dBAcoustics

ENVIRONMENTAL BASIC ASSESSMENT FOR THE PROPOSED GRAVEL ROAD CONSTRUCTION TO THE APPROVED PHASE 1 PROJECT

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Date: 21 January 2023

DECLARATION OF INDEPENDENCE

I, **Barend J B van der Merwe** as duly authorised representative of **dBAcoustics**, hereby confirm my independence and declare that I have no interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which **Ecoleges Environmental Consultants** was appointed as environmental assessment practitioner in terms of the National Environmental Management Act (NEMA), 1998 as amended (Act No. 107 of 1998), other than fair remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, No 43110 of 20 March 2020 for the compilation of a professional opinion in terms of a Part 2 Amendment application for the proposed construction of a gravel road from the existing gravel road to the Phase 1 project area. I further declare that I am confident in the results of the studies undertaken and conclusions drawn because of it. I have disclosed, to the environmental assessment practitioner, in writing, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2020. I have further provided the environmental assessment practitioner with written access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not. I am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2020 and any other specific and relevant legislation (national and provincial), policies, guidelines, and best practice.

Signature: 

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Date: 21 January 2023

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Registration(s): SAAI, NACA, SAAG and IAIAsa

Qualifications

1. MSc – Environmental Management – University of Johannesburg;
2. BSc Honors in Geography and Environmental Management – University of Johannesburg;
3. National Higher Diploma in Environmental Health - Witwatersrand Technikon;
4. National Diploma in Public Health - Cape Town Technikon;
5. National Certificate in Noise Pollution - Technikon SA;
6. National Certificate in Air Pollution - Technikon SA;
7. National Certificate in Water Pollution - Technikon SA;
8. Management Development Diploma - Damelin Management School; and
9. Advanced Business Management Diploma - Rand Afrikaans University.

Membership

- South African Institute of Acoustics (SAAI);
- International Association of Impact Assessment (IAIA);
- National Association of Clean Air (NACA);
- South African Association of Geographers (SAAG).

Experience

- Noise impact assessment of different mining establishments;
- Noise Control Officer i.t.o. Noise Control Regulations;
- Compilation of noise management plans;
- Annual and quarterly baseline noise surveys;
- Moderator Wits Technikon – Environmental Pollution III.
- Various road projects for SANRAL.
- Compilation of the Integrated Pollution strategy for Ekurhuleni Town Council.
- Represent clients at Town Planning Tribunals.
- Represent clients at Housing Board tribunals.
- Determine residual noise levels in certain areas as required by clients.
- Noise attenuation at places of entertainment.
- Design and implementation of sound attenuators.
- Noise projections and contouring.
- Advisory capacity regarding noise related cases to local authorities: - Sandton, Roodepoort, Randburg, Krugersdorp, Alberton, Centurion, Vereeniging. Due to my previous experience in Local Government I provide a service to these Local government departments on the implementation of the Noise Control Regulations and SANS 10103 of 2008 – The measurement and rating of environmental noise with respect to land use, health annoyance and to speech communication.
- Identification, Evaluation and Control of noise sources in industry.

I was involved in the following noise impact assessments during the Environmental Impact Assessment process (Noise and/or Vibration):

- Airlink BID for landing in Kruger National Park;
- Coal gasification plant in Theunissen;
- Langhoogte and Wolseley wind farms;
- Widening of N3 at Howick, KZN;
- Tulu Kapi Mine, Ethiopia;
- Boabab Iron Ore Mine, Mozambique;
- N11 Decommissioning Mokopane;
- Baseline noise survey for NuCoal Mines, Woestalleen, Vuna and Mooiplaats Collieries;
- Baseline noise monitoring Mooinooi mine;
- Leeuwpan coal mine;
- N17 Road at Trichardt for KV3 Engineers;
- N17 Road in Soweto;
- Proposed new by-pass road at Musina;
- George Western By-pass road between George Airport and Outeniqua Pass;
- Gautrain baseline monitoring;
- Upgrade of Delmas Road extensions in Moreletta Park, Pretoria;
- Proposed weigh bridge, N3, Pietermaritzburg:
- Tonkolili Manganese mine, Sierra Leone;
- Proposed backup power generators in the Western Cape – Caledon, Wolseley, Swellendam;
- Extension of works at the PPC factory in Piketberg;
- Exxaro Arnot Colliery – Mooifontein;
- Hydro power plant – 2 Sites in Durban;
- Coal export terminal in Beira, Mozambique;
- Site selection for new Power Station – Kangra Mine, Piet Retief;
- Gas exploration at Ellisras;
- Noise survey and assessment of future mine shafts at various mines;
- Mining exploration at Potgietersrus – Lonmin Akani;
- New coal mines in Witbank – Dorstfontein Expansion Project;
- New coal mines in Middelburg and Ermelo;
- New Vanadium Manganese mine in Potgietersrus;
- Xolobeni mining project in Transkei;
- Glynn mines in Sabie;
- Rezoning of properties for housing at Burgersfort, Shosanguve, Hammanskraal;
- Various noise impact assessment for clients in and around Centurion;
- Relocation of night races from Newmarket racecourse to Turfontein racecourse;
- Rezoning applications for private clients

