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Environmental Noise Impact Assessment

South Germiston Ext 25

Project No: 066/2017
Compiled by: B v/d Merwe
Date: 10 April 2017

Contents

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 the proposed residential development. I further declare that I am confident in the results of the studies undertaken and conclusions drawn as a result of it. I have further provided Lokisa Environmental with written access to all information at my disposal regarding the noise impact assessment. I am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 and any other specific and relevant legislation (national and provincial), policies, guidelines and best practice.

Signature: 

Full Name: Barend Jacobus Barnardt van der Merwe

Date: 10 April 2017
Title / Position: Environmental noise and vibration specialist
Qualification(s):\ MSc Environmental Management
Experience (years/ months):14 years
Registration(s): SAAI, AIAI, SAAG, NACA and SAIOH

Details of specialist and expertise

I, Barend JB van der Merwe of 43 6th Street, Linden Johannesburg have been an environmental noise and ground vibration specialist for the last 14 years. I have been instrumental in the pre-feasibility studies of proposed projects which may have an impact on the environment and noise sensitive areas. I am also involved with the noise and ground vibration impact assessments and the environmental management plans compilation of large projects such as wind farms, mining, roads, trains (primarily the Gautrain) and various point noise sources. As a post-graduate student in Environmental Management at the University of Johannesburg, I obtained an MSc degree with the research project concentrating on the impact of noise and ground vibration on a village close to a new underground mine. I have played a major role in the identification, evaluation and control of physical factors such as noise and ground vibration in the following projects – wind farms, various platinum and coal mines and the quarterly noise evaluation of the Gautrain, the decommissioning of the N11 near Mokopane, construction of the P166 near Mbombela, design of the Musina by-pass, noise mitigatory measures at the N17 road near Trichardt, establishment of the weigh bridge along the N3 near Pietermaritzburg, George Western by-pass. The following large environmental companies are amongst my clients: Gibb, Royal Haskoning DHV, Coffey Environmental, Golder Associates Africa (Pty) Ltd, GCS Environmental (Pty) Ltd, Knight Piesold Environmental (Pty) Ltd, MattMcdonold Engineering (Pty) Ltd and SRK Engineering (Pty) Ltd.

Qualifications

1. MSc – Environmental management – University of Johannesburg;
2. BSc Honours 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);
- South African Institute of Occupational Hygiene (SAIOH).

Experience

- Noise impact assessment of different mine 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 wind turbines in the Western Cape – Caledon;
- 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.

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. 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 make reference 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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1. Introduction

dBAcoustics was appointed to determine the prevailing noise levels in the vicinity of the proposed residential development west of an existing residential area and east of a railway line/industrial area. This will be a residential development and the application use zone will be for Residential 4, Public open space and a Power line servitude.

The noise survey was done to identify noise sources in and around the proposed development, which may have an impact on the proposed development and to recommend mitigatory measures for compliance to the Noise Control Regulations and the South African National Standards SANS 10103 of 2008 - The measurement and rating of environmental noise with respect to annoyance and to speech communication.

The location of the proposed development is illustrated in Figure 1.

Figure 1: Location of proposed South Germiston ext 25 development

2. Purpose of the Study

The noise survey is part of the requirements of the Noise Control Regulations where it is required to do a noise impact assessment in terms of Section 10 of the Noise Control Regulations, 1999.

The purpose of the noise survey was:

- To determine the prevailing ambient noise levels in the vicinity of the proposed development.

- Quantify the impact of noise of the proposed development during the construction and/or operational phases on the prevailing ambient levels and the outdoor environment.

- Determine the noise impact of the additional traffic on the existing residential units in the vicinity of the proposed development.

The proposed development will consist out of Residential 4 type development on 3 erven with an open space (park) and servitude for a power line and will consist of the following:

- Residential properties;
- Road infra-structure;
- Power, sewage and storm water systems.

3. 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.

