



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

BASIC ASSESSMENT REPORT
And
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT:

TEL NO:

CELL NO:

FAX NO: N/A

POSTAL ADDRESS:

FILE REFERENCE NUMBER SAMRAD:

1. IMPORTANT NOTICE

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

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

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

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

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

2. Objective of the basic assessment process

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

- (a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- (b) identify the alternatives considered, including the activity, location, and technology alternatives;
- (c) describe the need and desirability of the proposed alternatives,
- (d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:
 - (i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
 - (ii) the degree to which these impacts—
 - (aa) can be reversed;
 - (bb) may cause irreplaceable loss of resources; and
 - (cc) can be managed, avoided or mitigated;
- (e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
 - (i) identify and motivate a preferred site, activity and technology alternative;
 - (ii) identify suitable measures to manage, avoid or mitigate identified impacts; and
 - (iii) identify residual risks that need to be managed and monitored.

PART A
SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

3. Contact Person and correspondence address

a) Details of

i) Details of the EAP

Name of The Practitioner: Dr Alexander Sergeyevich Rodionov

Tel No.: 08 234 29 234

Fax No. : N/A

e-mail address: asr.geology.consulting@gmail.com

ii) Expertise of the EAP.

(1) The qualifications of the EAP

(with evidence). Registered Professional Geologist, PhD, Novosibirsk State University – **Diploma of engineer-geologist-geochemist with distinction (Copies of relevant documents are attached as Appendix 1)**

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

(In carrying out the Environmental Impact Assessment Procedure) Accepted and approved by DMR full **EIA for Mining Right by Gem Wes for farm Van Zoelen's Laagte 158, several scoping reports, hundreds of EMPr's accompanying applications for mining permits and prospecting rights.**

b) Location of the overall Activity.

Farm Name:	Ebenezer (Portion 4 of Farm De Aar 180, NC)
Application area (Ha)	5 Ha
Magisterial district:	Pixley ka Seme (De Aar)
Distance and direction from nearest town	~6.5 km East of De Aar
21 digit Surveyor	C05700000000018000004

General Code for each farm portion	
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c) Locality map

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

Locality Plan

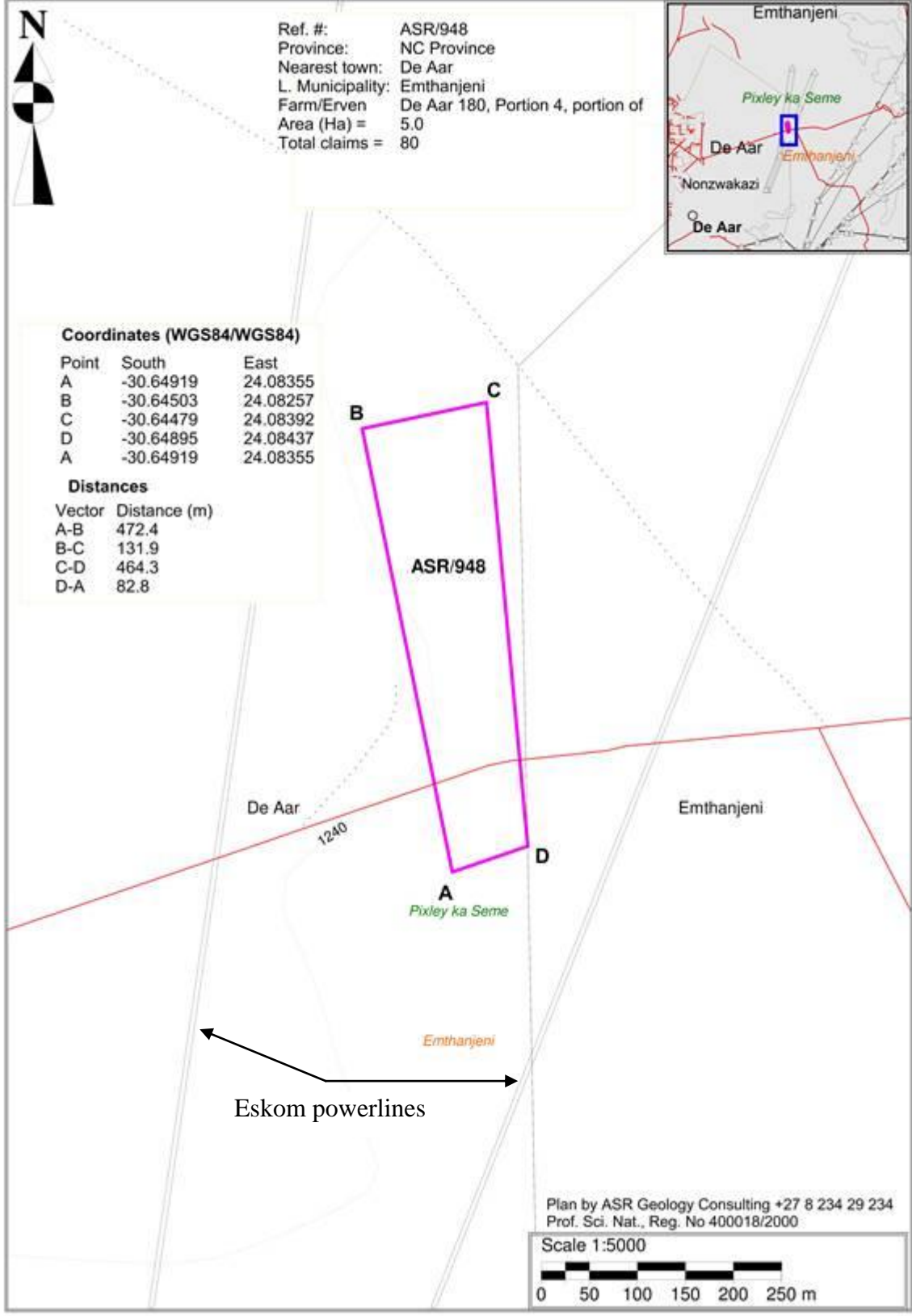


Figure 1. Locality Plan.

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

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

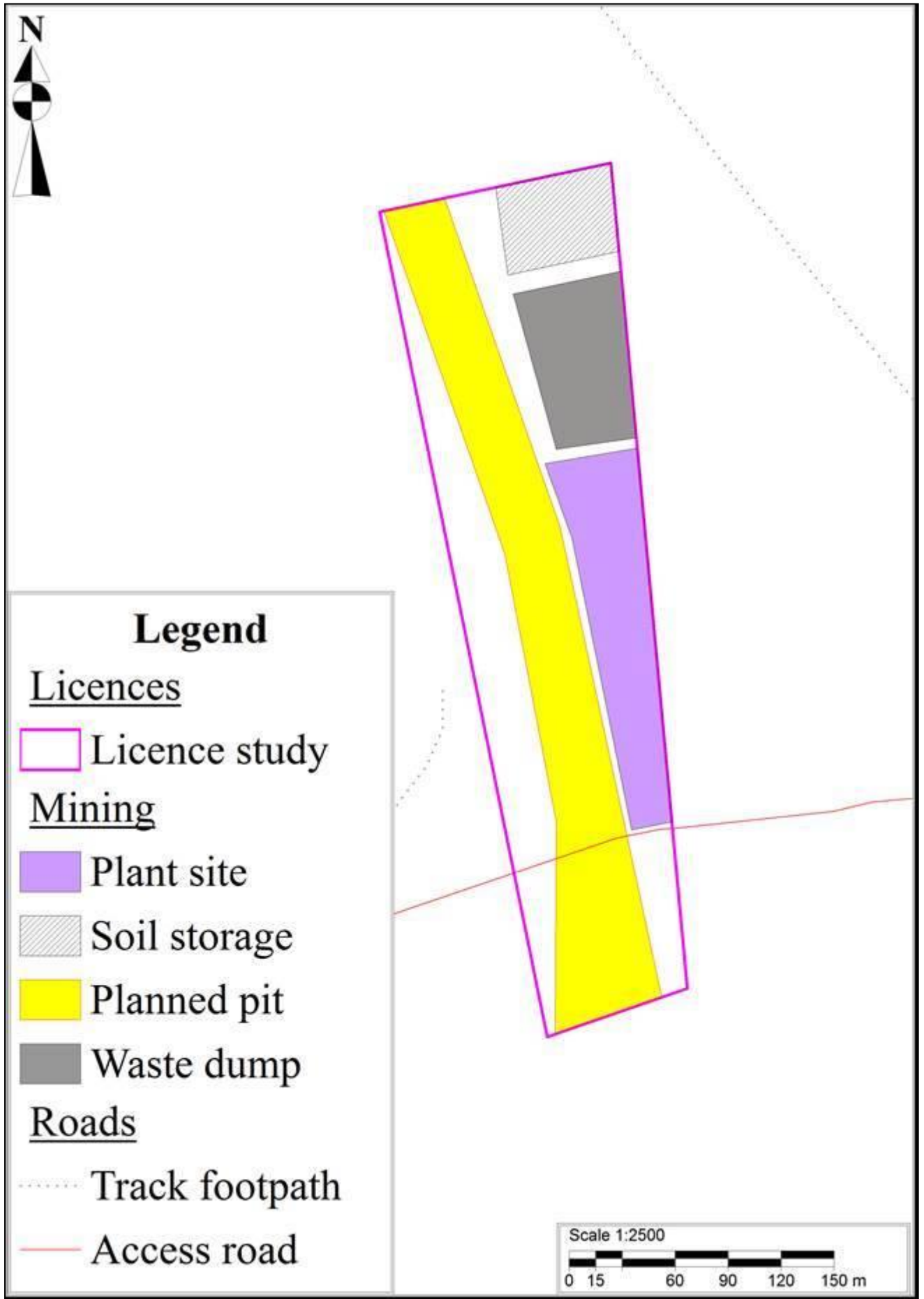


Figure 2. Locality plan with major activities indicated.

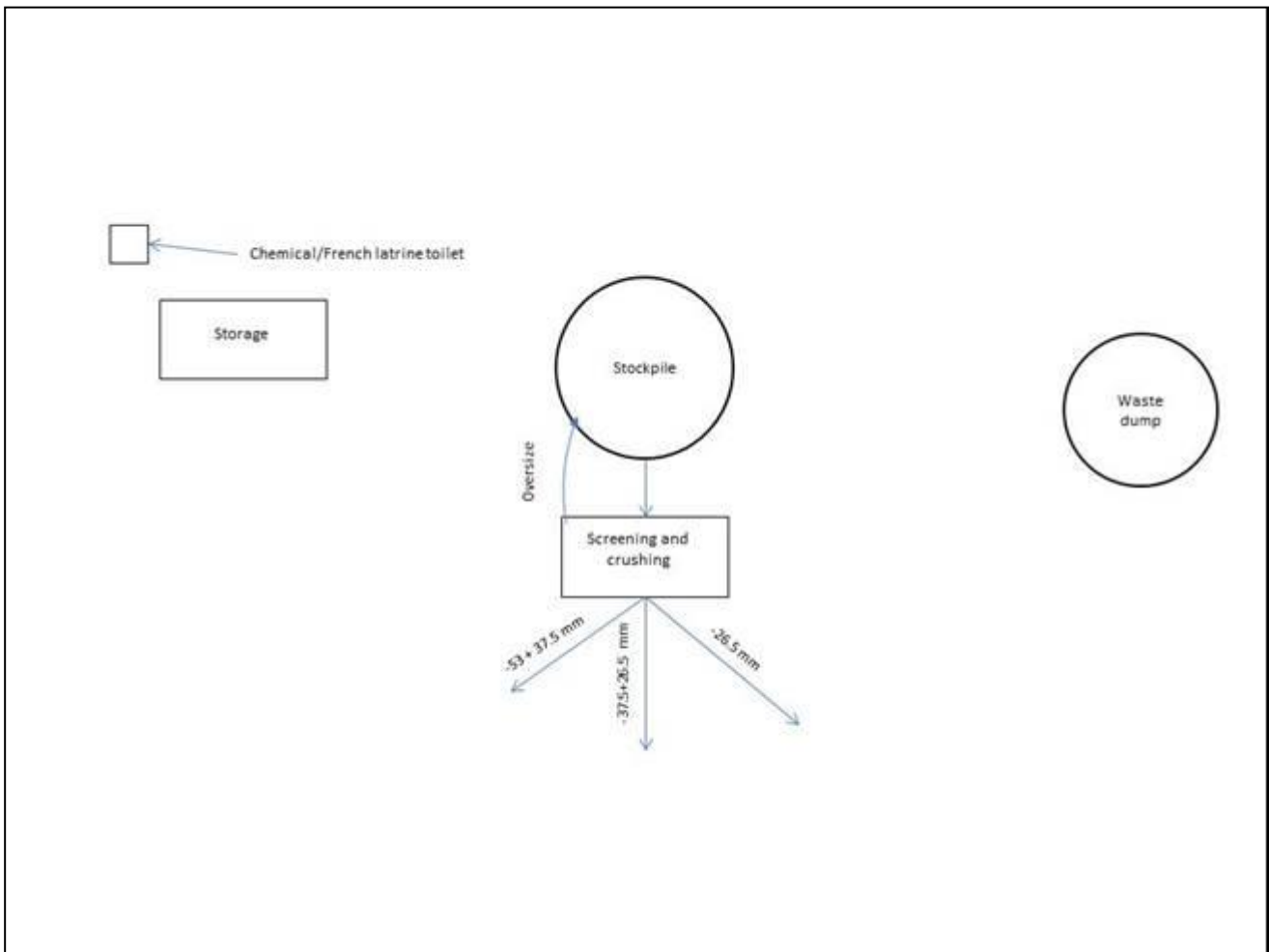


Figure 3. Generalised layout of the Plant site.

