual internal EMPr audit Ongoing inspections of PPE being worn on site Annual internal EMPr audit Annual external EMPr audit	Internal ECO undertaking inspections EAP undertaking annual EMPr audit	Mine Health and Safety Act (Act 29 of 1996) as amended
				Neg	**Post-mitigation**	**24**	**Low**						

Activity	Project Phase	Aspect	Impact description	STATUS	Mitigation status	SIGNIFICANCE RATINGS (score of 200)		Mitigation measures	Time Period of implementation	Monitoring Method (Implementation & Compliance)	Monitoring Frequency	Person(s) Responsible for Monitoring	Compliance with Standards
Site clearing (remove soils and vegetation) and construction of infrastructure, roads and stockpiles. Mining activities, stockpiling and continued disturbance to soils and surrounding environment. Rehabilitation and Closure of mine areas.	**Construction, Operation & Decommissioning**	**Noise**	Noise pollution and damage of hearing to workers near loud machinery	Neg	**Pre-mitigation**	**40**	**Moderate**	AVOID: Use of loud machinery at night- latest operating hours are until 7pm. MINIMIZE/ CONTROL: Sound mufflers to be used on vehicles. Reverse beeping to have a reverse flashing light if vehicles used at night. Workers to wear PPE (ear plugs) when near loud machinery. REMEDY: None	Throughout life of mine	Inspection of usage of PPE	Ongoing inspections of PPE being worn on site	Internal ECO	Mine Health and Safety Act (Act 29 of 1996) as amended
				Neg	**Post-mitigation**	**27**	**Low**						
Non-mineral waste management	**Construction, Operation & Decommissioning**	**Waste**	Pollution	Neg	**Pre-mitigation**	**56**	**Moderate**	AVOID: Littering MINIMIZE/CONTROL: Waste to be separated and hazardous waste to be disposed of at a licensed hazardous waste service provider REMEDY: Weekly inspections of littering/hazardous spills	Continuous or as needed through Operational phase of mine.	Monitoring of site to ensure no hazardous spills or littering Inspections that there are safety disposal certificates	Weekly	ECO	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); National Water Act, 1998 (Act 36 of 1998) (NWA); General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998); and Requirements of the Government Notice 704 in Government Gazette 20119.
				Neg	**Post-mitigation**	**25**	**Low**						

21 MONITORING OF IMPACT MANAGEMENT ACTIONS

The table below details the monitoring actions, including: Monitoring and reporting frequency; Responsible persons; Time period for implementing impact management actions; and Mechanism for monitoring compliance:

Table 42: Monitoring of Impact Management Actions

<table>
<tr><th>Activity</th><th>Aspect</th><th>Impacts requiring monitoring programmes</th><th>Functional requirements for monitoring</th><th>Roles and Responsibilities (for the execution of the monitoring programmes)</th><th>Monitoring and reporting frequency and time periods for implementing impact management actions</th></tr>
<tr><td rowspan="3">All infrastructure areas, development footprints and associated activities</td><td>Soil</td><td>Loss of agricultural soils
Soil erosion, soil contamination and soil compaction</td><td>Ensure proper storm water diversion and separation to avoid contamination of soils.
Spill kits to be utilized for spills.
Soil ripping up to 25cm for compacted soils</td><td>ECO</td><td>Continuous or as issues arise.</td></tr>
<tr><td>Fauna</td><td>Direct mortality of SCC fauna
Direct mortality of fauna
Reduced dispersal/migration of fauna
Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light</td><td>Activities to be undertaken in a phased manner so that fauna are able to move. Specifically: Brinckiella arboricola, this species lays its eggs within the ground or plant stems, with only one egg laying event per year and adults usually living for a year. As such it is highly recommended that prior to vegetation clearing activities a search be conducted in order to locate and move adults out of the area to be cleared. Furthermore, cleared vegetation must be stored for a period of a year in order to allow for any eggs to hatch.
Should any small scorpion species, insects and harmless reptiles be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint.
For larger venomous snakes, a suitably trained mine official should be contacted to effect the relocation of the species, should it not move off on its own.