Noise from a point source attenuates at a rate of 6 dB per doubling of distance from a point source and from a line source at a rate of 3 dB per doubling of distance – Inverse Square Law. In free field conditions a point source (diesel generator) which is measured at 87,0 dBA and at 10m from the source 84,5 dBA will be at 20m 78,5 dBA and at 40m the SPL will be 72,5 dBA etc. At a line source, which is road with cars, the reduction will only be 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.

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.

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 analyzed due to loud noises.

- Excessive loudness – loud music or impulse sound created by explosions

- Annoyance – Barking dogs

A number of 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 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 noise source, 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.

The human condition is affected by the intensity of the sound; the length of time of exposure and how often over time the human is exposed to it. Urban dwellers are besieged by noise, not only in the city streets but also in the busy workplaces and by household noises.

The World Health Organisation has published a series of recommended maximum sound pressure levels applicable to various situations and is illustrated in Table 1.

Table 1: Recommended noise levels for specific areas

Descriptor	Limit	Situation or effect
LAeq, 24	70 dBA	Negligible risk of hearing impairment
LAeq, 8	75 dBA	Negligible
LAeq	30 dBA	Excellent speech intelligibility
LAeq	55 dBA	Fairly good speech intelligibility
LAeq	30 dBA	No sleep disturbance in a bedroom
LAmax	45 dBA	No sleep disturbance – peak inside bedroom
LAeq	55 dBA	Residential areas, outdoors, daytime
LAeq	45 dBA	Residential areas, outdoors, night time

In terms of Table 5 of SANS 10103 of 2008 which is illustrated in Table 2 are the community response should the ambient noise level be exceeded.

Table 2: Categories of community/group response

1	2	3
Excess $)L_{Req,T}$ [1)] dB	**Estimated community/group response**	
	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 (determined in the absence of the specific noise under investigation).

b) $)L_{Req,T}$ = $L_{req,T}$ of ambient noise under investigation MINUS the maximum rating level for the ambient noise given in table 1.

c) $)L_{Req,T}$ = $L_{Req,T}$ of ambient noise under investigation MINUS the typical rating level for the applicable district as determined from table 2.

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

The following is of relevance to the ambient noise measurements:

The L_{Aeq} was measured over a sampling period in excess of 15-minute at each of the measuring points and was done during the day time.

4. Method of evaluation

The noise survey was conducted in terms of the provisions of the Noise Control Regulations and the South African National Standards.

The following integrated noise level meter was used in the noise survey:

- Larsen Davis Integrated Sound Level meter Type 1 – Serial no. S/N 0001072;
- Larsen Davis Pre-amplifier – Serial no.PRM831 0206;
- Larsen Davis ½" free field microphone – Serial no. 377 B02 SN 102184;
- Larsen Davis Calibrator 200 – Serial no.9855;

The instrument was calibrated before and after the measurements was done and coincided within 1.0dBA. Batteries were fully charged and the windshield was in place at all times.

5. Comments

The noise survey was carried out at the boundaries of the proposed development. This is a typical residential development in the vicinity of industrial/commercial area and the residents can commute to the industrial/commercial areas by foot or limited motorised transport due to the short distance between the industrial /commercial area and the residential areas. The proposed development is given in Figure 2.