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EXECUTIVE SUMMARY

The need for the additional upgraded gravel road will be to convey material and equipment to the Phase 1 project area and to ensure compliance with ESKOM minimum road requirements. The main noise sources within and beyond the boundaries of the Sun Central Cluster 1 300MW Solar PV project are:

- Construction activities during the construction phase of the proposed gravel road;
- Traffic noise which can be continuous and/or intermittent at times;

The consolidated new access road will consist out of the following:

- run along the existing District Public Road for ± 5.2km from the N10 (Pink Line);
- existing private farm tracks for ± 6.25km (Light brown line);
- New gravel road required by ESKOM for access to the two substations for ± 2.65km (Turquoise line).

The following methodology was employed to determine the potential noise intrusions levels at the abutting noise receptors to the gravel road:

- The calculated noise levels will be used to assess the potential noise intrusion levels at the noise receptors in the vicinity of the proposed gravel road.

There may be a shift in the prevailing ambient noise level in the immediate vicinity of the proposed gravel road in the vicinity of Farmhouse C but at the remainder of the noise receptors the intrusion level will be insignificant and in line with the Noise Control Regulations, 1994.

Barend van der Merwe – MSc UJ
Environmental Noise and Vibration Specialist

ENVIRONMENTAL BASIC ASSESSMENT FOR THE PROPOSED EXTENSION OF THE GRAVEL ROAD TO THE PHASE 1 PROJECT AREA OF THE SUN CENTRAL 1300MW SOLAR PHOTVOLTAIC PROJECT IN THE NORTHERN CAPE.

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This report was prepared in terms of the Environmental Management Act, 1998 (Act No. 107 of 1998), the Environmental Impact Assessment Regulations, 2014 – Regulation 982 and the following aspects are dealt with in the report:

No.	Requirement	Section in report
1a)	Details of -	
(i)	The specialist who prepared the report	Page 1-2
(ii)	The expertise of that specialist to compile a specialist report including a curriculum vitae	Page 1-4
b)	A declaration that the specialist is independent	Page 1-2
c)	An indication of the scope of, and the purpose for which, the report was prepared	Page 7
cA)	An indication of the quality and age of the base data used for the specialist report	Page 7
cB)	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Page 16
d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Page 7
e)	A description of the methodology adopted in preparing the report or carrying out the specialised process	Page 17
f)	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Page 9
g)	An identification of any areas to be avoided, including buffers	Page 9
h)	A map superimposing the activity including the associated structure and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Page 9
i)	A description of any assumption made and any uncertainties or gaps in knowledge	Page 14
j)	A description the findings and potential implication\s of such findings on the impact of the proposed activity, including identified alternatives on the environment	Page 16
k)	Any mitigation measures for inclusion in the EMPr	Page 22
l)	Any conditions for inclusion in the environmental authorisation	Page 22
m)	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Not applicable
n)	A reasoned opinion -	
(i)	As to whether the proposed activity or portions thereof should be authorised	Page 22
iA)	Regarding the acceptability of the proposed activity or activities: and	Page 22
(ii)	If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Page 22
o)	A description of any consultation process that was undertaken during preparing the specialist report	Not applicable

ABBREVIATIONS

dBA – A-weighted sound pressure level;

dB – Decibel;

IFC – International Finance Corporation;

Km/h – kilometre per hour;

m – Meters;

MW – megawatt

m/s – meters per second;

N, E, S, W – North, East, West, South

L_{Basic} – Basic noise level in dBA;

NSA – Noise sensitive areas;

MP – Measuring points;

SANS – South African National Standards;

Indemnity and Conditions Relating to this Report

The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information supplied by Ecoleges. The accuracy of the results and conclusions are entirely reliant on the accuracy and completeness of the supplied data. dBAcoustics does not accept responsibility for any errors or omissions in the supplied data and information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions and the findings apply to the site conditions as they existed at the time of the field survey. These opinions do not necessarily apply to conditions that may arise after the date of the field survey and subsequent noise impact assessment report. The report is based on scientific and recommended survey and assessment techniques. This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must refer to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

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GLOSSARY

Ambient sound level
Means the reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.

A-weighted sound pressure level (sound level) (L_{pA}), in decibels
The A-weighted sound pressure level is given by the equation:

$L_{pA} = 10 \log (p_A/p_o)^2$

Where

p_A is the root-mean-square sound pressure, using the frequency weighting network A in pascals; and

p_o is the reference sound pressure (p_o = 20 μPa).

NOTE The internationally accepted symbol for sound level is dBA.

Distant source
A sound source that is situated more than 500 m from the point of observation.