(i) Listed and specified activities

NAME OF ACTIVITY (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc E.g. for mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)	Aerial extent of the Activity Ha or m ²	LISTED ACTIVITY Mark with an X where applicable or affected.	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546)
Plant and mobile offices site	7400 m ²	x	GNR 544 (20)
Excavation	~ 1.8 Ha	x	GNR 544 (20)
Domestic waste containers	~ 4 m ²	x	GNR 544 (20)
Toilets (French latrine) or chemical	~ 10 m ²	x	GNR 544 (20)
Access roads	~ 50 m ²	x	GNR 544 (20)
Oils storage platform with shade	~ 20 m ²	x	GNR 544 (20)

Conveyors	50 m	x	GNR 544 (20)
Crushing and screening module	~80 m ²	x	GNR 544 (20)
Stockpile of ore	~ 300 m ²	x	GNR 544 (20)
Soil and waste stockpiles	~ 8100 m ²	x	GNR 544 (20)
Water pipelines	N/A (dry processing)	x	GNR 544 (20)
Slimes discharge pipeline	N/A (dry processing)	x	GNR 544 (20)
Workshop	N/A - existing at the farm will be used	x	GNR 544 (20)
Earthmoving machinery maintenance yard	N/A (farm structure used)	x	GNR 544 (20)
Scrap metal and old tyres storage	N/A (farm stand used)	x	GNR 544 (20)
Overall mining operation	5 Ha	x	GNR 544 (20)

(ii) Description of the activities to be undertaken

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

Dolerite body is a dyke of close to S-N strike. A narrow quarry will be cut using excavator for the first bench in weathered top layer. Afterwards so-called “soft blasting” will be used for loosening the rocks. This method eliminates risk of flying rocks, which is imperative, considering proximity of the Eskom powerlines (see Figure 1).

Screening and crushing plant will be set immediately next to the quarry (Figure 2).

Screened by the standard size fractions material/product will be temporary stockpiled within plant site (Figure 2) and loaded on the dump trucks for delivery to the construction site and/or to external buyers.

Waste representing country rock shales will be stored separately for back filling. Market study could potentially find a buyer for this material also.

Overall process is dry and water will be required only for dust control. This will be brought in by water bowser re-filled at the farm stand from existing borehole.

e) Policy and Legislative Context

<p>APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT</p> <p>(a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)</p>	<p>REFERENCE WHERE APPLIED</p>	<p>HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.</p> <p>(E.g. In terms of the National Water Act a Water Use License has/ has not been applied for)</p>
<p>NEMA No 62 1998 with all later amendments</p>	<p>Overall EMPr</p>	<p>Recommended mitigations will minimise impact</p>
<p>NWA No 36 1998 with all later amendments</p>	<p>N/A</p>	<p>Dry process, dust suppressing water will be brought by a bowser filled at the farm stand</p>
<p>Waste Act No 59 2008</p>	<p>Domestic and mine waste</p>	<p>Compliant</p>

f) Need and desirability of the proposed activities.

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

Development of a mineral reserve has one of the highest priorities in terms of a land use, with exception of specially protected and sensitive environment areas.

It is planned to develop a solar power plant on this farm. Substantial portion of the product will be used at this project at construction phase. This shall reduce costs of this secondary project.

Solar plant construction and follow up operation and maintenance phases will secure future jobs for personnel employed at mining (with appropriate training).

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

Several samples collected from surface were already tested at geotechnical laboratory and found as meeting industrial standards for building materials.

The planned solar plant site is only few hundred meters away from the site under application. Existing good gravel road runs through the site minimising need in additional access construction. Only ~15-20 m of road leading to the plant site from existing road will be required

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

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

Decision to undertake mining operation is closely related to the plan on constructing solar power plant on the same property. There are several similar plants in the area. Local source of crushed stone will reduce costs of construction phase.

Applicant is also farm owner. This is why he plans to use existing farm stand structures for support of both projects; namely, the yard, workshop, existing borehole, etc.

Current land use as grazing ground found to be marginally viable taking into account extremely dry climate conditions and steadily diminishing yield of water from boreholes in the area.

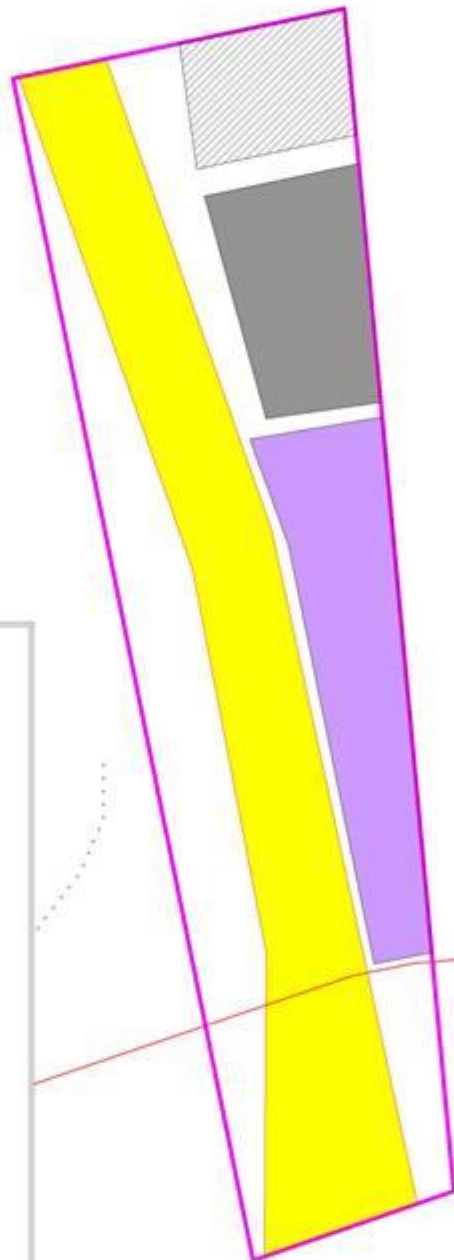
i) Details of the development footprint alternatives considered.

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

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


- (a) The proposed mining operation will take place on a portion 4 of Farm De Aaar 180 known as Ebenezer, Northern Cape Province;
- (b) The planned activity is relatively small-scale mining for construction materials (aggregate stone, gravel and sand);
- (c) Proposed operation layout is presented on Figure 4 below;
- (d) Pretty standard mining and processing technique will be utilised at the operation. Screening plant (dry) is fed by x 1 excavator, x 2 front end loaders and x 1 dump truck. Dolerite will be excavated applying soft blasting and excavator, transferred to the screening and crushing plant and eventually dispatched;

- (e) Location of the target within infrastructure of the farm combined with planned usage of existing farm stand structures makes layout of the operation very compact with minimal disturbance of the area;**
- (f) If the activity will not be implemented this would have negative impact on the economy of the planned solar power plant construction. Also a number of new jobs would not be created.**




Legend


Licences

 Licence study

Mining

 Plant site


 Soil storage

 Planned pit

 Waste dump

Roads

 Track footpath

 Access road

Scale 1:2500

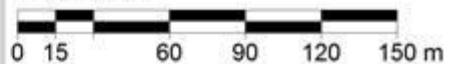


Figure 4. Operation layout – general.

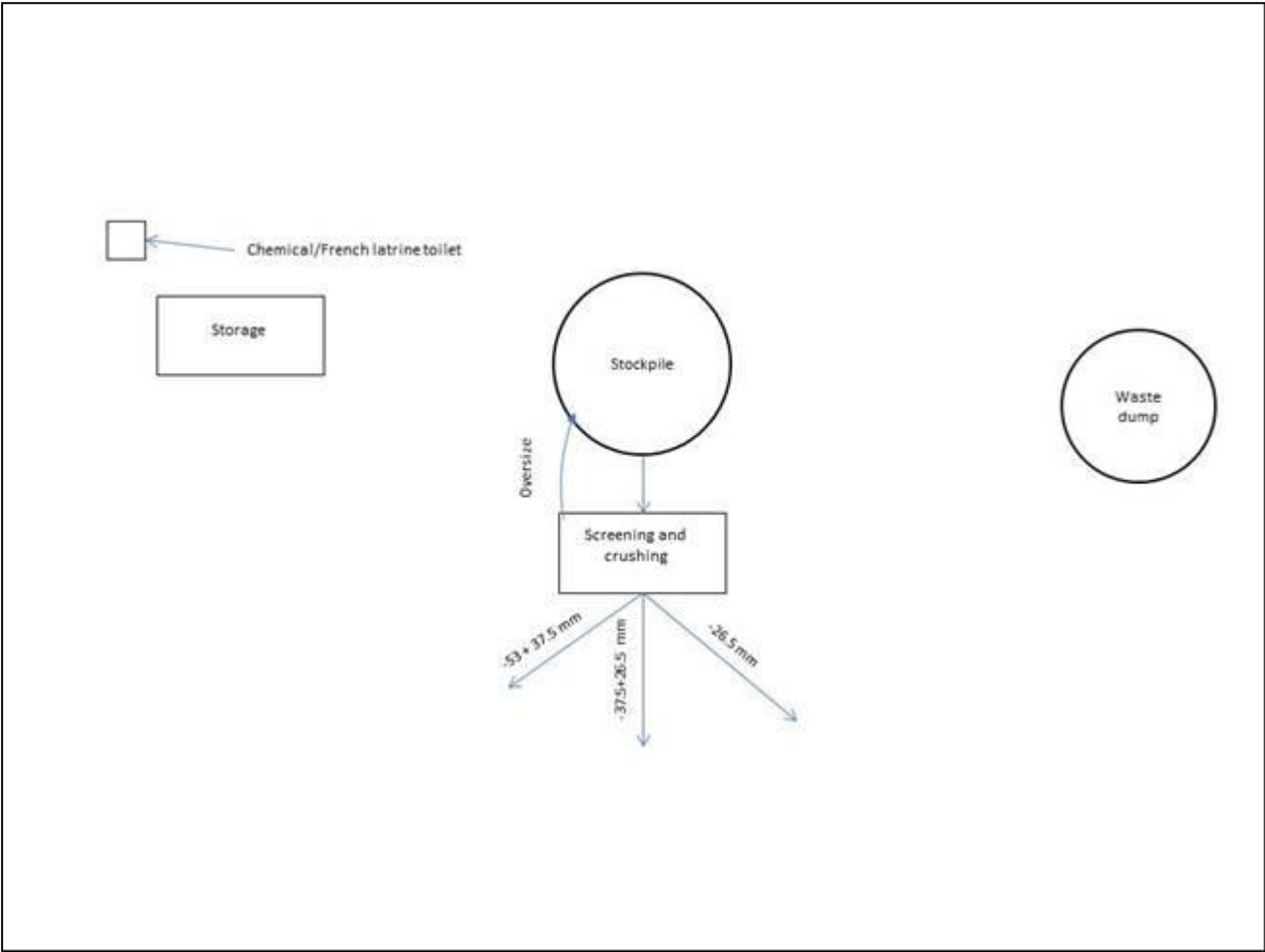


Figure 5. Generalised layout of the Plant site.

i) Details of the Public Participation Process Followed

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

Consultation process was implemented by personal meetings with neighbours and Municipality. Public notices were displayed at Post Office and Library inviting interested and affected parties to come forward.

Only one party – J. Lambrecht, owner of Portion 1 of the same farm bordering the Portion 4 from South (Figure 6) objected to the proposed operation.

1. Generated dust could negatively affect other solar power plants in the area;
2. New quarry will have negative impact on the business of other similar quarries operating in the area as new competition;
3. Generated noise and dust would affect game, including exotic species kept on his property.