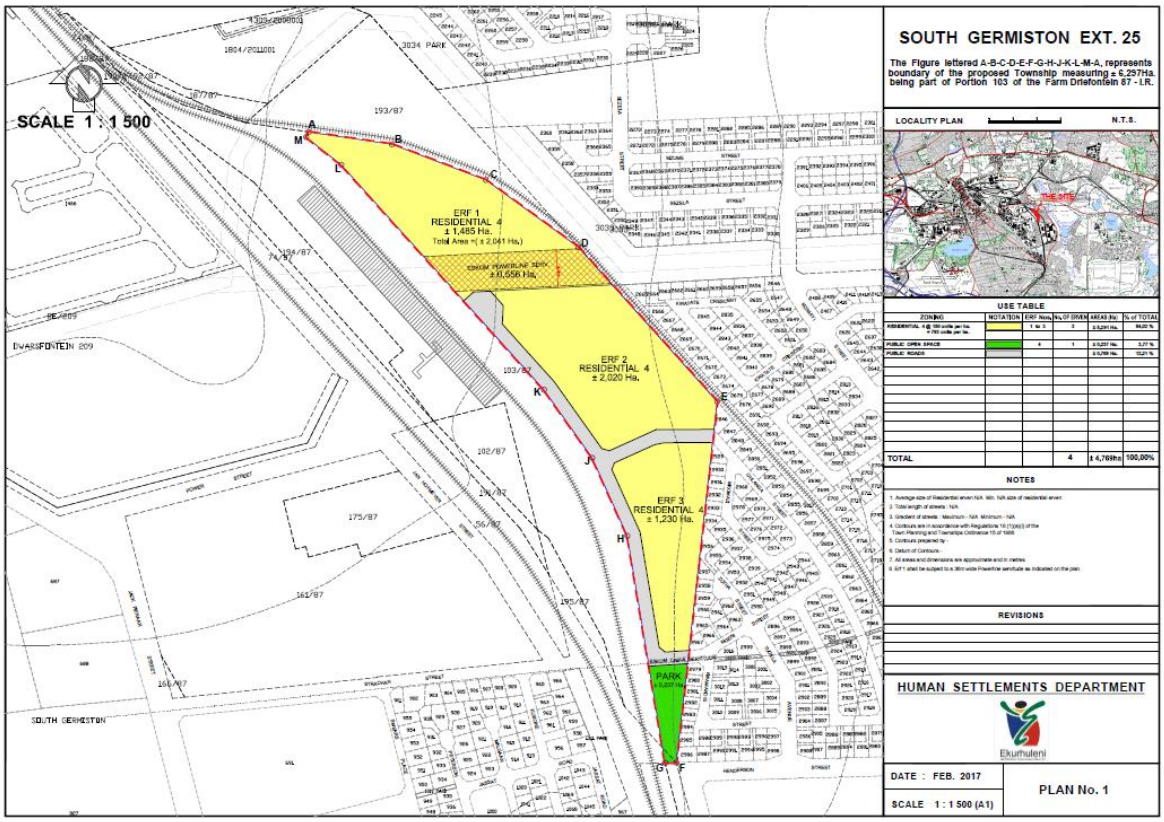

Figure 2: Proposed development

6. Methodology of the study

6.1 Site visit
6.2 Ambient noise measurements
6.3 Noise emissions during day time in the vicinity of the proposed development
6.4 Noise impacts
6.5 Assessment of the noise impact

6.1 Site visit

A site visit was carried out on 30 March 2017 in order to:

- Identify the major contributors to the prevailing ambient noise levels in and around the proposed development.
- Identify the major feeder roads in the vicinity of the proposed development.
- Any other sources of noise.

6.2 Ambient noise measurements

The measuring points 1 to 4 along the boundary of the proposed development and measuring points 5 at the industrial area are illustrated in Figure 3.

Figure 3: Measuring points

The prevailing ambient noise levels were taken at the following geographical spatial points as illustrated in Table 3.

Table 3: Geographical information of the different measuring points

Measuring point	Latitude	Longitude	Remarks
1	26^0 13.316"S	028^0 11.525"E	Southern corner of the site in the vicinity of residential properties, feeder road and the railway line. Traffic and intermittent train noise.
2	26^0 12.964"S	028^0 11.285"E	Northern corner of the site in the vicinity of residential properties and the railway line. Traffic and intermittent train noise.
3	26^0 12.980"S	028^0 11.389"E	Eastern side of the site in the vicinity of residential properties. Distant traffic and train noise.
4	26^0 13.120"S	028^0 11.542"E	Eastern side of the site in the vicinity of residential properties. Distant traffic and train noise.
5	26^0 13.282"S	028^0 11.308"E	North of the industrial site along Strachan Street. Industrial activity noise.