Disturbing noise
A disturbing noise means the following;

- A noise which exceeds the prevailing ambient noise level by 7.0dBA or more;

Equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$), in decibels
The value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval T, has the same mean-square sound pressure as a sound under consideration whose level varies with time. It is given by the equation.

$$L_{Aeq,T} = 10 \log \left[\frac{1}{t_2 - t_1} \int_{t_1}^{t_2} \frac{p_A^2(t)}{p_o^2} dt \right]$$

Where
$L_{Aeq,T}$ is the equivalent continuous A-weighted sound pressure level, in decibels, determined over a time interval T that starts at t_1 and ends at t_2;

p_o is the reference sound pressure (p_o = 20 μPa); and

$p_A(t)$ is the instantaneous A-weighted sound pressure of the sound signal, in pascals.

Impulsive sound
Sound characterised by brief excursions of sound pressure (acoustic impulses) that significantly exceed the residual noise.

Initial noise
The component of the ambient noise present in an initial situation before any change to the existing situation occurs.

Intelligible speech
Speech that can be understood without undue effort.

Low frequency noise
Sound, which predominantly contains frequencies below 100 Hz.

Nearby source
A sound source that is situated at 500 m or less from the point of observation.

Noise nuisance
Means any sound which disturbs or impairs the convenience or peace of any person.

Rating level
Means the applicable outdoor equivalent continuous rating level indicated in Table 2 of SANS 10103 2008.

Residual noise
Means means the all-encompassing sound in each situation at a given time, measured as the reading on an integrated impulse sound level meter for a total period of at least 10 minutes, excluding noise alleged to be causing a noise nuisance or disturbing noise.

Specific noise
A component of the ambient noise which can be specifically identified by acoustical means, and which may be associated with a specific source.

NOTE Complaints about noise usually arise because of one or more specific noises.

1 INTRODUCTION

Ecoleges Environmental Consultants commissioned dBAcoustics to determine the potential noise increase from the proposed extension of the gravel road from an existing gravel road (district road) to the Phase 1 project area. The need for the additional upgraded gravel road will be to convey material and equipment to the Phase 1 project area and to ensure compliance with ESKOM minimum road requirements.

The main noise sources within and beyond the boundaries of the Sun Central Cluster 1 300MW Solar PV project are:

- Construction activities during the construction phase of the proposed gravel road;
- Traffic noise which can be continuous and/or intermittent at times;

The noise survey was conducted on 7 and 8 January 2023.

The consolidated new access road will consist out of the following:

- run along the existing District Public Road for ± 5.2km from the N10 (Pink Line);
- existing private farm tracks for ± 6.25km (Light brown line);
- New gravel road required by ESKOM for access to the two substations for ± 2.65km (Turquoise line).

The location of the gravel road is presented in Figure 1.

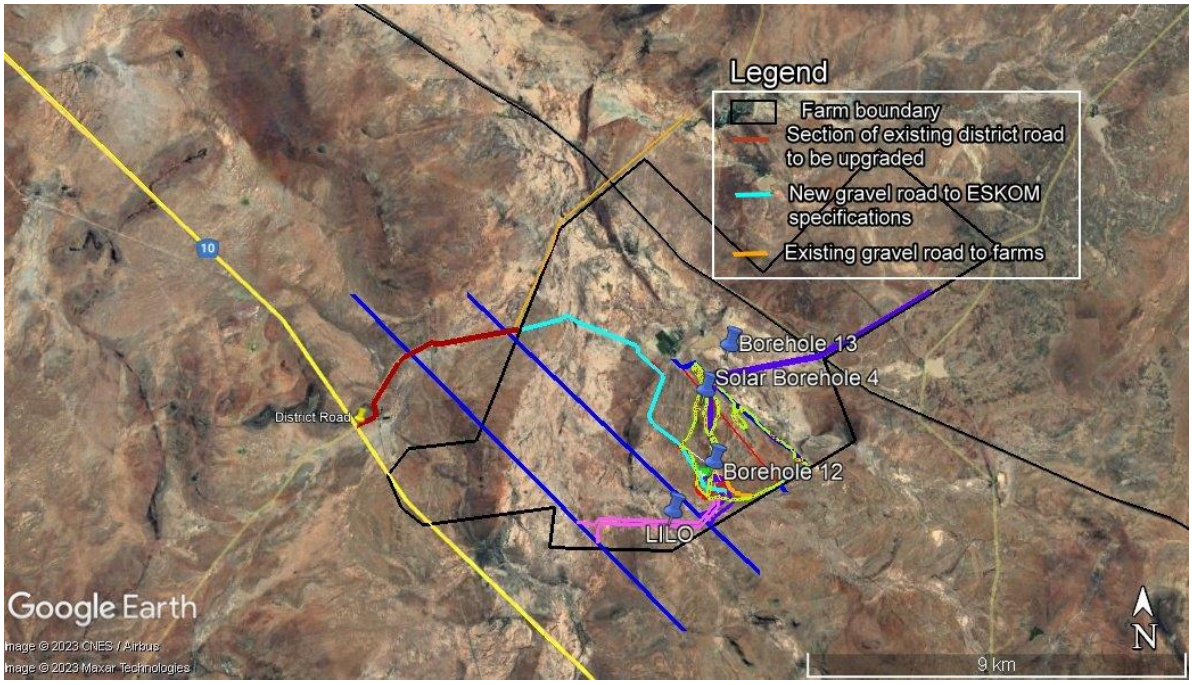

Figure 1: Location of the proposed gravel road

The geographical information of the noise receptors of which only Farmhouse C within 500m from the proposed road is illustrated in Figure 2. The potential impact during the construction phase and the operational phase on C will be assessed.