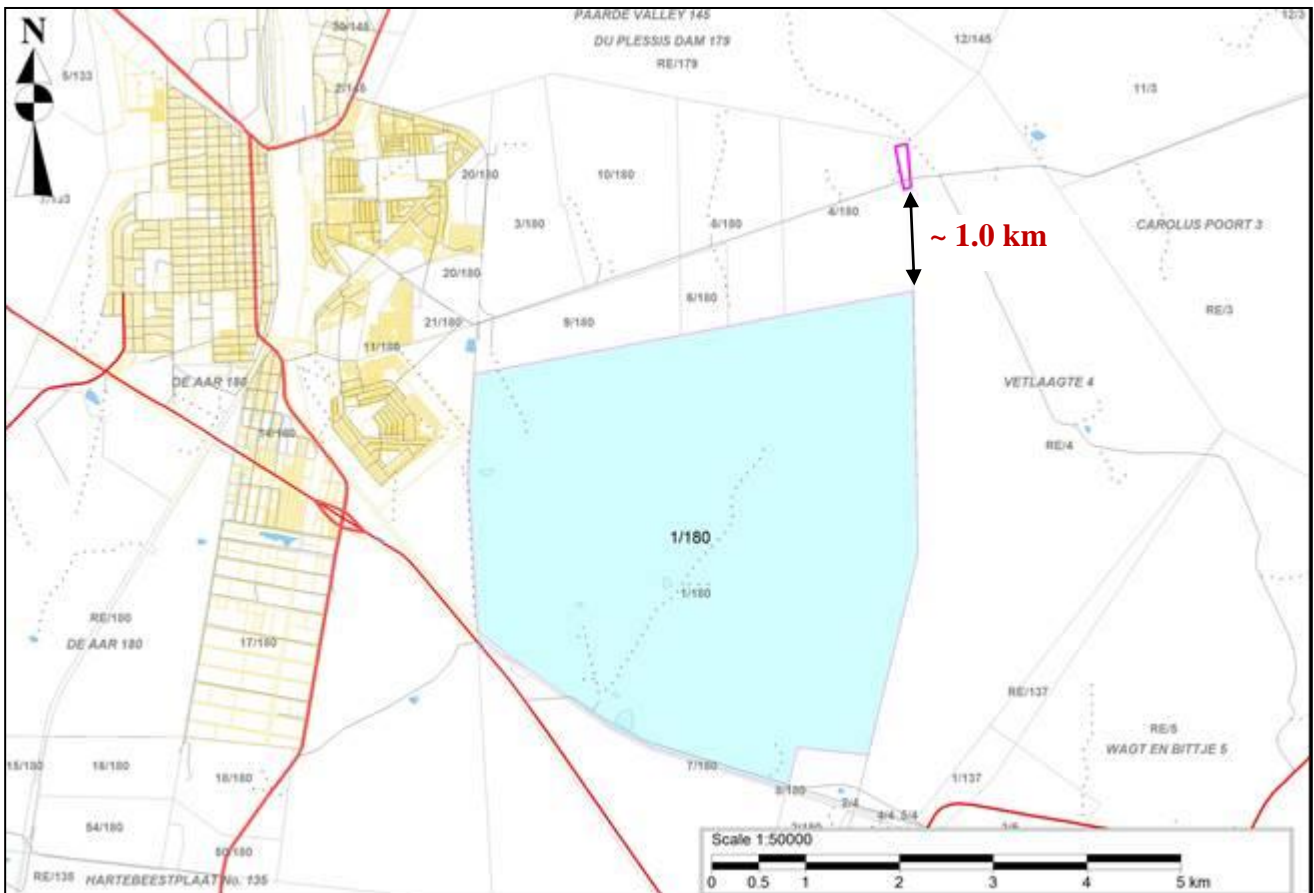


Figure 6. Relative location of the site and Mr Lambrecht's property.

ii) Summary of issues raised by I&Aps

(Complete the table summarising comments and issues raised, and reaction to those responses)

Interested and Affected Parties		Date	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Comments Received			
<u>AFFECTED PARTIES</u>					
Landowner is the Applicant	X		None	N/A	N/A
				N/A	N/A
				N/A	N/A
Lawful occupier/s of the land	N/A	N/A		N/A	N/A
				N/A	N/A
				N/A	N/A
Landowners or lawful occupiers on adjacent properties				N/A	N/A
Mr L.D. Pienaar (Adjacent farm landowner)		12/11/2015	None	N/A	N/A
Mr R.S. Du Plessis (Adjacent farm landowner)		12/11/2015	Refused to sign as new quarry would be competition to his son, who runs similar quarry nearby (farm Paarde Valley 145).	N/A as objection contradicts Competition Act No 89, 1998	N/A

Mr J.J. Lambrecht (Adjacent landowner)		12/11/2015	Refused to sign: 1. Negative impact on existing quarries (competition); 2. Dust and noise would negatively impact game, including exotic, on his property; 3. Dust would negatively impact other planned in the area solar plants.	Formal reply sent. Competition argument contradicts Competition Act No 89, 1998; Dust control is addressed in EMPr hereafter; Not a single owner of several solar power plants in the area came forward with objections on the grounds of additional dust considering small scale of operation. It is recommended to make measurements of noise level at the fence line after operation launch. If above prescribed level, sound blocking wall will be erected near the plant.	Section "f" of EMPr
Emthanjeni Local Municipality (presentation of the Project)		19/11/2015	None	N/A	N/A
South African National Civic Organisation (NC) – on behalf of De Aar community		30/11/2015	Full support as job creation opportunity in the high unemployment area	N/A	N/A
<u>OTHER AFFECTED PARTIES</u>		N/A			
<u>INTERESTED PARTIES</u>		N/A			

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

(1) Baseline Environment

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

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

The site has been inspected and the following assessment of the area was done:

The surrounding area is a flat plain with elevation of ~ 1240 m amsl. Overall plain has a gentle sloping towards North with ~ 5 m per ~ 1.0 km decrease in elevation.

Vegetation of the area is characteristic of Nama Karoo Biome (Rutherford, et al, 2003, see Figure 7).

According to Acocks (1988) more detailed classification it belongs to False Upper Karoo veld type (Figure 8).

This veld type is generally identical to Upper Karoo, but is severely damaged by overgrazing.

Signs of overgrazing were evident during site inspection.

Dominating vegetation is dwarf bitter bush (*Chrysocoma ciliata* L.), which is known as an aggressive invader in the overgrazed areas.

This bush covers most over the area with occasional scattered *Eragrostis lehmanniana* grass. Some dwarf Acacia Karoo was also noted.

Vegetation cover is not forming a consistent blanket with up to several meters bare "windows" covered with rock outcrops (shale and dolerite) and sand.

No larger trees were noticed within ~ 1 km radius from the site.

Animal life is represented by birds, earth squirrels, mice, snakes and numerous insects.

No large animals were noticed.

No natural drainage lines or artificial dams are present in vicinity of the site.

There is currently dry water reservoir to the West of the block under application, which presumably was filled by borehole water.

Google image (Figure 9) shows that next to the tank there are several small cultivated fields, which are currently abandoned due to the lack of water.

Servitudes comprise two high voltage Eskom power lines and Farm road running through several private farms; the latter crosses the block under application.

There are two shallow little quarries, where material (shale) was presumably excavated for the farm road construction.

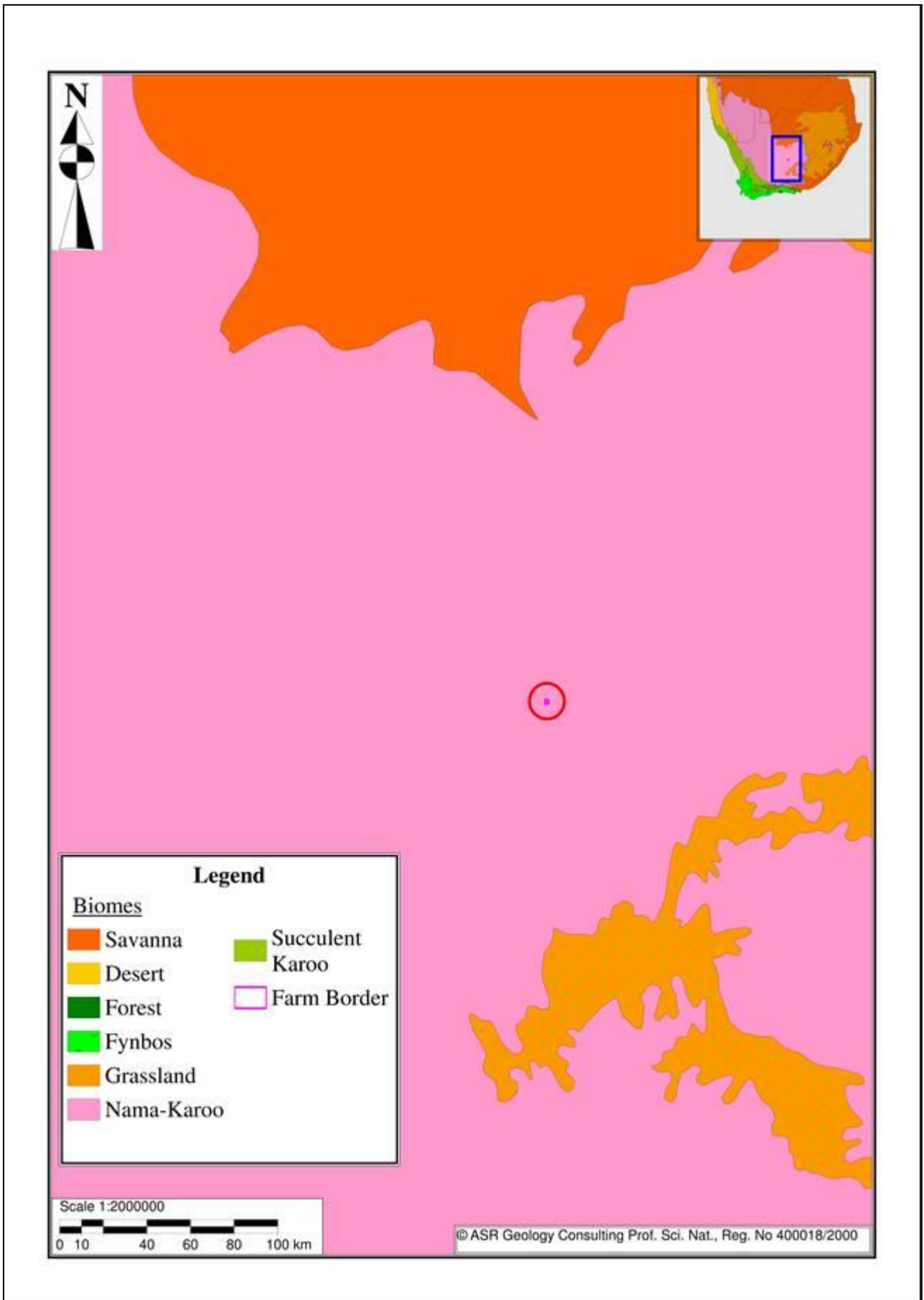


Figure 7. Farm location on the map of Southern Africa biomes (<http://www.plantzafrica.com/>).

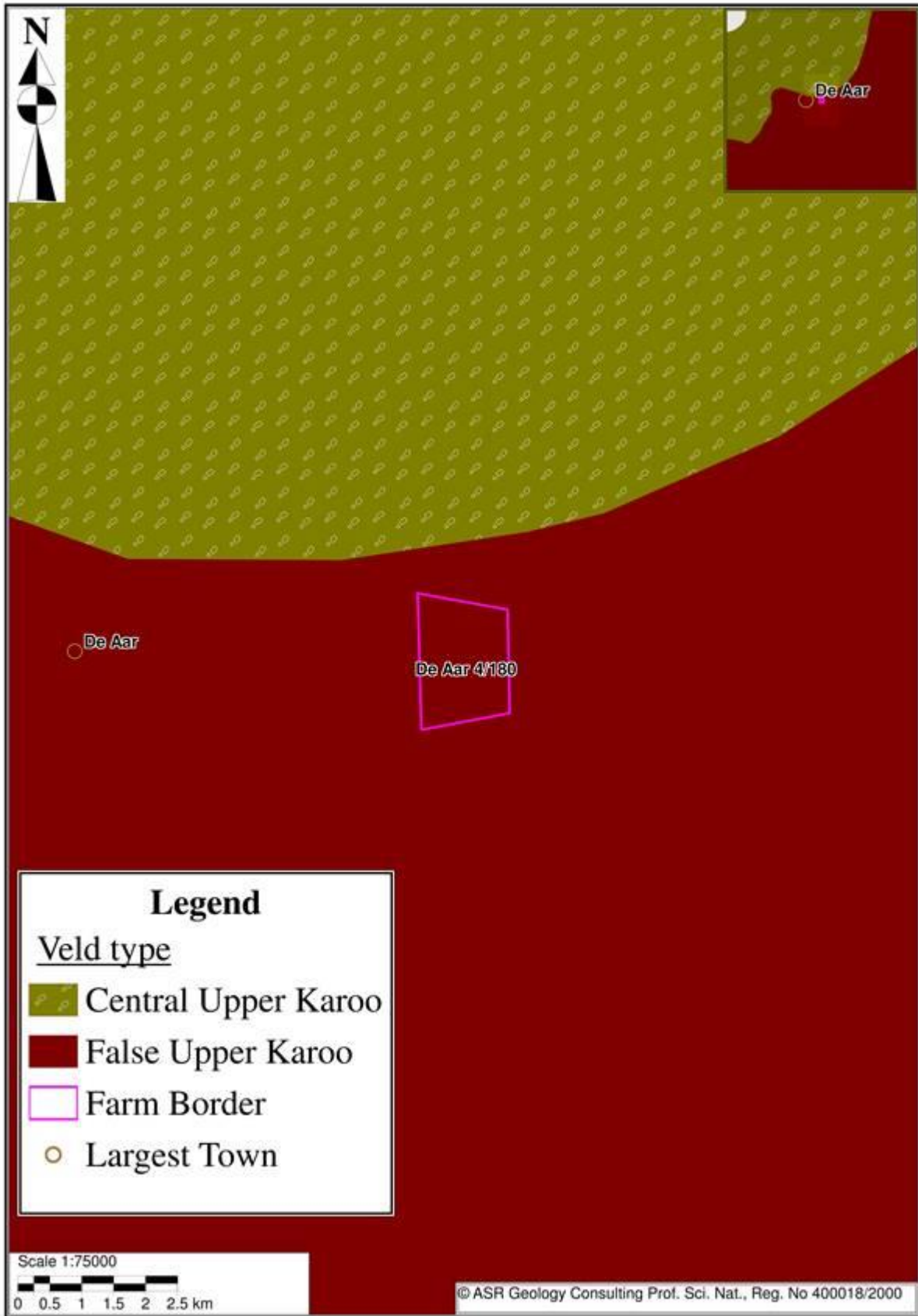


Figure 8. Farm on the map of Acock's veld types (<http://www.plantzafrica.com/>).



Figure 9. The farm (green) and site (magenta) borders on the Google image.

b) Geology and soils:

The area where the mine site will be located is composed of shales of Beaufort Group, Adelaide Subgroup with numerous younger dolerite intrusions (Figure 10).



Figure 10. Geology of the area.

A dolerite dyke runs through the site under application.