6.3 Noise emissions at the measuring points

The ambient noise level is made up out of traffic noise, industrial activity noise, distant traffic noise and aircraft flying over the property.

The following were the pre-vailing noise sources in the vicinity of the proposed residential development:

Daytime:

- Traffic noise – distant and abutting roads;
- Industrial activity noise
- Aircraft;
- Birds.

Nighttime:

- Distant traffic noise;
- Industrial activity noise;
- Insect noises.

6.4 Noise impacts

The difference between the actual noise and the ambient noise level will determine how people will respond to sound and what the noise impact on an individual will be. In order to evaluate such there must be uniform guidelines to evaluate each scenario. The World Health Organization has laid down sound pressure levels for specific districts and SANS 10103 of 2008 has provided the following recommended equivalent continuous noise levels per district:

Table 4: Typical rating levels for ambient noise in districts

Type of district	***Equivalent continuous* rating level $L_{Req.T}$ [1] for ambient noise** dBA					
	Outdoors			**Indoors, with open windows**		
	Day-night L_{Rdn} [2]	**Day-time** L_{Rd} [1]	**Night-time** L_{Rn} [1]	***Day-night*** L_{Rdn} [2]	**Day-time** L_{Rn} [1]	**Night-time** L_{Rn} [1]
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

In districts where the $L_{R.dn}$ exceeds 55.0 dBA, residential buildings e.g. dormitories, hotel accommodation and residences, these areas should preferably be treated acoustically to obtain indoor $L_{Reg.T}$ values in line with Table 1 of SANS 10103 of 2008.

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 nighttime between 22h00 and 6h00.

The response to noise can be classified as follows:

- An increase of 0.0dBA or less will cause no response from the affected community. For a person with normal hearing an increase of less than 3.0dBA will not be noticeable
- An increase between 0.0dBA – 10.0dBA will elicit little to sporadic response. When the difference is more than 5.0dBA above the ambient noise level a person with normal hearing will start to hear the difference.
- An increase between 5.0dBA and 15.0dBA will elicit medium response from the affected community.
- An increase between 10.0dBA and 20.0dBA will elicit strong community reaction.

The overlapping categories are because there is no clear-cut transition from one community response to another and there are variables, which should be taken into account when evaluating a potential noise problem.

6.6 Assessment of noise impacts

Two aspects are important when considering potential noise impacts on a specific area, and it is:

- The increase in the noise level, and;
- The overall noise level produced.

In terms of noise increases, persons exposed to an increase of 2.0dBA or less would not notice the difference. Some people exposed to increases of 3.0 to 4.0dBA will notice the increase in noise level, although the increase would not be considered serious. Noise

increases of 5.0dBA and above are very noticeable, and, if these are frequent incidents, or continuous in nature, could represent a significant disturbance.

7. Results of the noise survey

7.1 Description of the environment

- Erven 1 to 3, South Germiston Ext 25

7.2 Measured ambient noise levels

- Erven 1 to 3, South Germiston Ext 25

7.1 Description of the environment

- Erven 1 to 3, South Germiston Ext 25

The proposed development is situated in an area where there are residential properties, railway line, industrial activities, a business type development, and feeder roads. The traffic noise from the feeder roads and the distant industrial activities contribute to the prevailing environmental ambient noise levels.

The following meteorological conditions were recorded on 30 March 2017:

30 March 2017 - Daytime

- Wind speed – less than 1.5m/s
- Temperature – 31.8^{o}C – No strong temperature gradient occurred near the ground.
- Cloud cover – Clouds.
- Wind direction – There was north-westerly wind blowing.
- Humidity – 40%.

7.2 Measured ambient noise levels

The results of the noise survey are illustrated in Table 5 where the Leq is the average noise level for the specific measuring point over a period of time, the Lmax is the maximum noise level and the Lmin is the minimum noise level registered during the noise survey for the specific area in dBA.