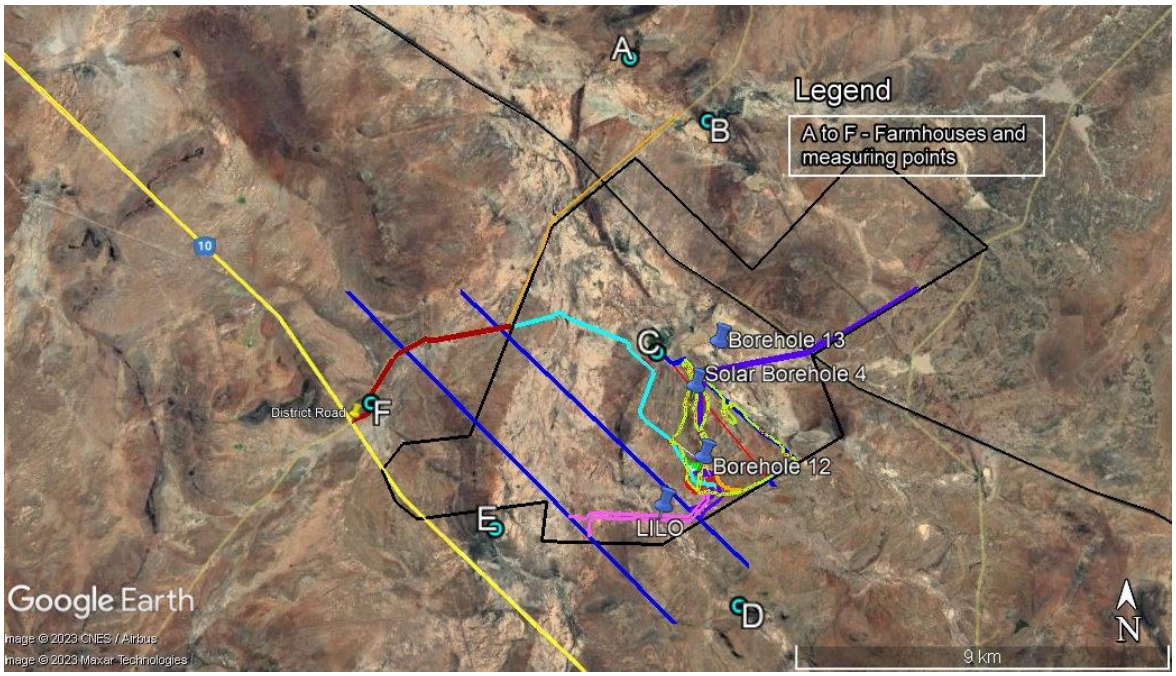

Figure 2: Location of the noise receptors and measuring points

1.1 Background to noise

Sound is a wave motion, which occurs when a sound source sets the nearest particles of air in motion. The movement gradually spreads to air particles further away from the source. Sound propagates in air with a speed of approximately 340 m/s.

The sound pressure level in free field conditions is inversely proportional to the square of the distance from the sound source – Inverse Square Law. Expressed logarithmically as decibels, this means the sound level decrease 6 dB with the doubling of distance. This applies to a point source only. If the sound is uniform and linear then the decrease is only 3 dB per doubling of distance.

The decibel scale is logarithmic therefore decibel levels cannot be added together in the normal arithmetic way, for example, two sound sources of 50 dB each do not produce 100 dB but 53 dB, nor does 50 dB and 30 dB equal 80 dB but remains 50 dB.

Air absorption is important over large distances at high frequencies, and it depends on the humidity but is typically about 40 dB/km @ 4000 Hz. Traffic noise frequencies are mainly mid/low and will be unaffected below 200m.

When measuring the intensity of a sound, an instrument, which duplicates the ear variable sensitivity to sound of different frequency, is usually used. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter because it conforms to the internationally standardized A-weighting curves. Measurements of sound level made with this filter are called A-weighted sound level measurements, and the unit is dB.

Sound propagation is affected by wind gradient rather than the wind itself. The profile of the ground causes such a gradient. The sound may be propagated during upwind

conditions upwards to create a sound shadow. A downwind refracts the sound towards the ground producing a slight increase in sound level over calm isopower conditions.