Sandy soil is thin (~ 3-10 cm) with large patches lacking soil completely. They are covered with fragments of shale (Photo 1).

Subsoil layer varying in thickness from virtually zero up to ~ 1.0 m is composed of sandy matrix with numerous fragments of broken shale (Photos 2 and 3).



Photo 1. Zone virtually lacking topsoil.



Photo 2. Subsoil layer is ~ 1.0 m.

2003	18.1	26.8	10.3	207	16.6	26	0	30	4	0	2
2004	18.1	26.8	10.7	333.96	15.5	27	0	28	2	0	0
2005	-	-	-	-	-	-	-	-	-	-	-
2006	16.6	25.4	9.5	455.93	15.5	46	0	38	9	0	0
2007	17.3	26.4	9.6	299.2	16.5	26	0	31	3	0	0
2008	17.2	26.2	9.7	240.79	16.2	26	0	35	5	0	0
2009	17.1	26	9.8	361.66	16.4	28	0	31	2	0	0
2010	18.1	27.1	10.6	421.12	16.2	26	1	29	1	0	0
2011	16.5	25.5	9.3	451.07	15.2	36	0	28	8	0	1
2012	16.8	26	9.5	450.59	15.8	41	2	38	6	0	0
2013	17.1	26.3	9.4	235.46	16.2	25	0	27	0	0	3
2014	17.3	26.4	9.9	298.71	16.2	27	1	44	2	0	2
2015	18.1	27.2	10.4	231.4	15.6	17	0	32	0	0	2

- T - Average annual temperature
- TM - Annual average maximum temperature
- Tm - Average annual minimum temperature
- PP - Rain or snow precipitation total annual
- V - Annual average wind speed
- RA - Number of days with rain
- SN - Number of days with snow
- TS - Number of days with storm
- FG - Number of foggy days
- TN - Number of days with tornado
- GR - Number of days with hail

The following Figure 11 shows wind rose for the area; strongest winds have E-W and NW-SE directions.

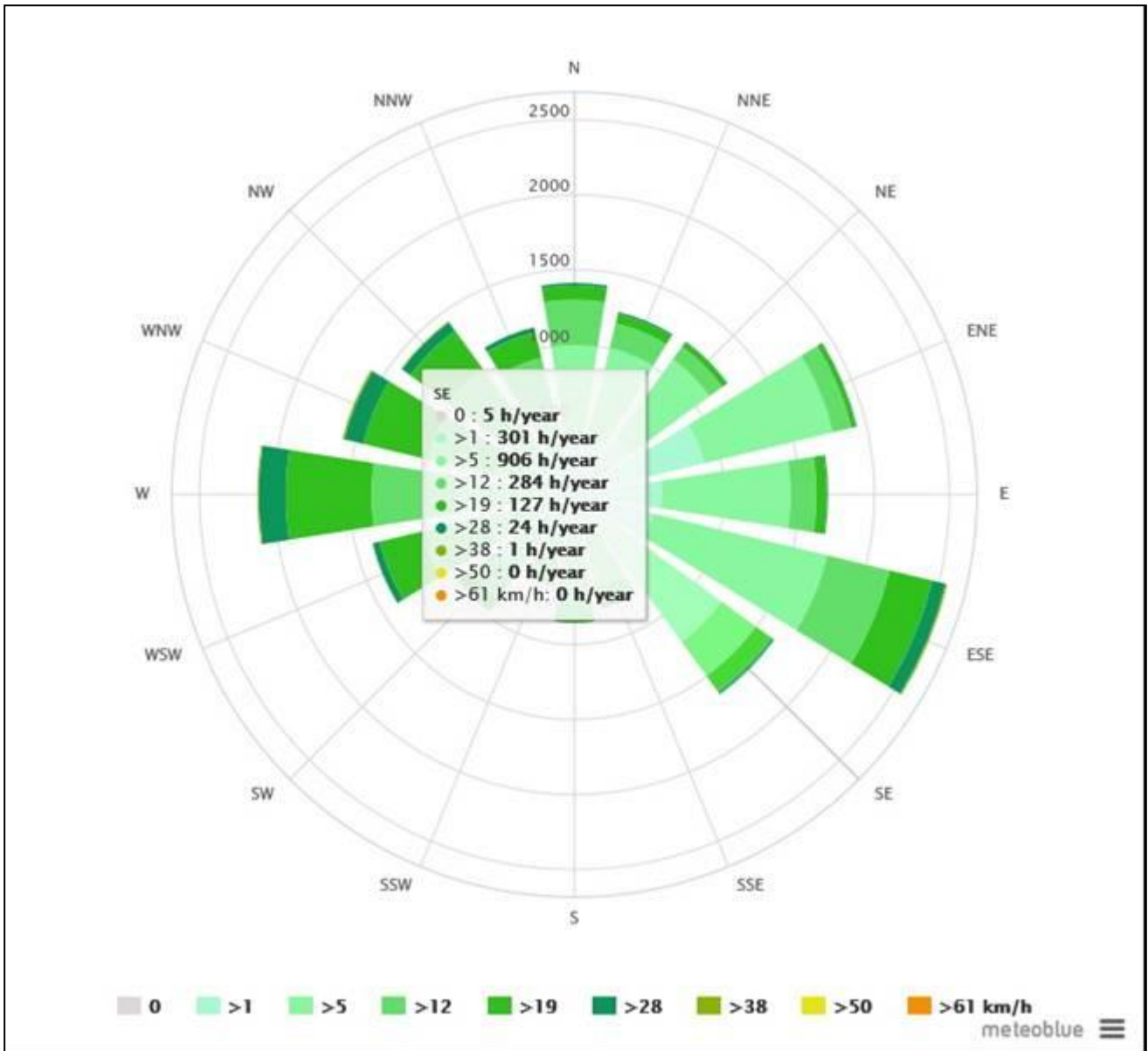


Figure 11. Wind rose for De Aar.

e) Air quality and Noise:

The air quality is good with no major industries or external sources that impact on air quality. The background noise in the area is typical to usual farm activities.

Major source of dust is movement of vehicles on the public gravel road and local dirt roads at the farms.

(b) Description of the current land uses.

Surrounding area is generally used for farming (primarily grazing). Farm immediately to the South is used a game farm.

There are several mining operations, where aggregate stone is mined. Several solar power plants

are at various stages of construction and/or operation.
The following Google Earth image illustrates the above.



Figure 12. Land use in the area. *Magenta contours – quarries, Brown – densely populated residential area, White contours - solar power plants, White lines – Eskom power lines crossing the property.*

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

There are several farm access roads, several water points for cattle at the wind water pumps.
The farm stand comprises main house, several outbuildings and shades.

(d) Environmental and current land use map.

(Show all environmental, and current land use features)

Surrounding area is used mostly for grazing and occasional crop fields. Figure 7 above shows spatial distribution of different activities.

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

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

ACTIVITY	DESCRIPTION	Se	D	SP	C	P	Si
1. CONSTRUCTION PHASE IMPACTS							
Road construction	Loss of vegetation + habitat	L	L	L	L	L	L
Eskom line	Loss of vegetation + habitat	NOT APPLICABLE					
Plant construction	Loss of vegetation + habitat	L	L	L	L	L	L
Pipeline installation	Loss of vegetation + habitat	NOT APPLICABLE					
Offices	Loss of vegetation + habitat	NOT APPLICABLE					
2. OPERATIONAL PHASE IMPACTS							
Mining	Geological degradation	L	L	L	L	H	H
Disposal	Topographic change - dump	L	L	L	L	L	L
Mining	Topographic change - pit	L	L	L	L	L	L
Mining	Soil pollution - accidental spills and	L	L	L	H	M	H
Operation	Soil pollution (workshop, store,	L	L	L	H	M	H
Operation	Loss of grazing	L	L	L	L	L	L
Operation	Loss of/ disturbance to plants	L	L	L	L	L	L
Extraction of groundwater	N/A	L	L	L	L	L	L
Operation	Problem plant invasion	L	L	L	L	L	L
Operation	Effect on animals	L	L	L	L	L	L
Waste water disposal	Water regime (regional)	NOT APPLICABLE					
Mining	Noise (earth moving equipment and	L	L	L	L	L	L
Operation	Air quality: Dust - Transport	L	L	L	L	L	L
Operation	Air quality: Dust - Crusher	L	L	L	L	L	L
Mining	Noise - blasting nuisance - regional	NOT APPLICABLE					
Mining	Noise - blasting nuisance -personnel	NOT APPLICABLE					
Mining, operation	Loss of archaeological items	L	L	L	L	L	L
Operation	Sensitive landscapes	L	L	L	L	L	L
Mining	Visual impact	L	L	L	L	L	L
3. DECOMMISSIONING PHASE IMPACTS							
Demolition	Waste disposal	Pos					
Rehabilitation	Re-vegetation	Pos					
4. RESIDUAL IMPACTS AFTER CLOSURE							

Vacated site	Rehabilitation of exposed areas	Pos					
Vacated site	Safety risks	Pos					

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

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

The following criteria were used for compilation of the above table:

SEVERITY

- **Low negative impact** (indicates a

state of 'calmness' concluding that the effect the operations may have on the environment is so insignificant that the well-being of the environment or any individual will not be degraded or prohibited.)

- **Medium negative impact** (describes as state of 'manageable stress', giving the idea of that the effect of the operations on the environment is significant enough to cause tolerable disturbance to the well-being or overall conditions of the environment or any individual.)

- **High negative impact** (indicating a state of 'high stress', meaning that the effect of the operations on the environment is so significant that the well-being and overall conditions of the environment or any individual will be degraded or prohibited.)

DURATION

- **Short-term** (short-term duration is rated as a period less than two years and indicated as a low impact.)

- **Medium-term** (medium-term impact is rated as the period between 2 and 5 years and indicated as a medium impact.)

- **Long-term** (long term impact is rated as the any period exceeding 5 years and indicated as a high impact.)

SPATIAL SCALE

- **Localized** (the disturbance occurs within a radius of 500 m from point of existence and indicated as low impact)

- **Fairly widespread** (the disturbance is carried over a short distance, between 500 m and 1 km radius from point of existence and indicated as medium impact)

- **Widespread** (disturbance exercise a negative affect over an area greater than 1 km radius from point of existence and indicated as high impact.)

CONSEQUENCE

- **Low consequence** (meaning that the probability of cumulative impact occurrence is minimal with little to no lasting effects and is indicated as low impact)

- **Medium consequence** (meaning that the probability of cumulative impact occurring exists with a moderate, short-term lasting effect and is indicated as medium impact.)

- **High consequence** (meaning that the probability of cumulative impact occurrence is absolute with a short to medium-term lasting effect and indicated as high impact)

SIGNIFICANCE

- **Low overall significance** (the disturbance caused by the impact is minimal with an excellent probability for total recovery after operations ceased.)

- **Medium overall significance** (the disturbance caused by the impact is moderate with a good chance for total recovery over an intermediate period after operations ceased.)

-**High overall significance** (the disturbance caused by the impact is severe with a poor to no probability for recovery after operations ceased.)

LEGEND FOR THE ABOVE TABLE

Se = Severity

L = Low negative impact

D = Duration

M = Medium negative impact

SP = Spatial scale

H = High negative impact

C = Consequence

Pos = Positive impact

P = Probability

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

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

Current status of the land is already heavily disturbed by previous mining activity (old shallow quarry on apportion of the site). If only two periods of Mining Permits validity (as allowed by the Mineral Act) would be utilised, the final status of the land would improve, if all recommended mitigation measures and proper rehabilitation would be applied, the final outcome would be positive improvement.

Residual void can be used as a water reservoir, if a borehole with sufficient water yield would be found on vicinity.

Alternatively it could be utilised by the planned solar power project as refuse dumping site with final closure after filling it up.

Appropriate application and authorisation would be required in this scenario.

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

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

The following table was included into application for environmental authorisation. It summarises most of the issues.

ACTIVITIES	PHASE	SIZE AND SCALE	TYPICAL MITIGATION MEASURES	COMPLIANCE WITH STANDARDS
<p>(of operation in which activity will take place).</p> <p>(E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc E.g. for mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water</p>	<p>(volumes, tonnages and hectares or m²)</p> <p>State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure.</p>	<p>(Eg, storm water control, dust control, noise control, access control, rehabilitation etc....., etc.....)</p>	<p>(A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>	

control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)				
Plant and stockpiles site	Construction and operation	7,400 m ² of surface disturbance	Dust control, dismantling of all structures and rehabilitation	Low to positive impact after rehabilitation of already disturbed ground
Excavations	Operation	~ 1.8 Ha	Dust control	Removal of old dump and rehabilitation of surface – positive; Open pit will be eventually flooded and used as water reservoir -positive
Blasting	Operation	1.8 Ha	Only soft blasting to be used. Access control, warning signs and informing personnel and all parties about blasting schedule	Low impact considering small scale and remote location of the site
Access and Mine roads, haulage	Operation	50 m ² of new surface disturbed	Usage of pre-existing roads, wherever possible, dust control, speed limit of 20 km/hour for dump trucks and 40 km/hour for light vehicles, rehabilitation	Final rehabilitation. Low impact if mitigations applied
Fuel and oils storage	Operation	20 m ² oils storage platform	Diesel bowser will be used for refuelling. Spillage trays to be used. Oils to be stored on a concrete slab under the shade. Any spillages will be treated with bio-degrading agent. After prescribed treatment period, the affected material will be used for backfilling	Low to impact if mitigations applied

			after appropriate tests.	
Ore stockpiles	Operation	~ 300 m ² within plant site	Minimise temporary storage time, dust control, rehabilitation	Low impact if mitigations applied
Soil and waste stockpiles	Operation	~ 8100 m ² next to plant site	Wind erosion protective berms with planted grass, rain water erosion protective drainage channel, rehabilitation	Low impact if mitigations applied
Water pipe lines	Operation	N/A (dry process)		
Processing plant	Operation	~ 2,500 m ²	Dust control, grease and oils handling control, rehabilitation.	Low to medium impact if mitigations applied
Workshop	N/A – structure at the farm stand will be used			
Earthmoving machinery maintenance yard	N/A – structure at the farm stand will be used			
Chemical/or French latrine toilets	Operation	~ 10 m ²	Standard maintenance, final rehabilitation	Low impact if mitigations applied
Domestic waste	Operation	2-4 containers	At least once a week removal to the nearest official dumping site; usage of clearly visible containers with lids.	Low impact if mitigations applied
Scrap metal and old tyres storage	N/A – structure at the farm stand will be used			
Overall mining operation	Operation	5.0 Ha	Environment awareness training of personnel on regular basis. Management must be well familiar with approved EMP and all relevant mitigation procedures	Managerial level measures to minimise overall negative impacts

Final rehabilitation and after care	Mine closure and final rehabilitation	N/A	Mining Right application will be lodged within 6 months of the operation	Mine operating under the Mining Right will take over rehabilitation liabilities
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viii) Motivation where no alternative sites were considered.