Ensure all activities are done according to best practice to minimise all impacts to flora and fauna of site.</td><td>ECO</td><td>Continual monitoring of site for evidence of any impact to fauna of the area. Report any animal interactions or deaths and follow up with mitigation actions.</td></tr>
<tr><td>Surface water</td><td>Runoff, erosion and sedimentation.</td><td>Ensure proper storm water diversion and separation and ensure adequately sized storm water management features.
Monitoring to ensure that the mining does not exceed the proposed footprint area.</td><td>ECO</td><td>Monitoring and inspections of storm water diversions as seen below (SD Hydrological Services, April 2018):
<table>
<tr><th rowspan="2">Months</th><th rowspan="2">Wet Season</th><th rowspan="2">Dry Season</th><th colspan="3">SITE INSPECTION AND REMEDIATION</th></tr>
<tr><th>Pre Dry Season</th><th>Pre Wet Season</th><th>Peak Wet Season</th></tr>
<tr><td>January</td><td></td><td rowspan="3"></td><td></td><td></td><td></td></tr>
<tr><td>February</td><td></td><td></td><td></td><td></td></tr>
<tr><td>March</td><td></td><td></td><td></td><td></td></tr>
<tr><td>April</td><td rowspan="8"></td><td></td><td></td><td></td><td></td></tr>
<tr><td>May</td><td></td><td></td><td></td><td></td></tr>
<tr><td>June</td><td></td><td></td><td></td><td></td></tr>
<tr><td>July</td><td></td><td></td><td></td><td></td></tr>
<tr><td>August</td><td></td><td></td><td></td><td></td></tr>
<tr><td>September</td><td></td><td></td><td></td><td></td></tr>
<tr><td>October</td><td></td><td rowspan="3"></td><td></td><td></td><td></td></tr>
<tr><td>November</td><td></td><td></td><td></td><td></td></tr>
<tr><td>December</td><td></td><td></td><td></td><td></td></tr>
</table>
Pre-wet season- before the wet season all of the channels should be inspected so that they are free of debris, blockages as well as silt traps checked to ensure that there is enough storage capacity.</td></tr>
</table>

<table>
<tr><th>Activity</th><th>Aspect</th><th>Impacts requiring monitoring programmes</th><th>Functional requirements for monitoring</th><th>Roles and Responsibilities (for the execution of the monitoring programmes)</th><th>Monitoring and reporting frequency and time periods for implementing impact management actions</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>• Peak wet season- this is a follow up to the previous inspection to ensure that there have been no damages from the storms and if there are any blockages to ensure that these are cleared.
• Pre- dry season- this is to inspect and rectify any damage incurred from the wet season. An inspection should also be undertaken to ensure that all storm water controls are operating correctly.</td></tr>
<tr><td></td><td>Air Quality</td><td>Dust fall out, PM10 & PM 2.5 generation.</td><td>Ensure dust and PM monitoring plan is being done correctly.</td><td>ECO & Site Manager</td><td>Dust fallout monitoring as per the National Dust Control Regulations (2013) and reporting is to occur on a monthly basis. The parameters for dust monitoring can be seen below:
<table>
<tr><th>Restriction Areas</th><th>Dust Fallout Rate (mg/m2/day)</th><th>Frequency of Exceedance</th></tr>
<tr><td>Residential Areas</td><td>D < 600</td><td>Two within a year, no two sequential months</td></tr>
<tr><td>Non-residential areas</td><td>600 < D < 1200</td><td>Two within a year, no two sequential months</td></tr>
</table>
Continuous PM10 & PM2.5 ambient monitoring is to occur. The mine to register on NAEIS and report annually on their emissions.
The following points to be monitored are as follows (Rayten Engineering Solutions, June 2018):
<table>
<tr><th>Location</th><th>Latitude</th><th>Longitude</th><th>Location</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>D1</td><td>30°58'57.95"S</td><td>18°56'25.49"E</td><td>D5</td><td>30°58'47.49"S</td><td>18°58'11.59"E</td></tr>
<tr><td>D2</td><td>30°57'33.36"S</td><td>18°59'21.06"E</td><td>D6</td><td>30°59'29.74"S</td><td>18°56'13.08"E</td></tr>
<tr><td>D3</td><td>30°57'23.76"S</td><td>18°57'44.31"E</td><td>D7</td><td>30°59'28.29"S</td><td>18°58'25.05"E</td></tr>
<tr><td>D4</td><td>31° 0'22.50"S</td><td>18°57'46.54"E</td><td>D8</td><td>30°57'34.47"S</td><td>18°58'23.31"</td></tr>
<tr><td>PM station</td><td>30°57'52.68"S</td><td>18°58'30.68"E</td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td></td><td>Flora</td><td>Killing of floral SCC.
Spread and/or establishment of alien and/or invasive plants and resultant impacts on surrounding natural vegetation.</td><td>SCC to be relocated.
Control, with the aim of eradicating, alien and invasive species listed under CARA and NEM:BA from the relevant properties.</td><td>Botanist/plant specialist
ECO</td><td>This can occur as a botanist sees fit to keep the SCC thriving.
Area must be generally inspected at least biannually and areas where plants were removed must also be revisited monthly to remove any new saplings.</td></tr>
<tr><td></td><td>Visual</td><td>Deterioration in visual aesthetics and sense of place.</td><td>Ensure all material is stored in designated areas and the site is neat and orderly.
Maintain communication with I&APs and provide a platform for I&APs to lodge any comments.</td><td>Site Manager</td><td>General monthly inspections of areas for any materials not within designated areas, spills or litter.
Continual inspections of complaints register.</td></tr>
</table>