The velocity of sound is inversely proportional to the temperature therefore a temperature gradient produces a velocity gradient and a refraction of the sound. Temperature decreases with height and the sound is refracted upwards.

For a source and receiver close to the ground quite large attenuation can be obtained at certain frequencies over absorbing surfaces, noticeably grassland. This attenuation is caused by a change in phase when the reflected wave strikes the absorbing ground and the destructive interference of that wave with the direct wave. The reduction in sound tends to be concentrated between 250 Hz and 600 Hz.

Noise screening can be effective when there is a barrier between the receiver and the source i.e., walls, earth mounds, cuttings, and buildings. The performance of barriers is frequency dependent. To avoid sound transmission through a barrier the superficial mass should be greater than 10 Kg/m^2.

There is a complex relation between subjective loudness and the sound pressure level and again between annoyance due to noise and the sound pressure level. In general, the ear is less sensitive at low frequencies and the ear will only detect a difference in the sound pressure level when the ambient noise level is exceeded by 3-5 dBA.

There are certain effects produced by sound which, if it is not controlled by approved acoustic mitigatory measures, seem to be construed as undesirable by most people and they are:

- Long exposure to high levels of sound, which may damage the hearing or create a temporary threshold shift – in industry or at areas where music is played louder than 95 dBA. This will seldom happen in far-field conditions;
- Interference with speech where important information by the receiver cannot be analysed due to loud noises;
- Excessive loudness;
- Annoyance.

Several factors, for example clarity of speech, age of listener and the presence of noise induced threshold displacement, will influence the comprehensibility of speech communication. The effect of noise (except for long duration, high level noise) on humans is limited to disturbance and/or annoyance and the accompanying emotional reaction. This reaction is very difficult to predict and is influenced by the emotional state of the complainant, his attitude towards the noisemaker, the time of day or night and the day of the week.

Types of noise exposure:

- Continuous exposure to noise – The level is constant and does not vary with time e.g., traffic on freeway and an extractor fan;

- Intermittent exposure to noise – The noise level is not constant and occurs at times e.g., car alarms and sirens;
- Exposure to impact noise – A sharp burst of sound at intermittent intervals e.g., explosions and low frequency sound.

These time-varying characteristics of environmental noise are described using statistical noise descriptors:

Leq: The Leq is the constant sound level that would contain the same acoustic energy as the varying sound level, during the same period.

L_{Max}: The instantaneous maximum noise level for a specified period.

L_{Min}: The instantaneous minimum noise level for a specified period.

The following relationships occur for increases in A-weighted noise levels:

- The trained healthy human ear can discern changes in sound levels of 1 dBA under controlled conditions in an acoustic laboratory;
- It is widely accepted that the average healthy ear can barely perceive noise level changes of 3 dBA;
- A change in sound level of 5 dBA is a readily perceptible increase in noise level;
- A 10-dBA change in the sound level is perceived as twice as loud as the original source.

The World Bank in the Environmental Health and Safety Regulations has laid down the following noise level guidelines:

- Residential area – 55 dBA for the daytime and 45 dBA for the night-time period;
- Industrial area – 70 dBA for the day- and night-time periods.

The difference between the actual noise and the ambient noise level and the time of the day and the duration of the activity, will determine how people will respond to sound and what the noise impact will be. To evaluate such, there must be uniform guidelines to evaluate each scenario. SANS 10103 of 2008 has laid down sound pressure levels for specific districts and has provided the following continuous noise levels per district as given in Table 2.

Table 1: Recommended noise levels for different types of districts

Type of district	Equivalent continuous rating level $L_{Req,T}$ for ambient noise					
	Outdoors			Indoors, with open windows		
	Day-night	Daytime	Night-time	*Day-night*	Daytime	Night-time
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts with some workshops, with business premises and with main roads	60	60	50	50	50	40
e) Central business district	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

The reference time intervals can be specified to cover typical human activities and variations in the operation of noise sources and are for daytime between 6h00 to 22h00 and for night-time between 22h00 and 6h00.

The study area falls within an (a) to (b) type districts because of the type of activities such as main roads, gravel roads, little traffic and major traffic which all have an influence on the prevailing ambient noise level for a specific area.

There is therefore a mixture of activities and higher noise levels as per the above recommended continuous rating levels within i.e., residential, agricultural activities (seasonal) and feeder roads in proximity of each other or to a farmhouse. A farmhouse next to the R63 road will experience higher noise levels than the farmhouse/s some distance from roads. The ambient noise level will therefore differ throughout the study area, depending on the location and the measuring position in relation to areas with existing noise sources such as roads.

People exposed to an increase in the prevailing ambient noise level will react differently to the noise levels and the response is given in Table 2.

Table 2: Estimated community/group response when the ambient noise level is exceeded (Source: SANS 10103 of 2008).