Mining activity by definition takes place only where mineral reserves are present and can be mined viably. Therefore not much choice for the selection of the site was available. The targeted dolerite dyke is the only one found on the property so far.

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

Proposed mining operation will positively contribute to the economy of the solar power plant to be constructed on the property.

Preliminary layout of the operation presented here is very compact and minimises need in access and mine roads construction.

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

We refer to the table above summarising the identified risks. The assessment was made by site inspection and Google Earth image study.

Observations were compared with numerous previous studies and monitoring of similar mining operations.

j) Assessment of each identified potentially significant impact and risk

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

NAME OF ACTIVITY (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc E.g. For mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)	POTENTIAL IMPACT (Including the potential impacts for cumulative impacts) (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)	SIGNIFICANCE if not mitigated	MITIGATION TYPE (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc) E.g. Modify through alternative method. Control through noise control Control through management and monitoring through rehabilitation..	SIGNIFICANCE if mitigated
Plant and stockpiles site	Removal of vegetation and soil	Vegetation, habitat	Construction and operation	High	Rehabilitation	Low
Excavations	Removal of vegetation and soil	Vegetation, habitat	Operation	High	Back filling and rehabilitation	Low
Blasting	Risk of flying rocks	Health hazard, contamination of	Operation	High	Soft blasting. Access control, warning signs and	Low

		surface			informing personnel and all parties about blasting schedule, removal of rock fragments from surrounding surface	
Access and Mine roads, haulage	Removal of vegetation and soil, dust	Vegetation, habitat, subsoil compacting	Operation	High	Usage of pre-existing roads, wherever possible, dust control, speed limit of 20 km/hour for dump trucks and 40 km/hour for light vehicles, rehabilitation	Low. Only ~ 50 m ² of new access road
Fuel and oils storage	Soil and subsoil	Risk of spillages	Operation	High	Anti-spillage trays and concrete platform. Any spillages will be treated with bio-degrading agent. After prescribed treatment period, the affected material will be used for backfilling after appropriate tests.	Low
Ore stockpiles	Removal of vegetation and soil	Vegetation, habitat	Operation	Medium to high	Minimise temporary storage time, dust control, rehabilitation	Low
Soil and waste stockpiles	Removal of vegetation and soil	Vegetation, habitat	Operation	Medium to high	Wind erosion protective berms with planted grass, rain water erosion protective drainage channel, rehabilitation	Low
Water pipe lines	N/A					
Processing plant	Dust, noise	Air pollution	Operation	Medium	Dust and noise control	Low
Workshop	N/A (farm structure used)					
Earthmoving machinery maintenance yard	N/A (farm structure used)					
Chemical/or French latrine toilets	Removal of vegetation and soil, risk of soil pollution	Vegetation, habitat	Operation	Medium to high	Standard maintenance, final rehabilitation	Low

Domestic waste	General surface pollution	Vegetation, habitat	Operation	Medium to high	At least once a week removal to the nearest official dumping site; usage of clearly visible containers with lids.	Low
Scrap metal and old tyres storage	N/A (farm structure used)					
Overall mining operation	Removal of vegetation and soil, general surface disturbance, void	Vegetation, habitat, soil, subsurface mineral reserve	Operation	High	Environment awareness training of personnel on regular basis. Management must be well familiar with approved EMP and all relevant mitigation procedures	Low to medium
Final rehabilitation and after care	Removal of vegetation and soil, general surface disturbance, void	Vegetation, habitat, soil, subsurface mineral reserve	Mine closure	Medium	Removal of all structures, levelling and compacting the ground after back filling of the void with waste. Residual void can be left as a water reservoir or refuse dumping site for solar power project.	Low to positive

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

k) Summary of specialist reports.

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

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
No specialised studies carried out		N/A	N/A

Attach copies of Specialist Reports as appendices

I) Environmental impact statement

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

There are no environmental features on the area of interest that may require protection, remediation, management or avoidance.

(ii) Final Site Map

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

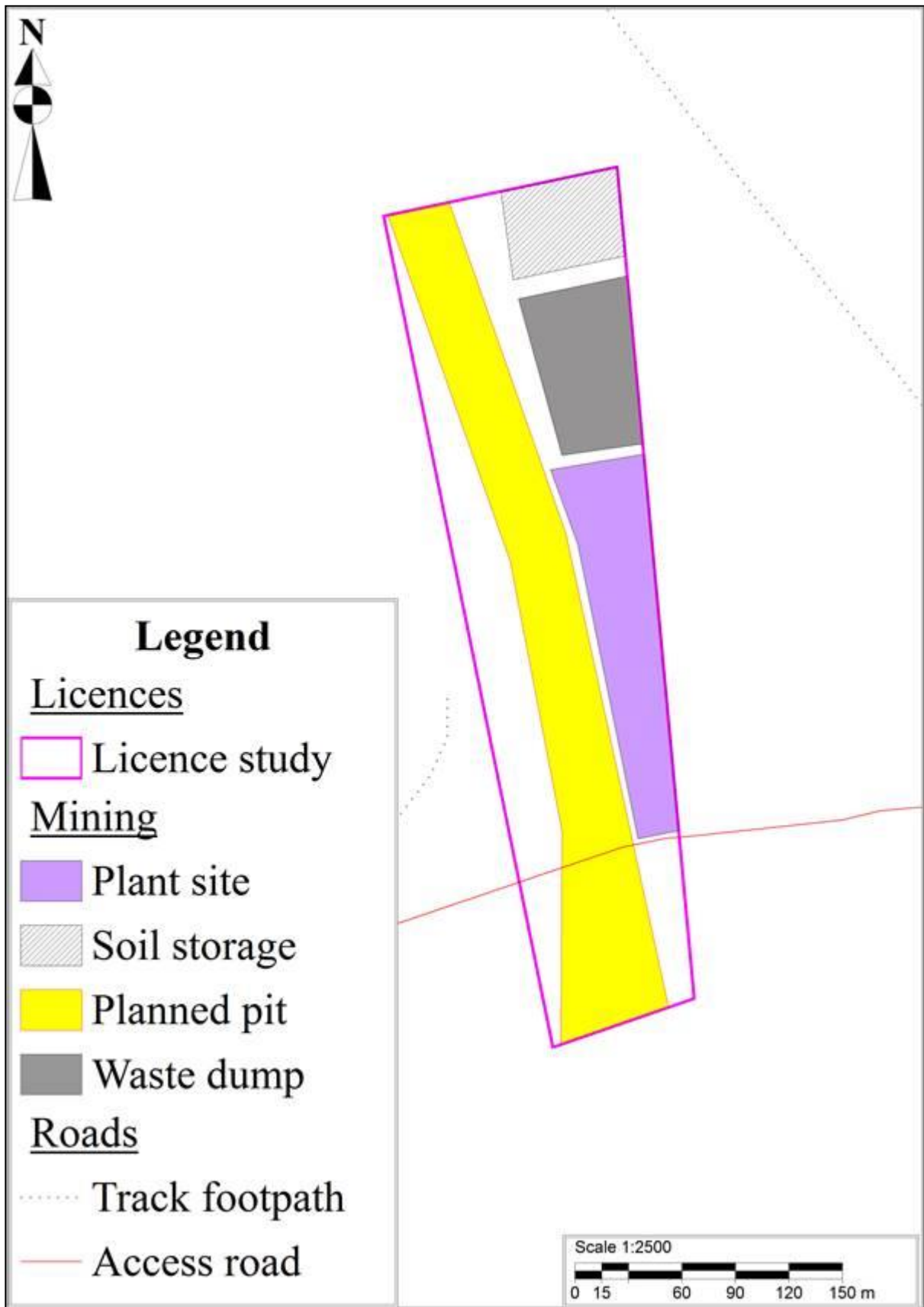


Figure 13. Mining operation layout.

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

Positive outcomes of the proposed operation:

- Contribution to boosting economic activities in the area;
- Improved economy of construction phase of the planned solar power plant;
- Utilisation of the mineral reserve;
- Jobs creation;
- Properly applied mitigation measures and final rehabilitation should improve overall status of the land

Negative impacts:

- Residual void;
- Increased dust and noise levels during operation phase.

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

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

The objectives of impact management are to minimise overall impact on the environment and immediately apply appropriate mitigation measures, where deviations from the recommended procedures would be identified (intentional or accidental).

n) Aspects for inclusion as conditions of Authorisation.

Any aspects which must be made conditions of the Environmental Authorisation

Systematic monitoring of compliance with approved EMPr by appointed EAP (at least once a quarter) and environment awareness training of personnel.

Operation inspections by DMR officials.

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

(Which relate to the assessment and mitigation measures proposed)

N/A.

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

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

The proposed operation will take place on the economically stagnated area. Utilization of the identified mineral (aggregate stone and shale) reserve will have positive contribution to the local and economy, including job creation and alleviation of poverty.

ii) Conditions that must be included in the authorisation

Strict following the recommended mitigation measures and procedures; environment awareness training of personnel and regular monitoring inspections by EAP are recommended.

q) Period for which the Environmental Authorisation is required.

5 years

r) Undertaking

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

Confirmed

s) Financial Provision

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

Calculated amount totals **R 335,525.54**

i) Explain how the aforesaid amount was derived.

Currently valid quantum calculation recommended procedure was applied (see following table).

Table 2. Quantum calculation**CALCULATION OF THE QUANTUM**

Applicant: **Mr W. van der Merwe**
 Evaluator **ASR Geology Consulting**
OFFICE USE ONLY

Location: Farm De Aar 180 (Prt. 4)
Date: 15-Jan-16

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and power lines)	m3	100	11.4135	1	1	R 1,141.35
2 (A)	Demolition of steel buildings and structures	m2	0	158.991	1	1	R 0.00
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	234.297	1	1	R 0.00
3	Rehabilitation of access roads	m2	50	28.455	1	1	R 1,422.75
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	276.129	1	1	R 0.00
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	150.6225	1	1	R 0.00
5	Demolition of housing and/or administration facilities	m2	0	317.9715	1	1	R 0.00
6	Opencast rehabilitation including final voids and ramps	ha	1.8	166684.63	0.52	1	R 156,016.82
7	Sealing of shafts adits and inclines	m3	0	85.3545	1	1	R 0.00
8 (A)	Rehabilitation of overburden and spoils	ha	0	111123.09	1	1	R 0.00
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	138401.8	0.52	1	R 0.00
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	401984.43	1	1	R 0.00
9	Rehabilitation of subsided areas	ha	0	93048.848	1	1	R 0.00
10	General surface rehabilitation	ha	1.55	88028.231	0.52	1	R 70,950.75
11	River diversions	ha	0	88028.231	1	1	R 0.00
12	Fencing	m	0	100.4115	1	1	R 0.00
13	Water management	ha	0	33470.808	1	1	R 0.00
14	2 to 3 years of maintenance and aftercare	ha	1	11714.766	1	1	R 11,714.77
15 (A)	Specialist study	Sum	0			1	R 0.00
15 (B)	Specialist study	Sum	0			1	R 0.00
Sub Total 1							R 241,246.44

1	Preliminary and General			weighting factor 2	
		R		1	
		28,949.57			
2	Contingencies	R		1	
		24,124.64			

Subtotal 2	R 294,320.65
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VAT (14%)	R 41,204.89
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Grand Total	R 335,525.54
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ii) Confirm that this amount can be provided for from operating expenditure.

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

Yes

t) Specific Information required by the competent Authority

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

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

N/A

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

N/A

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

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

Motivation letter is on the file

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft environmental management programme.

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

Details of EAP are included as requested

- b) **Description of the Aspects of the Activity** (Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

Various aspects of the proposed activities are included

c) Composite Map

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

Map and plans are attached

- d) **Description of Impact management objectives including management statements**

- i) **Determination of closure objectives.** (ensure that the closure objectives are informed by the type of environment described)

Mine closure objective is to bring the environment to the status suitable for the pre-mining land use (grazing) to the satisfaction of the land owner and approved by the State authorities.

- ii) **Volumes and rate of water use required for the operation.**

1.5-5 m³ per day will be used for dust control during dry windy seasons. Water will be brought in by water bowser.