Activity	Aspect	Impacts requiring monitoring programmes	Functional requirements for monitoring	Roles and Responsibilities (for the execution of the monitoring programmes)	Monitoring and reporting frequency and time periods for implementing impact management actions
	Waste	Waste separation Littering Hazardous waste	Ensure waste is separated and there is no littering on site. Ensure hazardous waste is disposed of at a reputable hazardous waste service provider. Mine to register on SAWIS.	ECO	Weekly inspections to ensure waste is separated and that there is no littering. Monthly inspections to ensure safety disposal certificates were received for general waste and hazardous waste. Annual reporting of monthly volumes on SAWIS.
	Groundwater	Pollution plume and seepage from contaminants	Storage of potentially hazardous material will be within properly constructed and lined or paved areas. Oil traps will be sized, operated and maintained to contain all discarded oil from working areas.	ECO/EAP	• Groundwater monitoring to occur monthly for the first year and quarterly after the first year. Ideally, the monitoring program should start a year before mining starts in order to be able to build a database that is not impacted by the mining activities. Monitoring to continue 5 years post closure. The following parameters to be tested and a reported to Department of Water Affairs on a quarterly basis: • General chemistry such as pH, Total Dissolved Solids (TDS) and Electrical Conductivity (EC); • Major elements such as calcium, magnesium, sodium, potassium, sulphate, nitrate, fluoride, chloride, phosphate; • An Inductively Coupled Plasma (ICP) scan of minor elements including aluminium, arsenic, barium, boron, bismuth, cadmium, copper, chrome (total), cyanide, iron, manganese, mercury, molybdenum, nickel, lead, antimony, selenium, vanadium and zinc. The monitoring program should include: • The groundwater monitoring boreholes drilled during this study: KAN1 to KAN4; and • Hydrocensus points which lie close to the zones of impact and could possibly be at risk: KH01 and KH04. The coordinates for monitoring boreholes are as follows: KAN1 30°59'44.04"S 18°56'56.81"E KAN2 30°58'47.20"S 18°57'20.28"E KAN3 30°58'0.20"S 18°58'33.26"E KAN4 30°59'11.89"S 18°58'18.50"E KH01 30°58'33.93"S 18°58'10.11"E KH04 30°58'57.66"S 18°56'25.44"E
Surface trench mining	Soil	Loss of agricultural soils Soil erosion, soil contamination and soil compaction	Ensure proper storm water diversion and separation to avoid contamination of soils. Spill kits to be utilized for spills. Soil ripping up to 25cm for compacted soils	ECO	Continuous or as issues arise.
	Fauna	Direct mortality of SCC fauna Direct mortality of fauna Reduced dispersal/migration of fauna Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light	Activities to be undertaken in a phased manner so that fauna are able to move. Ensure all activities are done according to best practice to minimise all impacts to flora and fauna of site.	ECO	Continual monitoring of site for evidence of any impact to fauna of the area. Report any animal interactions or deaths and follow up with mitigation actions.