1	2	3
Excess $)L_{Req,T}$[1)]	**Estimated community/group response**	
dB	**Category**	**Description**
0	None	No observed reaction
0-10	Little	Sporadic complaints
5-15	Medium	Widespread complaints
10-20	Strong	Threats of community/group action
>15	Very strong	Vigorous community/group action

1) Calculate $)L_{Req,T}$ from the appropriate of the following:
a) $)L_{Req,T}$ = $L_{Req,T}$ of ambient noise under investigation MINUS $L_{Req,T}$ of the residual noise (determine the specific noise under investigation).
b) $)L_{Req,T}$ = $L_{req,T}$ of ambient noise under investigation MINUS the maximum rating level for the ambie table 1.
c) $)L_{Req,T}$ = $L_{Req,T}$ of ambient noise under investigation MINUS the typical rating level for the applicab determined from table 2.

The difference between the actual noise and the ambient noise level will determine how people will respond to sound.

1.2 Legislative and Policy Context

The following legislation and/or standards were used in the assessment of the proposed gravel road.
:

International Guidelines

- Environmental, Health and Safety (EHS) Guidelines, World Health Organisation (WHO, 2002).

National legislation

- National Environmental Management Act. 2006 Act 62 of 2008 (RSA, 2008).

Provincial legislation

Noise Control Regulations – Government Notice No. 55 of 14 January 1994

These noise control regulations are applicable in the Northern Cape Province and the main aspect of these regulations is that you may exceed the prevailing ambient noise levels by 7.0dBA before a noise disturbance is created.

National Standards

- SANS 10357 of 2004 – The calculation of sound propagation by the concave method (SANS, 2004);
- SANS 10210 of 2004 – Calculating and predicting road traffic noise (SANS, 2004);
- SANS 10328 of 2008 – Methods for environmental noise impact assessments (SANS, 2008); and
- SANS 10103 of 2008 – The measurement and rating of environmental noise with respect to annoyance and to speech communication (SANS, 2008).

A disturbing noise according to the Noise Control Regulations, 1994 means a noise which exceeds the prevailing ambient noise level by 7.0dBA before a noise disturbance is created.

Constitution of South the Republic of South Africa (RSA, 1996)

Article 24: Everyone has the right -
(a) to an environment that is not harmful to their health and well-being; and
(b) to have the environment protected for the present and future power generator plants through reasonable legislative and other measures that-
(i) prevent pollution and ecological degradation;
(ii) promote conservation; and
(iii) secure ecological sustainable development and use of natural resources, while promoting justifiable economic and social development.

The potential noise impact of the gravel road will be evaluated in terms of the above legislation.

1.3 Noise projections

1.3.1 Projected noise levels

Two aspects are important when considering potential noise impacts of a project namely:

- The increase in the noise level because of the construction and operational phases, and;
- The possible overall noise level produced by the gravel road.

The prevailing ambient noise level may change according to the season of the year when agricultural activities, insects or wind becomes the pre-dominant contributor to the higher ambient noise levels for a specific area.

1.3.2 Assumptions and Limitations

The following assumptions were used in the noise impact statement:

- There was no traffic and/or train noise along the gravel road during the time of the noise survey..

1.3.3 Noise projections

This noise impact formula and the Interactive noise calculator (ISO 9613) will be used to determine the noise levels during the construction phase of the project. The noise levels at the noise sensitive areas will be added in a logarithmic manner to determine the overall sound exposure at the receptor. The categorization of the intrusion levels during the

construction and operational phases will be as follows. The increase in the prevailing ambient noise level is calculated in the following manner:

$\Delta L_{Req,T} = L_{Req,T}$ (post) - $L_{Req,T}$ (pre)

where,

$L_{Req,T}$ (post) – noise level after completion of the project – projected or calculated noise levels;

$L_{Req,T}$ (pre) – noise level before the proposed project – ambient noise level.

The criteria for assessing the magnitude of a noise impact are illustrated in Table 3.

Table 3: Noise intrusion level criteria

Increase Δ-dBA	Assessment of impact magnitude	Color code
0 <Δ≤ 1	Not audible	
1 <Δ≤ 3	Very Low	
3 <Δ≤ 5	Low	
5 <Δ≤ 10	Medium	
10 <Δ≤ 15	High	
15 <Δ	Very High	

The noise projections at the houses are given in Table 4.