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

Yes, agricultural use licence is in place

iv) Impacts to be mitigated in their respective phases

Measures to rehabilitate the environment affected by the undertaking of any listed activity

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
<p>(E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc</p> <p>E.g. For mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)</p>	<p>(of operation in which activity will take place.</p> <p>State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure).</p>	<p>(volumes, tonnages and hectares or m²)</p>	<p>(describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)</p>	<p>(A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>	<p>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.</p> <p>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-</p> <p>..</p> <p>Upon cessation of the individual activity</p> <p>or.</p> <p>Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</p>
Plant and mobile office site	Construction and operation	7,400 m ² of surface disturbance	Dust control, dismantling of all structures and rehabilitation	Low to positive impact after rehabilitation of already disturbed ground	Dust control – ongoing during operation rehabilitation at de-commissioning phase
Excavations	Operation	1.8 Ha quarry	Dust control, back filling, rehabilitation of surface	Quarry will be back filled and rehabilitated –low impact	Back filling and surface rehabilitation at de-commissioning phase
Access and Mine roads, haulage	Operation	50 m ² of new surface disturbed	Usage of pre-existing roads, wherever possible, dust control, speed limit of 20 km/hour for dump trucks and 40 km/hour for light vehicles, dust control,	Low impact if mitigation measures applied	Dust control and speed limitation – ongoing during operation rehabilitation at de-commissioning phase

			rehabilitation		
Fuel and oils storage	Operation	Diesel bowser to be used for re-fuelling 20 m ² oils storage platform	Diesel bowser (SABS compliant) will bring the fuel. Spillage trays will be used in the process. Oils to be stored on a concrete slab under the shade. Any spillages will be treated with bio-degrading agent. After prescribed treatment period, the affected material will be used for backfilling after appropriate tests.	Low to medium impact if mitigations applied	Close monitoring during operation dismantling at de-commissioning phase
Ore stockpiles	Operation	~ 300 m ² within plant site	Minimise temporary storage time, dust control, rehabilitation	Low impact if mitigation measures applied	Final rehabilitation at de-commissioning phase
Soil and waste stockpiles	Operation	~ 8100 m ²	Wind erosion protective berms with planted grass, rain water erosion protective drainage channel, rehabilitation	Low impact if mitigations applied	Final rehabilitation at de-commissioning phase
Processing plant	Operation	~ 7,400 m ²	Dust control, grease and oils handling control, rehabilitation.	Low impact if mitigations applied	Dismantling and rehabilitation at de-commissioning phase
Workshop	N/A (farm structures will be used)				
Earthmoving machinery maintenance yard	N/A (farm structures will be used)				
Chemical/or French latrine toilets	Construction and Operation	~ 10 m ²	Standard maintenance, final rehabilitation	Low impact if mitigations applied	Dismantling and rehabilitation at de-commissioning phase
Domestic waste	Construction and Operation	2-4 containers	At least once a week removal to the nearest official dumping site; usage of clearly visible containers with lids.	Positive	Ongoing
Scrap metal and old tyres storage	N/A (farm structures will be used)				

Overall mining operation	Operation	5 Ha	Environment awareness training of personnel on regular basis. Management must be well familiar with approved EMP and all relevant mitigation procedures	Positive (minimising all impacts)	Ongoing
Final rehabilitation and after care	Mine closure and final rehabilitation	5 Ha	Back filling of the void with waste.	Low impact to positive, considering potential void after-use (water reservoir or dumping site for solar power operation)	De-commissioning and mine closure. Aftercare inspections every 3 months for the next year after operation closure

e) Impact Management Outcomes

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

ACTIVITY (whether listed or not listed). (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablation, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.).	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)	MITIGATION TYPE (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc) E.g. <ul style="list-style-type: none"> • Modify through alternative method. • Control through noise control • Control through management and monitoring • Remedy through rehabilitation.. 	STANDARD TO BE ACHIEVED (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.
Plant and mobile office site	Removal of vegetation and soil	Vegetation, habitat	Construction and operation	Rehabilitation	Low impact after rehabilitation
Excavations	Removal of vegetation and soil, removal of mineral resource	Vegetation, habitat	Operation	Back filling and rehabilitation	Medium to positive considering potential usage of residual void (still to be decided)
Access and Mine roads, haulage	Removal of vegetation and	Vegetation, habitat, subsoil	Operation	Usage of pre-existing roads, wherever possible, dust control, speed limit of 20	Low impact if mitigation measures applied

	soil, dust	compacting		km/hour for dump trucks and 40 km/hour for light vehicles, rehabilitation	
Oils storage	Soil and subsoil	Risk of spillages	Operation	Anti-spillage trays and concrete platforms. Any spillages will be treated with bio-degrading agent. After prescribed treatment period, the affected material will be used for backfilling after appropriate tests.	Low impact if mitigations applied
Ore stockpiles	Removal of vegetation and soil	Vegetation, habitat	Operation	Minimise temporary storage time, dust control, rehabilitation	Low impact if mitigation measures applied
Soil and waste stockpiles	Removal of vegetation and soil	Vegetation, habitat	Operation	Wind erosion protective berms with planted grass, rain water erosion protective drainage channel, rehabilitation	Low impact if mitigations applied
Processing plant	Dust, noise	Air pollution	Operation	Dust and noise control (sprinkling sprays during windy weather)	Low impact if mitigations applied
Workshop	N/A (farm structures will be used)				
Earthmoving machinery maintenance yard	N/A (farm structures will be used)				
Chemical/or French latrine toilets	Removal of vegetation and soil, risk of soil pollution	Vegetation, habitat	Operation	Standard maintenance, final rehabilitation	Low impact if mitigations applied
Domestic waste	General surface pollution	Vegetation, habitat	Operation	At least once a week removal to the nearest official dumping site; usage of clearly visible containers with lids.	Positive
Scrap metal and old tyres storage	N/A (farm structures will be used)				
Overall mining operation	Removal of vegetation and soil, general surface	Vegetation, habitat, soil, subsurface mineral reserve	Operation	Environment awareness training of personnel on regular basis. Management must be well familiar with	Positive (minimising all impacts)

	disturbance, void			approved EMP and all relevant mitigation procedures	
Final rehabilitation and after care	Removal of vegetation and soil, general surface disturbance, void	Vegetation, habitat, soil, subsurface mineral reserve	Mine closure	Back filling with waste, compacting and smothering quarry benches. Placement of stored soil as the top layer	Low impact to positive, considering potential usage of residual void

f) Impact Management Actions

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

<p>ACTIVITY</p> <p>whether listed or not listed.</p> <p>(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.).</p>	<p>POTENTIAL IMPACT</p> <p>(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)</p>	<p>MITIGATION TYPE</p> <p>(modify, remedy, control, or stop) through</p> <p>(e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)</p> <p>E.g.</p> <ul style="list-style-type: none"> • Modify through alternative method. • Control through noise control • Control through management and monitoring <p>Remedy through rehabilitation..</p>	<p>TIME PERIOD FOR IMPLEMENTATION</p> <p>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.</p> <p>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-..</p> <p>Upon cessation of the individual activity</p> <p>or.</p> <p>Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</p>	<p>COMPLIANCE WITH STANDARDS</p> <p>(A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>
Plant and mobile office site	Removal of vegetation and soil, dust from crushing and screening plant	Rehabilitation	Dust control (sprinkling during windy weather) – ongoing during operation rehabilitation at de-commissioning phase	Low to positive impact after rehabilitation of already disturbed ground
Excavations	Removal of vegetation and soil	Back filling and rehabilitation	Back filling at de-commissioning phase	Back filling with waste, compacting and smothering quarry benches. Placement of stored soil as the top layer

Access and Mine roads, haulage	Removal of vegetation and soil, dust	Usage of pre-existing roads, wherever possible, dust control, speed limit of 20 km/hour for dump trucks and 40 km/hour for light vehicles, rehabilitation	Dust control (sprinkling the roads during windy weather) and speed limitation – ongoing during operation rehabilitation at de-commissioning phase	Low impact if mitigation measures applied. New access road ~ 50 m ² only
Oils storage	Soil and subsoil	Anti-spillage trays and concrete platform. Any spillages will be treated with bio-degrading agent. After prescribed treatment period, the affected material will be used for backfilling after appropriate tests.	Close monitoring during operation dismantling at de-commissioning phase	Low to impact if mitigations applied
Ore stockpiles	Removal of vegetation and soil	Minimise temporary storage time, dust control, rehabilitation	Final rehabilitation at de-commissioning phase	Low impact if mitigation measures applied
Soil and waste stockpiles	Removal of vegetation and soil	Wind erosion protective berms with planted grass, rain water erosion protective drainage channel, rehabilitation	Final rehabilitation at de-commissioning phase	Low impact if mitigations applied
Processing plant	Dust, noise	Dust and noise control	Dismantling and rehabilitation at de-commissioning phase	Low impact if mitigations applied
Workshop	N/A (farm structures will be used)			
Earthmoving machinery maintenance yard	N/A (farm structures will be used)			
Chemical/or French latrine toilets	Removal of vegetation and soil, risk of soil pollution	Standard maintenance, final rehabilitation	Dismantling and rehabilitation at de-commissioning phase	Low impact if mitigations applied
Domestic waste	General surface pollution	At least once a week removal to the nearest official dumping site; usage of clearly visible containers with lids.	Ongoing	Positive
Scrap metal and old tyres storage	N/A (farm structures will be used)			

Overall mining operation	Removal of vegetation and soil, general surface disturbance, void	Environment awareness training of personnel on regular basis. Management must be well familiar with approved EMP and all relevant mitigation procedures	Ongoing	Positive (minimising all impacts)
Final rehabilitation and after care	Removal of vegetation and soil, general surface disturbance, void	Removal of all structures. Back filling of void with waste, compacting and smothering quarry benches. Placement of stored soil as the top layer	De-commissioning and mine closure. Aftercare inspections every 3 months for the next year after operation closure	Low impact to positive, considering potential void after-use

i) Financial Provision

(1) Determination of the amount of Financial Provision.

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

Closure objective is to rehabilitate the land to the status suitable for agricultural use, namely grazing

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

Landowner is applicant in this case

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

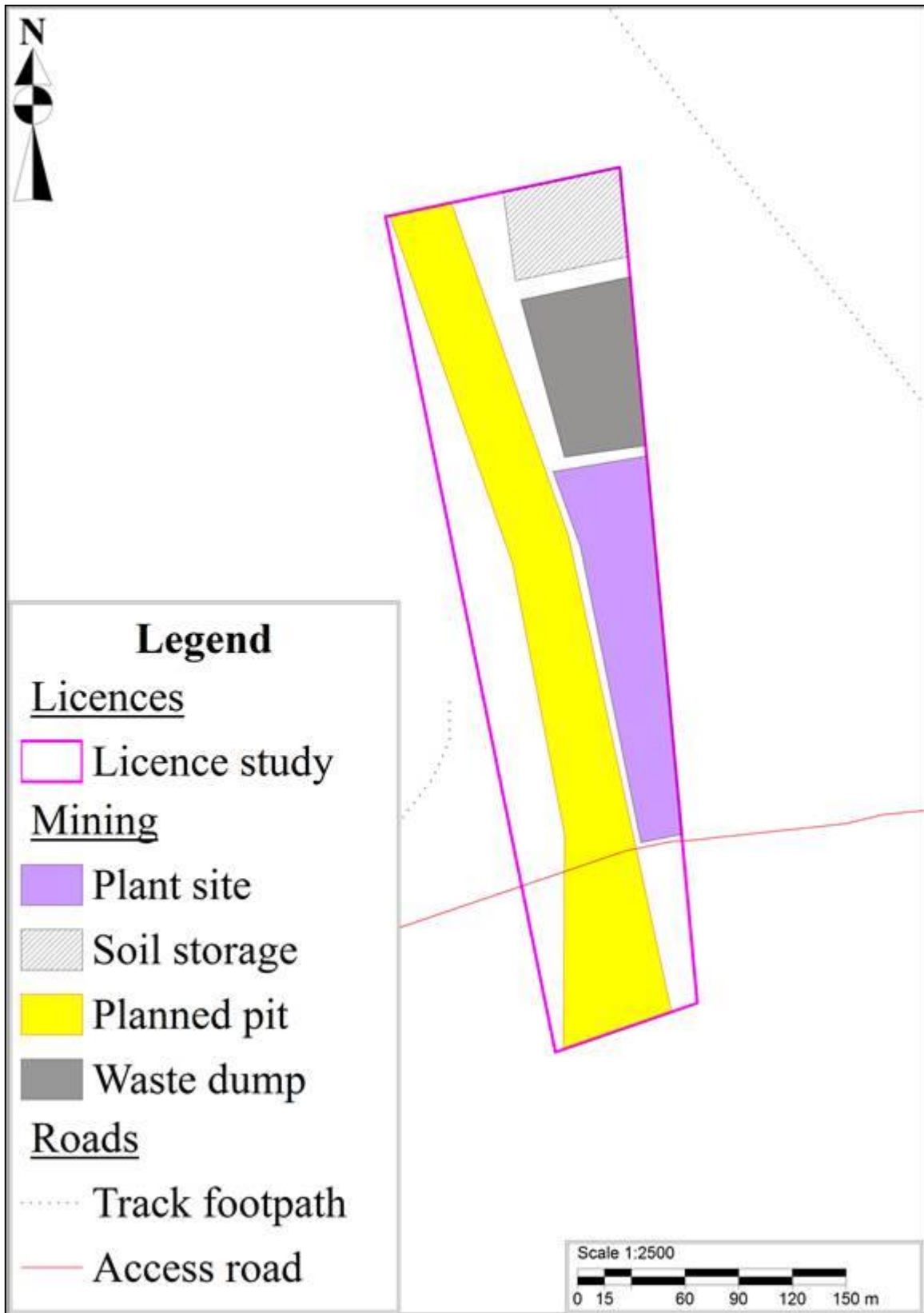


Figure 14. Operational phase layout. Residual void will coincide with the planned pit contour

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

Relatively small scale of operation under mining permits will not generate residual waste and tailing dumps.