Activity	Aspect	Impacts requiring monitoring programmes	Functional requirements for monitoring	Roles and Responsibilities (for the execution of the monitoring programmes)	Monitoring and reporting frequency and time periods for implementing impact management actions
	Surface water	Runoff, erosion and sedimentation. Encroachment into ephemeral drainage line nor the 100m buffer.	Ensure proper storm water diversion and separation and ensure adequately sized storm water management features. Monitoring to ensure that the mining does not exceed the proposed footprint area.	ECO	Monitoring schedule of storm water management to be undertaken as per Surface Water in all infrastructure areas mentioned above. • Pre-wet season- before the wet season all of the channels should be inspected so that they are free of debris, blockages as well as silt traps checked to ensure that there is enough storage capacity. • Peak wet season- this is a follow up to the previous inspection to ensure that there have been no damages from the storms and if there are any blockages to ensure that these are cleared. • Pre- dry season- this is to inspect and rectify any damage incurred from the wet season. An inspection should also be undertaken to ensure that all storm water controls are operating correctly. Weekly/monthly monitoring to take place to ensure the mining footprint has not encroached into the ephemeral drainage line nor the 100m buffer.
	Air Quality	Dust fall out, PM10 & PM 2.5 generation.	Ensure dust and PM monitoring plan is being done correctly.	ECO & Site Manager	Dust fallout monitoring as per the National Dust Control Regulations (2013) and reporting is to occur on a monthly basis. Parameters and dust monitoring points can be seen under Air Quality All Infrastructure Areas mentioned above. Continuous PM10 & PM2.5 ambient monitoring is to occur. The mine to register on NAEIS and report annually on their emissions.
	Flora	Killing of floral SCC. Spread and/or establishment of alien and/or invasive plants and resultant impacts on surrounding natural vegetation.	SCC to be relocated. Control, with the aim of eradicating, alien and invasive species listed under CARA and NEM:BA from the relevant properties.	Botanist/plant specialist ECO	This can occur as a botanist sees fit to keep the SCC thriving. Area must be generally inspected at least biannually and areas where plants were removed must also be revisited monthly to remove any new saplings.
	Visual	Deterioration in visual aesthetics and sense of place.	Ensure all material is stored in designated areas and the site is neat and orderly. Maintain communication with I&APs and provide a platform for I&APs to lodge any comments.	Site Manager	General monthly inspections of areas for any materials not within designated areas, spills or litter. Continual inspections of complaints register.
All material stockpile areas	Soil	Erosion	Ensure that stockpiles do no stand for too long.	ECO	Continuous.
	Fauna	Direct mortality of SCC fauna Direct mortality of fauna Reduced dispersal/migration of fauna Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light	Activities to be undertaken in a phased manner so that fauna are able to move. Ensure all activities are done according to best practice to minimise all impacts to flora and fauna of site.	ECO	Continual monitoring of site for evidence of any impact to fauna of the area. Report any animal interactions or deaths and follow up with mitigation actions.
	Surface water	Runoff, erosion and sedimentation.	Ensure proper storm water diversion and separation and ensure adequately sized storm water management features. Monitoring to ensure that the mining does not exceed the proposed footprint area.	ECO	Monitoring schedule of storm water management to be undertaken as per Surface Water in all infrastructure areas mentioned above. • Pre-wet season- before the wet season all of the channels should be inspected so that they are free of debris, blockages as well as silt traps checked to ensure that there is enough storage capacity.