Table 4: Projected noise intrusion levels

Receptor	Distance	Projected noise level during the construction phase - dBA	Projected noise level during the operations phase - dBA	Prevailing ambient noise level daytime - dBA	Prevailing ambient noise level night-time - dBA	Cumulative noise level daytime - dBA	Cumulative noise level daytime - dBA	Noise intrusion level daytime - dBA	Noise intrusion level night-time - dBA
A	7108	0.0	0.0	**33.4**	**30.4**	**33.4**	**30.4**	0.0	0.0
B	6445	0.0	0.0	**33.1**	**30.1**	**33.1**	**30.1**	0.0	0.0
C	200	34.7	26.0	**46.1**	**28.4**	**46.4**	**30.4**	0.3	2.0
D	2748	10.0	2.0	**32.1**	**44.4**	**32.1**	**44.4**	0.0	0.0
E	3734	5.0	0.0	**49.5**	**35.2**	**49.5**	**35.2**	0.0	0.0
F	4430	2.0	.0	**49.5**	**35.2**	**49.5**	**35.2**	0.0	0.0

2 IMPACTS IDENTIFICATION AND ASSESSMENT

2.1 Identification of Impacts

2.1.1 Construction Phase

- Construction of gravel road

  Noise may be generated by the construction activities and the use of construction equipment such as Graders, TLB's and Front-end loaders. The use of this equipment will create an increase in noise levels in the immediate vicinity of the construction activities and in some cases at some distance from the activities.

- Preparation of the footprint, digging of trenches, earthworks, and construction of the gravel road.

  Noise may be generated by the following activities: earth drilling, generator noise, civil construction and in extreme cases localised blasting.

- Construction traffic

  Construction traffic to and from the site would create a temporary linear noise source.

2.1.2 Operational Phase

- Noise generated by the traffic along gravel road.

  Noise could be generated through the lack of a cyclic maintenance programme to identify normal wear and tear of motor-vehicles and/or road.

- Traffic

  Traffic noise is created by vehicle movement where mechanical noise, rattles, and road surface play an important role on the noise levels along roads or some distance from roads.

- Maintenance activities

  The regular maintenance activities may give rise to site-specific increase in the noise levels.

2.2 Impact Assessment Methodology

The impact assessment methodology requires that each potential impact identified is clearly described including the following:

- Extent (spatial scale) - will the impact affect the national, regional, or local environment or only that of the site?
- Duration (temporal scale) - how long will the impact last?
- Intensity - will the impact be of high, moderate, or low severity?
- Probability (likelihood of occurrence) - how likely is it that the impact may occur?

To determine the environmental significance (importance) of each identified potential impact, a numerical value has been assigned to each of the above criteria (Table 1). The following formula is used to calculate the environmental consequence of each impact:

Significance = Extent + Duration + Intensity + Probability

Nature	**Category**	
Extent (E)	Categories 1 – 4	
	1	Footprint / site
	2	Local (within a radius of 2 kms of site)
	3	Regional
	4	National
Duration (D)	Categories 1 – 4	
	1	Short (less than five years)
	2	Medium term (5-15 years)
	3	Long term (15-30 years)
	4	Permanent
Intensity (I)	Categories 1 – 4	
	1	Low
	2	Moderate
	3	High
	4	Very High
Probability (P)	Categories 1 – 4	
	1	Improbable
	2	Probable
	3	Highly Probable
	4	Definite
IMPACT : Cumulative		
Extent (E)		
Duration (D)		
Intensity (I)		
Probability (P)		
Significance	**Significance = E + D + I + P**	

Minimum value of 4, maximum of 16	
Status determines if positive / negative	
Negative (13 - 16 points) NEGATIVE VERY HIGH	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a “very high impact” is likely to be a fatal flaw.
Negative (10 - 12 points) NEGATIVE HIGH	These are impacts which individually or combined pose a significantly high negative risk to the environment. These impacts pose a high risk to the quality of the receiving environment. The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Negative (7 - 9 points) NEGATIVE MODERATE	These are impacts which individually or combined pose a moderate negative risk to the quality of health of the receiving environment. These systems would not generally require immediate action, but the deficiencies should be rectified to avoid future problems and associated cost to rectify once in HIGH risk. Aesthetically and/or physically non-compliance can be expected over a medium term. In this case the impact is medium term, moderate in extent, mildly intense in its effect and probable. Mitigation is possible with additional design and construction inputs.
Negative (4 - 6 points) NEGATIVE LOW	These are impacts which individually or combined pose a deleterious or adverse impact and low negative risk to the quality of the receiving environment, and may lead to potential health, safety, and environmental concerns. Aesthetically and/or physical non-compliance can be expected for short periods. In this case the impact is short term, local in extent, not intense in its effect and may not be likely to occur. A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction, or operating procedure.
0 Neutral	Impact is neither beneficial nor adverse. These are impacts which cannot be classified as either positive, negative, or classified as null and void in the case of a negative impact being adequately mitigated to a state where it no longer renders a risk.
Positive (4 - 6 points) POSITIVE LOW	These are impacts which individually or combined pose a low positive impact to the quality of the receiving environment and health, and may lead to potential health, safety, and environmental benefits. In this case the impact is short term, local in extent, not intense in its effect and may not be likely to occur. A low impact has no permanent impact of significance.
Positive (7 - 9 points) POSITIVE MODERATE	These are impacts which individually or combined pose a moderate positive effect to the quality of health of the receiving environment. In this case the impact is medium term, moderate in extent, mildly intense in its effect and probable.
Positive (10 - 12 points) POSITIVE HIGH	These are impacts which individually or combined pose a significantly high positive impact on the environment. These impacts pose a high benefit to the quality of the receiving environment and health, and may lead to potential health, safety, and environmental benefits. In this case the impact is longer term, greater in extent, intense in its effect and highly likely to occur. The effects of the impact may affect the broader environment.