The prevailing ambient noise levels are typical noise levels which prevail in a district with feeder roads and existing residential properties.

Table 5: Results of noise survey

Position	Daytime			Remarks
	Ambient daytime - dBA	L_{Max} - dBA	L_{Min} - dBA	
1	***47.3***	64.5	39.6	Distant industrial activities and traffic noise.
2	***43.8***	63.7	36.8	Distant industrial activities and traffic noise.
3	***51.5***	65.4	45.6	Distant industrial activities and domestic noise.
4	***50.2***	58.8	45.4	Distant industrial activities and domestic noise.
5	***66.3***	71.1	52.7	Industrial activity noise.

The noise level in the vicinity of the proposed development was 43.8dBA to 51.5dBA. The noise level increased to 56.4dBA during the time an aircraft flew over the residential area. The railway line was higher than the proposed development and a finite type noise was created each time a train passed the measuring point. There were more trains during peak periods in the morning and afternoon after which the prevailing ambient noise level was created by distant industrial activities, traffic and domestic type noises. The increase in the noise level during train activities are illustrated in Figure 4. The peak value was from the locomotive, the wagons and then the prevailing ambient noise level is maintained. The noise levels measured was at 30m from the train

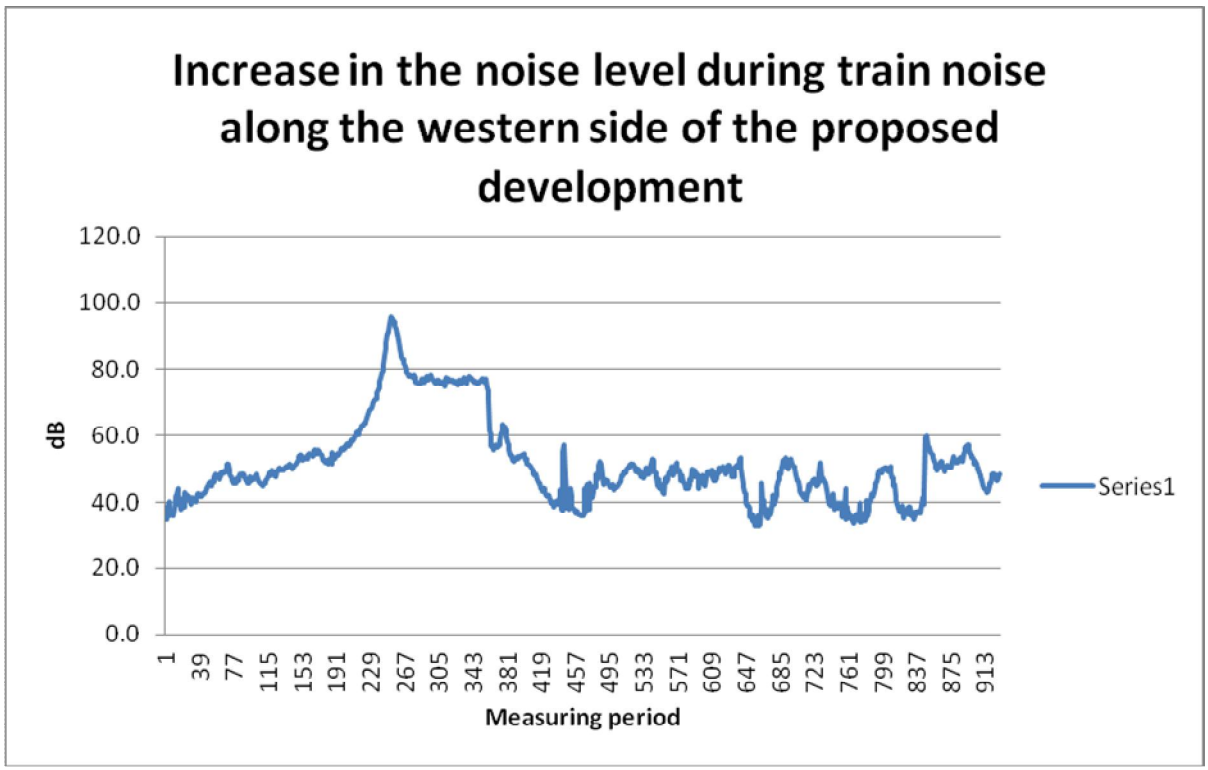

Figure 4: Increase in the prevailing ambient noise level during train activities

The calculations to determine the noise level from the additional traffic, when the project is completed, will be based on a total of 100 vehicles during the morning peak period and 100

vehicles during the afternoon peak period. The number of heavy-duty vehicles which will visit the site will be 5% of the total of the traffic volume per period. The traffic noise predictions according to SANS 10210 of 2004, the national standard for the calculating and predicting of road traffic noise was used to calculate the noise level to be generated by the traffic along the proposed road. The calculation of the noise levels along the abutting roads were based on a speed of 80km/h.

Basic Model

$L_{Basic} = 38.3 + 10 \text{ Log } (Q_r)$ dBA,

where; L_{Basic} = basic noise level in dBA and Q_r is the mean traffic flow per hour.

Primary corrections to the basic model:

- Traffic flow Q – vehicles/hour;
- Corrections for speed of traffic and percentage of heavy vehicles, $L_{P,v}$;
- Correction for gradient, L_{gr};
- Correction for road surface texture, L_{t}.

Propagation:

- Correction for ground conditions and distance of the receiver, $L_{d,hr}$;
- Height relative to source h,m;
- Average height of propagation h_{av}, m.