Removal of the mined material will result in final void.

This can be back filled only partly with overburden waste and covered with stockpiled soil.

Quarry benches shall be smoothed and levelled and compacted prior to soil layer and vegetation reinstatement.

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

Table 3. Quantum calculation

CALCULATION OF THE QUANTUM

Applicant: **Mr W. van der Merve**

Evaluator

Location: **Farm De Aar 180 (Prt. 4)**

Date: **15-Jan-16**

OFFICE USE ONLY

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and power lines)	m3	100	11.4135	1	1	R 1,141.35
2 (A)	Demolition of steel buildings and structures	m2	0	158.991	1	1	R 0.00
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	234.297	1	1	R 0.00
3	Rehabilitation of access roads	m2	50	28.455	1	1	R 1,422.75
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	276.129	1	1	R 0.00
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	150.6225	1	1	R 0.00
5	Demolition of housing and/or administration facilities	m2	0	317.9715	1	1	R 0.00
6	Opencast rehabilitation including final voids and ramps	ha	1.8	166684.63	0.52	1	R 156,016.82
7	Sealing of shafts adits and inclines	m3	0	85.3545	1	1	R 0.00
8 (A)	Rehabilitation of overburden and spoils	ha	0	111123.09	1	1	R 0.00
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	138401.8	0.52	1	R 0.00
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	401984.43	1	1	R 0.00
9	Rehabilitation of subsided areas	ha	0	93048.848	1	1	R 0.00
10	General surface rehabilitation	ha	1.55	88028.231	0.52	1	R 70,950.75
11	River diversions	ha	0	88028.231	1	1	R 0.00
12	Fencing	m	0	100.4115	1	1	R 0.00
13	Water management	ha	0	33470.808	1	1	R 0.00
14	2 to 3 years of maintenance and aftercare	ha	1	11714.766	1	1	R 11,714.77
15 (A)	Specialist study	Sum	0			1	R 0.00
15 (B)	Specialist study	Sum	0			1	R 0.00
Sub Total 1							R 241,246.44
1	Preliminary and General				weighting factor 2		
			R 28,949.57		1		R 28,949.57
2	Contingencies		R 24,124.64		1		R 24,124.64
Subtotal 2							R 294,320.65
VAT (14%)							R 41,204.89
Grand Total							R 335,525.54

Therefore total provision required for environment impact mitigations and final rehabilitation is R 335,525.54

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

The financial provision will be provided in the form of bank guarantee.

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

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

SOURCE ACTIVITY	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
Excavations	Dust control	Expertise in environment aspects of mining operations	Management – responsibility for compliance and applying relevant mitigation measures ASAP; EAP – independent monitoring;	Mine management – ongoing control; EAP monitoring inspections minimum every 3 months with feedback reporting to the mine and land owners; Annual report to DMR
Blasting	Soft blasting, access control, warning signs and signals			
Soil storage	Protection against wind and rain erosion			
Fuel and oils handling	Preventing spillages, immediate rehabilitation of effected spots.			
Waste management	Preventing pollution of land surface with waste, scheduled removal of domestic waste, regular removal of scrap metal and old tyres			
Dust control	Water bowser and sprinkles at crushing module functionality			

Storm water drainage	Drainage channels functionality			
Environment awareness training	Inspection of training logbooks and attendance lists			

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

Appointed EAP will provide quarterly EMPr compliance reports to the land and mine owner. Annual compliance performance report is to be submitted to DMR.

m) Environmental Awareness Plan

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

Mine management (top and medium level) must study the approved EMPr and be well familiar with recommended mitigation measures and procedures.

Initial employee training will be done on employment of personnel, handling all issues related to General and Conservational Environmental Awareness. Follow up training workshops will be held on an annual basis and when expansion and/or implementation of new equipment are introduced to the mine.

Environment awareness briefings shall be carried out quarterly with highlighting specific job related aspects for different categories of employees.

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

- Everyday awareness
 - Littering
 - As wild animal species still roam the area from time to time, the accidental ingestion of litter is a possibility and highly dangerous as it can and will kill the animal involved. Even when not ingested small mammals are always at risk in getting tangled with plastics rubber etc., this can ensure numerous suffering and eventually death of the animal.
 - Plastics, rubber some types of paper and glass are not biodegradable and

release poisons into the environment when exposed to harsh weather conditions. Even when buried, they tend to resist weathering. These poisons released into the

- Environment can be harmful to our plant species, but even if it is not harmful to the plant itself the plant tend to store all absorbed substances in their fruit, roots and root tuber and the last mentioned may be utilized by humans or animals leading to the consuming of harmful chemicals that may pose illness or even death.
- No glass, paper, plastics and cigarette buds are to be littered during the duration of the mining operations. Garbage containers will be installed and maintained to prevent litter pollution.
- Open fires
 - It is by law prohibited to start open fires ((Section 25, Government Gazette Volume 401 Number 19515 of 27 November 1998, regarding the National Veld and Forest Fire Act 1998 (Act no. 101 of 1998)).
 - Due to the hot and dry conditions the region is very susceptible for runaway fires. No open fires will be tolerated during the mining period and as this is regarded by law as a criminal offence related penalties can be issued. The littering of self-ignitable substances/objects (e.g. matches) are also not allowed as it will always pose a danger regarding field fires, and if such happen he person responsible for the littering will be charged with arson and related penalties can be issued.
- Sanitation and Personal Hygiene
 - Sanitation and personal hygiene is a very important subject for environmental and social health. Improper sanitation habits can lead to intestinal parasite infestations within humans and animals, endangering the overall health of the recipients. Unfortunately these infestations don not stay only within the host and will spread rapidly throughout a community or herd.
 - Human viruses like *Tubercle bacillus* (TB) and *Herpes simplex*. Both are very contagious, spread vigorously throughout a community not handling good hygiene habits/practices. Proper sanitation/ablution blocks will be erected during the commissioning phase of the activities and strict use and cleanliness of these facilities will be enforced during the entire life of mine.
 - Employees will further be advised and educated on the importance of consuming clean and fresh water. Several sites will be identified and colour coded water tanks will be erected for safe human water consumption.
- Fauna
 - Wild animals roaming within the area is a common sight form time to time, but reptiles and smaller rodents permanently inhabit the area. Wild animals are and will always be very dangerous.

- Mine employees will be advised to stay clear for any wild animal or reptile, not feeding them and not try to provoke them in any manner. They will further be educated on dangerous and poisonous reptiles and the actions to be taken when such reptiles are encountered.
- Flora
 - The vegetation of the Northern Cape regions is very fragile and easily endangered by pioneer/invader species invading the Northern Cape at an alarming rate and due to the slow growth rate of our indigenous species.
 - No indigenous shrubs or trees will be unnecessarily uprooted and utilised for firewood, they would rather be advised to utilize pioneer/invader species and be educated on which plant species are indigenous, endangered or pioneer.
 - If any pioneer/invader species are observed the reporting thereof to the rehabilitation site manager will be highly recommended.
 - Penalties will be given to individuals that damage any endangered species e.g. cutting branches/bark from a Camel/Grey Camel tree.
- Work related awareness of Heavy vehicle operators
 - All heavy vehicles pose a threat to the environment in several ways. Some awareness must be initiated by the operators to minimize the treat to the environment.
 - The following must be implemented or enforced:
 - Daily checking for oil/diesel leakages before vehicle is operated
 - Drip pans must be installed during "off-time"
 - Immediate communication with the workshop when faults are observed.
 - Strict adherence to the mine roads and no off-road driving to prevent trampling of vegetation
 - Driving speed must be complied with. Beware of animals, workers and other vehicles.
- Machinery operators
 - Although the operational mining equipment does not pose any environmental risk, employees still need to adhere to some measurements to prevent spillage.
- Maintenance personnel
 - All maintenance personnel must receive basic training on work related environmental awareness to minimize/eliminate the possibility of environmental degradation.

- Pointers that will be looked at: -
 - Electricians may not leave any cables unprotected scattered on the site - animals may get tangled up.
 - No metals may be left scattered as it pose the same threat as described directly above

n) Specific information required by the Competent Authority


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

The allocated financial provision will be reviewed annually and/or at any change of operation scale.

2) 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 – N/A;
and
- d)** that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected. parties are correctly reflected herein.



Signature of the environmental assessment practitioner:

ASR Geology Consulting

Name of company:

15 January 2016

Date:

-END-

Appendix 1. Dr A.S. Rodionov CV, Appendix to University Diploma, SACNASP Certificate

3, Poole Street,
Klisserville
Kimberley 8301
RSA

Tel/fax: +27(0) (53) 831 2430
Cell phone: +27 (0) 8-234-29-234
E-mail: arod@netactive.co.za
asr.geology.consulting@gmail.com

Dr. Alexander S. Rodionov

Personal

Marital status: Married with 2 children (both adults now)

Information

Nationality: Russian

Citizenship: RSA/Russia (dual)

Age: 62

Place of Birth: Novosibirsk, Russia

Summary of qualifications

Internationally recognised expert in the field of diamond geology with experience in gold, platinum, chrome, base metals, tantalite, iron, manganese, uranium, oil, gas, and coal geology, familiar with all stages of diamond prospecting, exploration and mining through personal experience both in the field and in the laboratory. Fieldworks and/or projects in Russia, Syria, Brazil, RSA, Botswana, Angola, Lesotho, Sierra Leone, Namibia, Guinea, DRC, Namibia, Madagascar, Tanzania, Armenia, Georgia, Kazakhstan, Kyrgyzstan, Albania, Mozambique, Zimbabwe, Cameroon, Sudan. Strong computer and programming skills. Projects evaluation, prospecting and sampling programs, mineral licencing applications, EMP's, BAR and scoping reports.

Education

1960 - 1970 Primary/Secondary School, Novosibirsk, Russia. Student.

Matriculation Certificate.

Distinctions in Mathematics, Physics, Biology and Chemistry. Diplomas of Mathematics, Physics, Geology Olympiads.

1970 - 1975 Novosibirsk State University, Novosibirsk, Russia. Student.

Diploma (with Distinction) of Engineer Geologist-Geochemist (analogue to MSci).

Major subjects include: General Geology, Geochemistry, Geophysics, Mineralogy, Petrography, Methods of Prospecting and Exploration of Mineral Deposits, Mineral Deposits, Land Surveying,

Management and Planning of Geological and Geophysical Projects (this included environment protection measures), etc. Full list includes about 50 subjects. The Diploma Project has been awarded

with a Special Diploma of Central Committee of Union of Youth Communists at the All-Union competition of student research works.

1979 - 1981 Institute of Geology and Geophysics, Russian Acad. Sci., Siberian Division, Novosibirsk, Russia. Post-graduate.

Diploma of Candidate of Geology and Mineralogy (analogue to PhD).

The Research Project and dissertation "MINERALOGY OF DEEP-SEATED XENOLITHS AND XENOCRYSTS FROM THE DALNAYA KIMBERLITE PIPE (YAKUTIA)" has been completed one year ahead of schedule. The degree has been granted at the age of 28 among the youngest doctors in the field of Geology in the USSR.

1987 – 1988 Imperial College, London, UK.

Research Sabbatical

1992 (4 months) University of Cape Town, RSA.

Research Sabbatical

**Professional
experience**

2013 – Present El' Dorado Minerais Lda (Mozambique)

Director (Geology)

Identification, prospecting programs and evaluation of projects and/or new target areas for viable mining of Au and/or other precious metals and minerals within Mozambique and neighbouring Southern Africa countries.

2010 – Present ITOMAK SA (Pty) Ltd

Director (Geology)

Identification and evaluation of projects suitable for employment of gold and platinum recovery equipment developed and manufactured by JSC ITOMAK (Russia).

2009 - Present Eurobcapital of Africa

CEO

Projects evaluations, recommendation of viable projects to Investors.

2007-2011 Kimberley Consolidated Mining (Pty) Ltd.

Non-Executive Director (Geology)

Prospecting programs, projects evaluation, monitoring prospecting and mining progress.

2006 – Present Hydromining Unlimited (Pty) Ltd.

Geology Director

Company promoting borehole mining method (developed in Russia) in South Africa and Sub-Sahara Africa; diamonds, gold, manganese, etc.

2006-Present Venmyn Deloitte (until 2012 known as Venmyn Rand) (Pty) Ltd.

Associate

Projects evaluation, prospecting/sampling programs design (RSA, Russia, Armenia, Georgia, Kazakhstan, Botswana, and Albania). Minerals include gold, base metals, diamond, chrome, PGE, nickel, uranium, coal, oil and gas.

2002 - 2006 LRL Resource Management (Pty) Ltd.

Geology Director

Design of a system and related software for mining activity monitoring and collection of royalties for local administration and community (Northern Cape).

2000 - Present ASR Geology Consulting and Mineralogical Services, Kimberley, RSA.

Geology Consultant (Sole Proprietor)

Consulting in the field of diamond geology, gold and base metals, platinum; petrography and mineralogy, projects evaluation, mining licence applications, environment management assessments, prospecting and sampling programs, mining operations design, etc. Projects in RSA, Tanzania, Madagascar, Angola, DRC, Sierra Leone, Lesotho, Armenia, Georgia, Russia, Albania, Kazakhstan, Namibia, Mozambique, Zimbabwe.