	Positive (13 - 16 points) POSITIVE VERY HIGH	These are permanent and important beneficial impacts which may arise. Individually or combined, these pose a significantly high positive impact on the environment. These impacts pose a very high benefit to the quality of the receiving environment and health, and may lead to potential health, safety, and environmental benefits. In this case the impact is long term, greater in extent, intense in its effect and highly likely or definite to occur. The effects of the impact may affect the broader environment.

2.3 Impact assessment for the construction phase

The impact rating during the different stages of the construction phase of the project is as follows:

Table 5: Site clearing and grubbing of the footprint area

Activity	***Site clearing and grubbing of the footprint area***						
Project phase	*Pre-construction and Construction phase*						
Impact Summary	*Noise increase at the boundary of the PV footprint and at the abutting houses*						
Potential Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	1	2	2	6	Negative Low	-
Management Measures	*Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels and during daytime only.*						
	Topsoil stripping should be limited to daytime only.						
After Management Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	2	1	1	5	Negative Low	-

Table 6: Civil construction activities of the road

Activity	***Civil construction activities of the road***						
Project phase	*Pre-construction and Construction phase*						
Impact Summary	*Noise increase at the boundary of the PV footprint and at the abutting houses*						
Potential Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	1	2	2	5	Negative Low	-
Management Measures	*Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels.*						
	Civil construction activities should be limited to daytime only.						
After Management Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	2	1	1	5	Negative Low	-

Table 7: Transportation of building material to and from the specific areas

Activity	***Transportation of building material to and from the specific areas***						
Project phase	*Pre-construction and Construction phase*						
Impact Summary	*Noise increase at the boundary of the PV footprint and at the abutting houses*						
Potential Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	1	2	2	6	Negative Low	-
Management Measures	*Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels.*						
After Management Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	2	1	1	5	Negative Low	-

2.4 Impact assessment for the operational phase

The impact rating during the different stages of the operational phase of the project is as follows:

Table 8: Traffic noise

Activity	***Traffic noise***						
Project phase	*Operational phase*						
Impact Summary	*Noise increase at the boundary of the PV footprint and at the abutting houses*						
Potential Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	3	2	2	8	Negative Moderate	-
	The speed limit to be always adhered to.						
After Management Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	3	2	1	6	Negative Low	-

Table 9: Maintenance activities

Activity	***Maintenance activities***						
Project phase	*Operational phase to the Closure phase*						
Impact Summary	*Noise increase at the boundary of the PV footprint and at the abutting houses*						
Potential Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	3	2	1	6	Negative Moderate	-
Management Measures	*Maintenance to be done on a regular basis to avoid the creation of potholes.*						
After Management Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	3	2	1	6	Negative Low	-

2.5 Impact assessment for the decommissioning phase

The following activities are associated with the decommissioning phase:

- Planting of grass and vegetation at the rehabilitated areas;
- Removal of infra-structure.

The impact rating during the different stages of the decommissioning phase of the project is as follows:

Table 10: Removal of infra-structure

Activity	***Removal of infra-structure***						
Project phase	*Decommissioning phase*						
Impact Summary	*Noise increase at the boundary of the mine footprint and at the abutting residential areas*						
Potential Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	3	2	1	6	Negative Low	-
Management Measures	*Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels.*						
	Removal of infra-structure should be limited to daytime only.						
After Management Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	2	1	1	5	Negative Low	-

Table 11: Planting of grass and vegetation at rehabilitated areas

Activity	***Planting of grass and vegetation at the rehabilitated areas***						
Project phase	*Decommissioning phase*						
Impact Summary	*Noise increase at the boundary of the mine footprint and at the abutting residential areas*						
Potential Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	3	2	1	6	Negative Low	-
Management Measures	*Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels.*						
	Planting of grass and/or vegetation should be limited to daytime only.						
After Management Impact Rating	***Extent***	***Duration***	***Intensity***	***Probability***	***Impact***	***SIGNIFICANCE***	***+/-***
	1	2	1	1	5	Negative Low	-

3 CONCLUSION

There will be a shift in the prevailing ambient noise level in the immediate vicinity of the road and at Farmhouse C on an intermittent basis but at a distance more than 500m from the road the intrusion level will be insignificant and in line with the Noise Control Regulations, 1994 provided that the following noise mitigatory measures are in place at all times:

- The speed limit to be always adhered to;
- Maintenance to be done on a regular basis to avoid the creation of potholes.

The large variations in the meteorological conditions and the geographical relations between the traffic noise and the noise sensitive receptors allow for the decrease in the noise as it propagates from the gravel road.

The potential noise impact from the proposed gravel road will be low and authorisation for the construction of the gravel road may be granted from an environmental noise point of view.

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