The traffic noise during the construction phase will be **51.2dBA** along the feeder road. The traffic noise during the operational phase from the additional vehicles during the morning and afternoon peaks will be **51.4dBA** at 25m from the feeder road. The noise level at 100m from the feeder road will be **43.4dBA**.

8. Discussion

Two aspects are important when considering potential noise impacts of a project and it is:

- The increase in the noise level, and;
- The overall noise level produced during the construction and the operational phase of the project.

The following activities will generate noise during the construction phase of the development:

- Ground works/Excavation;
- Transportation of waste soil/rock from the site;
- Foundations;
- Building activities;
- Transportation of building material to and from the construction site;
- Assembling of equipment/machinery and buildings.

The noise sources at the two different project areas which may create an increase in the noise levels in the near field on a temporary and/or permanent basis during the operational phase of the project:

- Increase in the traffic noise along the feeder roads;
- Traffic noise impact on the residential areas to the east of the proposed development.

The impact assessment during the construction phase is illustrated in Table 6.

Table 6: Impact rating during the construction phase

Aspect	**Impact** (Consequence + Likelihood) *	**Significance Rating** (Extreme, High, Medium, Low)	**Mitigation**	**Impact after mitigation measures**	**Significance rating after mitigatory measures** (Extreme, High, Medium, Low)
Ground works/Excavation	11	Medium	Machinery with low noise levels to be used. Must take place during daytime period only.	5	Low
Transportation of waste soil/rock from the site	11	Medium	Tip trucks with low noise levels to be used. Must take place during daytime period only.		
Foundations	9	Medium	Machinery with low noise levels to be used. Pile driving and cement floating to be done during the daytime period only.	5	Low
Building activities	9	Medium	Building activities to take place during daytime periods and may only take place during night time inside the building during the house-fitting period.	5	Low
Transportation of building material to and from the construction site	11	Medium	Machinery with low noise levels and maintained in a good order to be used and to comply with the IFC's Health and Safety Regulations.	5	Low
Assembling of equipment/machinery.	11	Medium	Machinery with low noise levels to be used.	5	Low

*Impact assessment methodology attached as Appendix A

The impact assessment during the operational phase is illustrated in Table 7.