Activity	Aspect	Impacts requiring monitoring programmes	Functional requirements for monitoring	Roles and Responsibilities (for the execution of the monitoring programmes)	Monitoring and reporting frequency and time periods for implementing impact management actions
					• Peak wet season- this is a follow up to the previous inspection to ensure that there have been no damages from the storms and if there are any blockages to ensure that these are cleared. • Pre- dry season- this is to inspect and rectify any damage incurred from the wet season. An inspection should also be undertaken to ensure that all storm water controls are operating correctly.
	Air Quality	Dust fall out, PM10 & PM 2.5 generation.	Ensure dust and PM monitoring plan is being done correctly.	ECO & Site Manager	Dust fallout monitoring as per the National Dust Control Regulations (2013) and reporting is to occur on a monthly basis. Parameters and dust monitoring points can be seen under Air Quality All Infrastructure Areas mentioned above. Continuous PM10 & PM2.5 ambient monitoring is to occur. The mine to register on NAEIS and report annually on their emissions.
	Visual	Stockpiles will change the topographical nature of the area.	Stockpiling must be done correctly to minimise visual / topographical negative impact. Stockpiles to not exceed 3 metres in height.	Site manager	Weekly/monthly monitoring to ensure stockpiles do not exceed 3 metres.
Access and hauling along roads	Air Quality	Dust fall out, PM10 & PM 2.5 generation.	Ensure dust and PM monitoring plan is being done correctly.	ECO & Site Manager	Dust fallout monitoring as per the National Dust Control Regulations (2013) and reporting is to occur on a monthly basis. Parameters and dust monitoring points can be seen under Air Quality All Infrastructure Areas mentioned above. Continuous PM10 & PM2.5 ambient monitoring is to occur. The mine to register on NAEIS and report annually on their emissions.
	Roads	Deterioration of road	Re-cutting and cleaning of side-drains and pipes, grading and shaping as well as dust suppression (where required).	Mine Transnet Transnet and the Northern Cape Provincial Department of Transport	Continuous or as issues arise.
Product handling	Air Quality	Dust fall out, PM10 & PM 2.5 generation.	Ensure dust and PM monitoring plan is being done correctly.	ECO & Site Manager	Dust fallout monitoring as per the National Dust Control Regulations (2013) and reporting is to occur on a monthly basis. Parameters and dust monitoring points can be seen under Air Quality All Infrastructure Areas mentioned above. Continuous PM10 & PM2.5 ambient monitoring is to occur. The mine to register on NAEIS and report annually on their emissions.
	Air Quality	Dust deposition that could reach the water resources located out of the MRA	Implement dust mitigation measures. Ensure proper storm water diversion and separation and ensure adequately sized storm water management features.	Environmental & Site manager	Daily dust suppression. Monitoring schedule of storm water management to be undertaken as per Surface Water in all infrastructure areas mentioned above. • Pre-wet season- before the wet season all of the channels should be inspected so that they are free of debris, blockages as well as silt traps checked to ensure that there is enough storage capacity. • Peak wet season- this is a follow up to the previous inspection to ensure that there have been no damages from the storms and if there are any blockages to ensure that these are cleared.

Activity	Aspect	Impacts requiring monitoring programmes	Functional requirements for monitoring	Roles and Responsibilities (for the execution of the monitoring programmes)	Monitoring and reporting frequency and time periods for implementing impact management actions
					Pre- dry season- this is to inspect and rectify any damage incurred from the wet season. An inspection should also be undertaken to ensure that all storm water controls are operating correctly.
Water Supply and storage (potable)	Groundwater	Irresponsible use of water and water wastage.	Ensure water usage is managed correctly.	Environmental & Site Manager	Inspections to ensure no taps are left running – continuously or as issues arise. Monitoring and reporting to occur as under Groundwater in All infrastructure areas, development footprints and associated.
Surface water management measures	Surface Water	Altered hydrological regime (flow). Environmental pollution due to uncontrolled runoff in to surrounding environment and potentially into the water resources located outside of the MRA.	Ensure proper storm water diversion and separation and ensure adequately sized storm water management features.	Environmental & Site manager	Monthly surface water monitoring and quarterly groundwater monitoring with quarterly reports to DWS.
	Groundwater	Seepage	Ensure that no water is ponded on site in dirty areas.	EAP/ECO	Continuous or as issues arise in terms of ponding. Monitoring and reporting to occur as under Groundwater in All infrastructure areas, development footprints and associated.
Ablutions and change house	Soil and Surface Water	Environmental pollution due to increased sedimentation and chemical runoff into the surrounding environment. Potential contamination of surface water bodies with sewage and nutrient enrichment of aquatic environments.	Reduce the risk of spills and leaks to optimise water use and minimise wasting of water.	Environmental & Site manager	Weekly inspections of ALL water management features (inclusive of ablutions).

22 INDICATE THE FREQUENCY OF THE SUBMISSION OF THE PERFORMANCE ASSESSMENT REPORT

All information as required by the various Government Departments should be captured and be readily available for submission when required and also for review by the external consultant conducting the performance assessment and audits.