1999 - 2000 DRM Technologies CC, Sandton, RSA.

Geology Director, Diamond Geology Consultant

Consulting in the field of diamond geology and alluvial gold. Projects in RSA, Guinea and Tanzania. Marketing of a number of High-tech products and technologies developed in Russia on RSA market (primarily related to mining).

**1997 - 1999 De Beers Consolidated Mines (Pty) Ltd. GeoScience Centre,
Johannesburg, RSA**

Principal Geologist

Diamond geology research, worldwide contract jobs (mineralogy and petrography).

1992 - 1997 Anglo American Research Laboratories (Pty) Ltd., Johannesburg, RSA

Senior Geologist, Principal Geologist (from 1993)

Diamond geology research, worldwide contract jobs (mineralogy and petrography), a new mine feasibility study (Botswana).

**1972 - 1992 Institute of Geology and Geophysics, Russian Acad. Sci., Siberian
Division, Novosibirsk, Russia**

Senior Lab Assistant, Engineer, Junior Researcher, Senior Researcher

1981-1992 Senior Researcher. Diamond geology research. Added role as a Project Manager, from 1989 – Head of computing group with responsibilities on design and monitoring of diamond indicators database. A number of joint fieldworks with Yakutalmaz (currently ALROSA) geologists resolving complicated diamond-prospecting cases.

1978-1981 Junior Researcher. Added responsibilities as a Project Leader and Head of a Field Team.

1975-1978 Engineer. Research and participation in contract jobs on diamond geology and mineralogy, electron microprobe operation, and fieldworks during summer seasons.

1972-1975 Senior Lab Assistant (part time, being a student). Samples preparation, minerals sorting, microprobe mounts preparation and participation in fieldworks.

1983 - 1992 Novosibirsk State University, Novosibirsk, Russia

Senior Lecturer (part time)

Course on Crystal Growth and Tutorials on Crystallography and Methods of Optical Studies of Minerals (Immersion Method).

Patents and publications Author and co-author of six inventions (mineralogical criteria of diamond potential evaluation, new borehole mining technology), 30 publications and numerous internal and external reports. 3 RSA patents.

Additional professional activities **1990 - 1992 All-Union (ex-Soviet Union) Committee on Diamond Deposits Geology. Member of Mineralogical Commission**

Review, recommendations, and monitoring of national scale projects and programs.

1991 - 1992 Siberian Commission on Geological Databases.

Member

Design and monitoring of All-Siberia uniform centralised database of geological data.

1987 - 1992 Three national (Russia) geological journals.

Expert-reviewer

Review and recommendations on publication/rejecting of manuscripts in the fields of petrology, mineralogy and diamond geology.

Professional memberships Mineralogical Society of Russia (from 1982)

Geological Society of RSA (from 1996)

Professional registration with South African Council for Natural Sciences Professions (SACNSP - from 2000)

Languages English, Russian

Community activities Close collaboration with Small Miners Association of SA and Barkly West Municipality (Northern Cape). ASR was the very first professional consultancy, which offered the small miners services on flexible terms. In many instances the consultations are provided free of charge.

References **Mr. A. Clay.** *Venmyn Deloitte (Pty) Ltd.* andclay@deloitte.co.za

Dr. T. Marshal. *Exploration Unlimited, JHB, RSA.* *Tel: (011) 828 2989*

Mr. K.T. Urry Kevin *Urry Diamonds CC, Kimberley, RSA.* kturry@telkomsa.net

Interests and activities Reading, computer, basketball, gardening.

Security clearance In Russia had the highest level of clearance for working with confidential information. Passed full clearance by De Beers twice. First time in 1988 for personal visit to the Sorting House in London and second time prior to employment by the Anglo American – De Beers Group in 1992.

Selected Publications 1. **Rodionov A.S.** (1980)// Composition peculiarities of the garnets from ultramafic xenoliths, kimberlite pipe Dalnaya (Yakutia). *Doklady Akad. Nauk USSR*, v. 253, N 2, pp. 457-461 (*in Russian*).

2. **Rodionov A.S., Sobolev N.V.** (1985)// New finding of a graphite-bearing harzburgite xenolith in kimberlite. *Geologia i Geofizika*, N 12, pp. 32-37 (*in Russian*).

3. **Rodionov A.S.**, Amshinsky A.N., Kuligin S.S. (1987)// Importance of the analysed diamond indicators sample volume for a kimberlite body characterising. In: "Methods Of Studying And Modelling Of The Geological Events", Transactions of the Institute of Geology and Geophysics, USSR Acad. Sc., pp.3-17 41 (*in Russian*).
4. **Rodionov A.S.**, Viljoen K.S. (1998)// Venetia megacrysts, Northern Province, South Africa. Abstracts 7th Int. Kimb. Conf., Cape Town, pp. 743-745.

I, Dr. A.S. Rodionov, declare, that following is a true correct translation of the original document written in Russian.




Commissioner of oaths
9/1/8/2/ Johannesburg (A2)
8th April 1991
DANIEL JOHANNES BOSMAN
Head Administrator
Anglo American Resources (Pty) Limited
81st Floor
10001 Johannesburg

Translation

**Appendix to the Diploma-E No.496087
with a distinction**

**EXTRACTION
from the examination curriculum
(not valid without the Diploma)**

(Page 1)

RODIONOV ALEXANDER SERGEYEVICH

during being at the Department of the Geology and Geophysics of the Novosibirsk State University from 1970 to 1975 passed exams on following disciplines in GEOCHEMISTRY speciality with specialisation in _____

Basics of the Scientific Communism	<u>Excellent</u>
CPSU History	<u>Excellent</u>
Marxism-Leninism Philosophy	<u>Excellent</u>
Political Economy	<u>Excellent</u>
Foreign Language (English)	<u>Excellent</u>
High Mathematics	<u>Excellent</u>
Physics	<u>Excellent</u>
General Chemistry	<u>Excellent</u>
Analytical Chemistry	<u>Accepted</u>
Physical Chemistry with Basics of Thermodynamic	<u>Accepted</u>
Geodesy	<u>Accepted</u>
General Geology	<u>Excellent</u>
Crystallography with Basics of Crystallochemistry	<u>Excellent</u>
Mineralogy	<u>Excellent</u>
Palaeontology	<u>Excellent</u>
Geological Mapping	<u>Excellent</u>
Crystalline Rocks Petrography	<u>Excellent</u>
Sedimentary Rocks Petrography	<u>Excellent</u>
Historical Geology	<u>Excellent</u>
USSR Geology	<u>Excellent</u>
Usful Minerals Deposits	<u>Excellent</u>
Exploration Methods and Techniques	<u>Excellent</u>
Geotectonics	<u>Excellent</u>
Geophysical Methods of Prospecting	<u>Excellent</u>
Geochemistry	<u>Excellent</u>
Physical-Chemical Basics of Petrography and Mineralogy	<u>Excellent</u>
Palaeovolcanology	N/A
Geomorphology and Quaternary Geology	N/A

Kodion

Commissioner of oaths
9/18/2/ Johannesburg (A2)
8th April 1991

DANIEL JOHANNES BOSMAN

Head: Administration

Anglo American Research Laboratories
8 Schonland Street
Theta Johannesburg

(Page 2)	
Introduction to Mineralogy	<u>Excellent</u>
Sea Geology	<u>N/A</u>
Fedorov's Method	<u>Accepted</u>
Palaeontology and Stratigraphy Methods	<u>N/A</u>
Metamorphism and Metasomatism	<u>Excellent</u>
Physics of the Earth	<u>Excellent</u>
Fourth year Project	<u>Excellent</u>
Management and Planning of Geological and Geophysical Projects	<u>Accepted</u>
Physical Culture	<u>Accepted</u>
Special Training	<u>Excellent</u>
Civil Defence	<u>Accepted</u>
<u>Special courses:</u>	
Geology of the Uranium Deposits	<u>Accepted</u>
Math Statistics	<u>Accepted</u>
Thermobarometry	<u>Accepted</u>
Spectra Analyses	<u>Accepted</u>
Mineragraphy	<u>Accepted</u>
Lithology Aspects	<u>Accepted</u>
<u>Practical training:</u>	
Training Geological Practice 1st year	<u>Excellent</u>
Training Geodesy Practice 1st year	<u>Accepted</u>
Training Geological Mapping Practice 2nd year	<u>Excellent</u>
Training Mineralogical Practice	<u>Accepted</u>
Working Practice in Research Institute	<u>Excellent</u>
Working Practice 3rd year	<u>Excellent</u>
Field Pre-Diploma Project Practice	<u>Excellent</u>

(Back cover)

Diploma project titled:

"Mineralogy and Petrography of the Ultramafic Rocks Xenoliths from the Kimberlite Pipe "Dalnaya" (Yakutia)"
defended with mark Excellent

Rector
of the Novosibirsk state university
academician

(Signature) S.T.Belyaev

Dean
of the Geology & Geophysics Dept.
Professor

(Signature) E.E.Fotiadi

Secretary

(Signature)

7 June 1975
Reg.number 51

Novosibirsk

Suid-Afrikaanse Raad vir Natuurwetenskaplike Professions



Hiermee word gesertifiseer dat

Alexandre Sergejevitch Rodionov

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geregistreer is kragtens artikel 11 van die
Wet op Natuurwetenskaplike Professions, 1993 as 'n

Professional Natural Scientist



17.02.2000

Pretoria

A handwritten signature in black ink, appearing to read "H. M. M. M. M.", written over a horizontal line.

President

A handwritten signature in black ink, appearing to read "R. J. J. J. J.", written over a horizontal line.

Registrateur

Appendix 2: Locality Plan

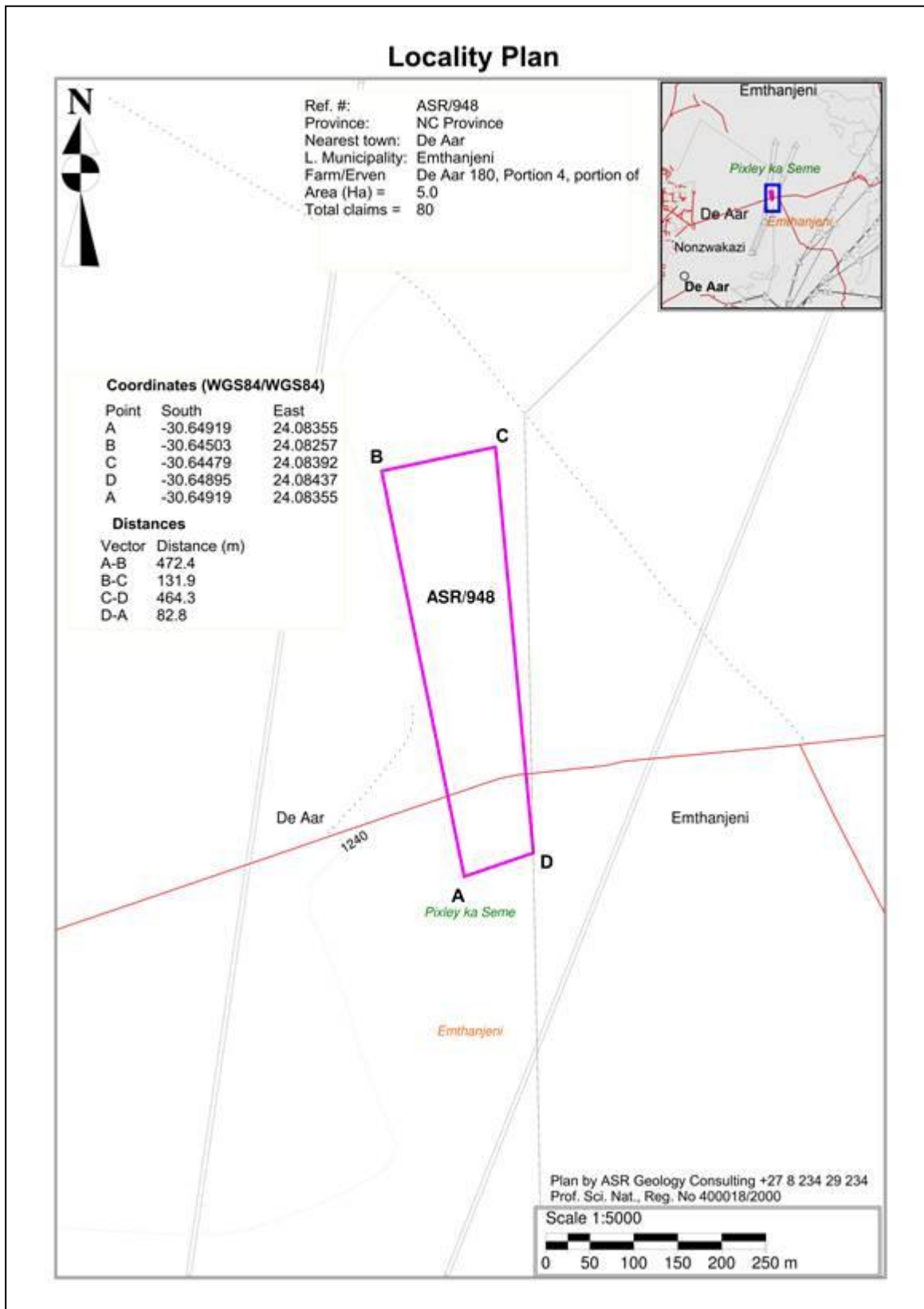


Figure 15. Locality Plan

Appendix 3. Area requiring special remedy

N/A