- Increase in the traffic noise levels along the feeder roads;
- Traffic noise impact on the residential areas to the east of the proposed development.

Table 7: Impact rating during the operational phase

Aspect	Impact (Consequence + Likelihood) *	Significance Rating (Extreme, High, Medium, Low)	Mitigation	Impact after mitigation measures	Significance rating after mitigatory measures (Extreme, High, Medium, Low)
Increase in the traffic noise levels along the feeder roads.	5	Low	There will be no increase in the prevailing ambient noise level as the calculated noise will be 51.2dBA during the afternoon and morning peaks whereas the prevailing ambient noise levels were 50.2dBA to 51.5dBA. There will be no additional noise mitigatory measures required.	5	Low
Train noise impact on the prevailing ambient noise level to the east of the proposed development.	5	Low	There will be a finite type noise increase when a train past the western boundary. The houses will be lower than the train line due to the fill and topography of the area. The residential properties may not be closer than 30m from the railway line.	5	Low

*Impact assessment methodology attached as Appendix A

9. Recommendations

The following noise mitigatory measures are recommended for the proposed residential development:

- Construction activities may only take place during the day time and a noise survey must be carried out should it be required to work after hours;
- The residential properties along the western side of the proposed development must be situated not closer than 30m from the rail line.

10. Conclusion and summary

The proposed development will be in line with SANS 10103 of 2008 - The measurement and rating of environmental noise with respect to annoyance and to speech communication and the Gauteng Noise Control Regulations, provided that the acoustic screening measures are in place.

Barend van der Merwe – MSc UJ
Environmental Noise Specialist

Definitions/Noise:

Ambient noise
The totally encompassing sound in a given situation at a given time and usually composed of sound from many sources, both near and far

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

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 a distance of 500 m or less from the point of observation

Residual noise
The ambient noise that remains at a given position in a given situation when one or more specific noises are suppressed

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 as a result of one or more specific noises.

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.

Disturbing noise
Means a noise that causes the ambient noise level to rise above the designated zone level, or if no zone level has been designated, the typical rating levels for ambient noise in districts, indicated in table 2 of SANS 10103.

Abbreviations: SPL = Sound Pressure Levels, dB = Decibel, dBA = Decibel A weighted

Appendix A

IMPACT ASSESSMENT METHODOLOGY

Criteria for assessing significance of impacts

SEVERITY OF IMPACT	RATING
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful	5

SPATIAL SCOPE OF IMPACT	RATING
Activity specific	1
Mine specific (within the mine boundary)	2
Local area (within 5 km of the mine boundary)	3
Regional (C[illegible])	4
National	5

DURATION OF IMPACT	RATING
One day to one month	1
One month to one year	2
One year to ten years	3
Life of operation	4
Post closure / permanent	5

CONSEQUENCE

FREQUENCY OF ACTIVITY / DURATION OF ASPECT	RATING
Annually or less / low	1
6 monthly / temporary	2
Monthly / infrequent	3
Weekly / life of operation / regularly / likely	4
Daily / permanent / high	5

FREQUENCY OF IMPACT	RATING
Almost never / almost impossible	1
Very seldom / highly unlikely	2
Infrequent / unlikely / seldom	3
Often / regularly / likely / possible	4
Daily / highly likely / definitely	5

LIKELIHOOD

Risk Rating	Risk Level	Guidelines for Risk Matrix
21 to 25	(Ex) - Extreme	Eliminate, avoid, implement specific action plans/procedures to manage and monitor
13 to 20	(H) – High	Proactively manage
6 to12	(M) – Medium	Actively manage
1 to 5	(L) – Low	Monitor and manage as appropriate

Impact: Loss of agricultural potential		
Severity: 3	Spatial scope: 2	Duration: 4
Consequence rating: 9		
Frequency of activity: 4	Frequency of impact:4	
Likelihood rating: 8		
Risk rating: 17 (High) – proactive management required		
~~Suggested management~~		
Risk rating following mitigation:		