As per NEMA EIA Regulations (GNR982 of 2014 as amended by GN R 326 of 2017), a performance assessment/audit will be conducted by an external consultant throughout the life of mine at intervals stipulated in the EA. It is recommended to complete these audits annually. This is conducted to assess the adequacy and compliance to the EMPr and the relevant legislation. As per NEMA, any amendments to the EMPr that may be required due to the performance assessment findings will be completed if necessary.

The Quantum of the Financial Provision must be reviewed on an annual basis, and submitted to the DMR.

In addition to the NEMA requirements, the IWUL will be audited as per conditions once this is obtained, at which time the site will also be audited against GN704.

23 ENVIRONMENTAL AWARENESS PLAN

A training needs analysis is to be performed through all levels of the organization including those within the administration, contractors, plant and mining worker sectors. Each of the categories / levels of the organization have different responsibilities and roles, accordingly different knowledge requirements are applicable. These are summarised in Table 43 below. After the training needs have been identified, it is the responsibility of the Safety, Health and Environment (SHE) Officer to ensure that personnel attend the relevant identified training, keep records of the training presented, and identify the need for follow-up / refresher training.

Table 43: Environmental Awareness Training Requirements

Occupation Category	Environmental Management Responsibility / Role	Required Knowledge And Input	Training Required	Interval
Senior Management	Managing the S&LP and the Safety, Health & Environmental (SHE) Management System	Understanding the purpose of the SHE Management System Knowledge of the significant impacts as described in the EIA/EMPr during the various LoM phases Knowledge of the commitments and management proposed within the EMPr. Setting and reviewing the mine's Environmental objectives Emergency preparedness and response	General in-house, management training on the EIA and EMPr. Training on the applicable environmental legislation	Once off Annually
Mine / Site Manager	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SHE Management System Understanding the EMPr 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 as part of the annual induction training	Annual
		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	Monthly
SHE Representative & Internal Auditor	Managing the SHE Management System, Monitoring and auditing	Understanding the purpose of the SHE Management System Knowledge of the significant impacts as described in the EIA/EMPr during the various LoM phases Knowledge of the commitments and management proposed within the EMPr Setting and reviewing the mine's Environmental objectives Directing the SHE management system, and monitoring their progress	General in-house, management training on the EIA and EMPr Training on the applicable environmental legislation and best practice guidelines	Once off Annually

Occupation Category	Environmental Management Responsibility / Role	Required Knowledge And Input	Training Required	Interval
		Emergency preparedness and response Knowledge in spill management, stockpile management, overburden management, water management and waste management Knowledge of the relevant Operational procedures, Emergency Response Plans and Incident reporting	Meetings and Talk Topics	Monthly
		Knowledge of the SABS standards and other relevant legislation regarding the correct storage of chemicals	Training on the SABS standards and other legislation	Annually
		Knowledge of auditing techniques and report writing	Auditor training	Once off
Supervisors, Shift Boss & Foreman	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SHE Management System Understanding the EMPr 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 as part of the annual induction training	Annual
Operators, tradespersons, floor employees, general administration staff & security	General Environmental Awareness and job specific impacts	General Awareness of aim and purpose of the SHE Management System Understanding the EMPr 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 as part of the annual induction training	Annual

23.1.1 SPECIALISED 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 Mine Manager with the assistance of the SHE Officer must identify relevant personnel and training courses in addition to those training needs identified in Table 43.

23.1.2 REVIEW OF TRAINING MATERIAL

Effectiveness of the environmental management training will be evaluated 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 organisational 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-compliances will be highlighted and management measures incorporated or improved upon within the training material.

23.1.3 RECORDS

Records from the implementation of this EMPr will be kept and controlled in accordance with internal systems control, i.e., recorded in an excel spreadsheet.

24 EMERGENCY RESPONSE PLAN

Training, as detailed above, will address the specific measures and actions as listed in the EIA and EMPr. In this way each staff member will be provided the knowledge required for their job to firstly prevent impact and secondly identify if an impact is likely to occur and then to report the possibility of risk or impact immediately so as to ensure immediate response.

The following is a list of the most likely potential environmental emergencies, followed by a basic summary of procedures (mine will develop detailed Standard Operation Procedures (SOPs), which will incorporate detailed requirements under the MPRDA Regulations, for emergency events):

- Fires;
- A hydrocarbon/chemical spill or leak;
- Flooding; and
- Explosions.

In the case of environmental emergencies, the remedial measures and actions as listed in the Emergency Response Plan should be followed, in addition the relevant authorities should be contacted; these are listed below:

Dept. of Water Affairs:	(053) 830 8800
Dept. of Mineral Resources:	(027) 712 8160

24.1.1 FIRES

Veldt fires and fires resulting from other sources must be handled with extreme caution. Fire extinguishers should be placed around the mine at accessible locations and needs to be frequently inspected and maintained in working condition. The following procedures apply In the event of a fire:

- An alarm should 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 should be used to contain and extinguish the fire.
- In the event of a large fire, the fire department will be notified.
- All staff will receive training in response to a fire emergency on site, including evacuation procedures.
- A Fire Association should be set up with the mine and surrounding land owners to facilitate communication during fire events and assist in fighting fires, where necessary. If such an association exists then the mine will join such an association.
- If possible all surrounding drains, such as storm water drains need to be covered and or protected with temporary covers to prevent any contaminated water from entering the drains.
- In case of a chemical or petroleum fire, run-off from the area should 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.

24.1.2 HYDROCARBON / CHEMICAL SPILLS

Hydrocarbons such as diesel, petrol, and oil which are used as fuel for mine machinery will be kept on site; therefore there is the possibility that spillage may occur. Further, any chemicals contained on site may also be detrimental to the environment if spills occur. In the event of a spillage, procedures must be put into place to ensure that there are minimal impacts to the surrounding environment.

The following procedure applies to a hydrocarbon/chemical spill:

- The incident must be reported to the Site / Mine Manager immediately.
- The Site / Mine Manager will assess the situation from the information provided, and set up an investigation team. Included in this team could be the Environmental Officer, 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.
- The Site / 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.
- In the event of a small spillage, the soil should be treated in situ, using Hazmat clean up kits.
- Every precaution should 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 brooms 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 should be removed and treated at a special soil rehabilitation facility.
- Reasonable measures must be taken to stop the spread of spills and secure the area to limit access.

24.1.3 FLOODING

There is always potential for flooding during the rainy season. 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 should be reviewed annually.
- Mine management should 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 should be contained on site, as far as possible and discharges to the environment should only occur if absolutely necessary in an extreme flood event as per GN704.

24.1.4 EXPLOSIONS

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

The procedure to be followed is:

- Safe evacuation routes should be devised in the event of an uncontrolled explosion and all staff trained on relevant evacuation routes and assembly points.
- Once safe to do so first responders may provide first aid to injured parties.
- All relevant emergency response units must be notified and hospitals informed of incoming patients.
- DMR to be notified of the incident.

25 CLOSURE, REHABILITATION AND FINANCIAL PROVISION

Rehabilitation of the project will aim to:

- Ensure a self-sustaining post-mining land capability similar to pre-mining.
- Ensure that the rehabilitated areas are cleared of all potentially contaminating substances and that runoff from the area is returned to the natural catchment.
- Ensure that vegetation growth and cover on the rehabilitated areas is sustainable and local indigenous species are establishing on site and that succession and colonisation from surrounding areas is taking place on rehabilitated areas.
- Ensure that AIP growth is eradicated until the closure certificate is granted.

The rehabilitation model must be drafted before final rehabilitation activities commence. The rehabilitation model must thereafter be finalised before decommissioning to ensure that final rehabilitation activities can commence in line with the final and approved rehabilitation model.

In order to ensure rehabilitation of the site can be undertaken responsibly, soils must be stripped and stockpiled separately. This will ensure preservation of soil for re-use in rehabilitation of the site.

Post mining land capability must be restored to as close to pre-mining land capabilities as possible, in this case grazing with some arable lands.

During closure of a mine area, infrastructure no longer required by the future land owner/user will be removed.

Plant and processing infrastructure will be re-used at other sites or sold to other mining companies before being considered as scrap.

All scrap metal will be removed and sold where possible, or disposed of at an appropriate site.

All other waste will be separated and removed from site. These will be recycled where possible or removed by reputable contractors to appropriate waste facilities for that particular waste type.

All fences will be dismantled and either disposed of at a permitted disposal site or sold as scrap. Fences erected to cordon off dangerous areas will remain in place and maintained, and will only be removed once such sites are considered safe and stable.

Roads or sections of roads no longer required after completion of mining will be identified. These roads will be ripped down and rehabilitated, as will all compacted infrastructure areas.

The entire site will be appropriately graded and contoured.

The site will then be seeded with local indigenous species.

25.1 SOIL MANAGEMENT AND REHABILITATION PLAN

Should there be contaminated soils biodegradable remedies should be used after a soil scientist has conducted an assessment. This could potentially return the soil chemistry to its natural state.

Concurrent rehabilitation is to occur so that if infrastructure encroaches on the Kimberly/Plooysburg soils they have been restored to their natural state for the land use to continue.

Revegetation, after soil stripping, is able to combat soil compaction and soil erosion, this is to occur concurrently.

25.2 SOIL STRIPPING, STOCKPILING AND REPLACEMENT

Disturbed soils can be ripped up to 25cm to combat soil compaction and then revegetated after construction.

There will be two stockpiles, one of industrial grade gypsum and one of agricultural grade gypsum. Stockpiles should not stand for long as this would cause erosion. They should be loaded onto the trains and/or trucks as soon as possible to avoid being eroded.

There will be concurrent rehabilitation therefore as the product is taken out of the ground then overburden will be returned.

25.3 CONSIDERATIONS FOR FLORA AND FAUNA

A rehabilitation plan, using indigenous species from the study area, must be implemented that will restore disturbed areas beyond the footprint of the infrastructure to what it was prior to construction, thereby making the impact on the

remainder of the site negligible in the long term. Before rehabilitation is to occur trials should be undertaken during the course of the project life to ensure successful rehabilitation. It was recommended that an indigenous/endemic plant species nursery must be propagated with focus on rehabilitation in conjunction with a suitably qualified specialist.

Concurrent rehabilitation to occur so that the habitat and food resources are to reach their original state so that fauna can return to the area.

25.4 I&AP INVOLVEMENT IN SETTING CLOSURE OBJECTIVES

Closure objectives as outlined in the EIA/EMPr, were presented at the EIA phase meeting held on 29th August 2018 (PPP report in Appendix 14), all registered I&APs and landowners were invited to attend.

Furthermore the EIA/EMPr was made available for public review for 30 days from 22nd August 2018 until 21st September 2018.

25.5 FINANCIAL PROVISION FOR CLOSURE

As per NEMA financial provision regulations, itemised costs must be provided within the financial provision.

The financial provisioning was calculated based on averaged contractor rates for the undertaking of each activity associated with closure. Financial provisioning has to be updated annually. Please refer to Appendix 16 for the full closure and financial provision report for the proposed operations.

Financial Provision, to the amount of R2,059,312.85 will be made by way of a guarantee acceptable to the DMR, as per the Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations.

Table 44: Quantum for Financial Provision (Cabanga, 2018)

MINE AREA	TOTAL CALCULATED CLOSURE LIABILITY
Offices	R 56,842.00
Plant & Stores	R 15,000.00
Workshop	R 214,490.80
Access	R 1,355.05
Rail & yard	R 512,190.00
Mining area	R 1,259,435.00
TOTAL	**R2,059,312.85**

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27 UNDERTAKING

The EAP herewith confirms

a) The correctness of the information provided in the reports ☒
b) The inclusion of comments and inputs from stakeholders and I&APs ; ☒
c) The inclusion of inputs and recommendations from the specialist reports where relevant; and ☒
d) The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; ☒

-END-

13 September 2018
Cabanga Environmental

13/09/2018

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Appendix 1: EAP CV's

Appendix 2: A3 Plans

Appendix 3: Soil, Land Use and Land Capability Assessment

Appendix 4: Surface Water Hydrology Report

Appendix 5: Groundwater EIA/EMP Study

Appendix 6: Faunal and Floral Ecological Assessment

Appendix 7: Freshwater Resource Assessment

Appendix 8: Heritage Impact Assessment

Appendix 9: Paleontological Impact Assessment

Appendix 10: Air Quality Impact Assessment

Appendix 11: Transport Impact Assessment

Appendix 12: Visual Impact Assessment

Appendix 13: Social and Labour Plan

Appendix 14: Public Participation Process

Appendix 15: Impact Assessment Tables

Appendix 16: Rehabilitation and Financial Provision Report