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Tenbosch Mine: Environmental Noise Impact Assessment

Prepared for:

Kimopax Group

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Revision History

Issue/revision	Remarks	Date	Prepared by	Checked by	Authorised by
Issue 1	Report	24/08/2023	Duduzile Skhosana BA. Env.Sc	Oliver Knoppersen AMIOA	Oliver Knoppersen AMIOA

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APPENDICES

National Environmental management Act (Act no. 107 of 1998), GN No. 326 of 07 April 2017 Regulations, Appendix 7

Relevant referencing to the Appendix 6 of the National Environmental, Management Act, 1998 (Act No. 107 of 1998) is made below:	
Information requirements	**Reference**
(1) A specialist who prepared the report (a) details of- (i) the specialist who prepared the report; (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	See below (next section) and **Appendix E**.
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	See below (next section).
(c) an indication of the scope of, and the purpose for which, the report was prepared; (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section **2** Section **6,** Section **0**
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section **6**
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section **5**
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section **0**
(g) an identification of any areas to be avoided, including buffers;	Section **0**
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section **0**
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section **5.4**
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity [including identified alternatives on the environment] or activities;	Section **0**
(k) any mitigation measures for inclusion in the EMPr;	Section **0**
(l) any conditions for inclusion in the environmental authorisation;	Section **0**
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section **8.2**
(n) a reasoned opinion— (i) As to whether the proposed activity, activities or portions thereof should be authorised; (ii) if the opinion is that the proposed activity, activities 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;	Section **8, 9**
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section **3.3**
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto;	Section **3.3**
(q) any other information requested by the competent authority.	None

DETAILS OF SPECIALIST & DECLARATION OF INTEREST

Project Title	Tenbosh Mine Environmental Noise Impact Assessment Report
Contact person	Oliver Knoppersen
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I, Oliver Knoppersen , declare that –

General declaration:

I act as the independent specialist;

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

Signature of the specialist:

Name of company: Acoustech Consulting

Date: 24/08/2023

ABSTRACT AND EXECUTIVE SUMMARY

Acoustech Consulting was appointed by Kimopax Group (main consultant) to determine the potential noise impact of the proposed Tenbosch mining development located in the Nkomazi Municipality, Barberton District Municipality within the Mpumalanga Province.

The scope of works of this Environmental Noise Impact Assessment (ENIA) is to determine if the project complies with Government Notice Regulation (GN R) 154 legislation (Government Gazette 13717, 10 January 1992). The methodologies applied in this report comply with the GN 320 of 20 March 2020 requirements.

Nine receptors were identified at various distances of the infrastructure footprint and comprised of rural settlements and homesteads. Due to the nature of the area one noise level measurement was performed at Point 1.

Based on the measurements the following Rating Levels were selected for receptors:

- A typical rating level (i.t.o SANS 10103:2008) highlights a Rural District within the study area.

The outcome of the assessment indicated that some mitigation options are required during the construction phase and operational phase. Key mitigation options include:

Construction Phase:

- The most important mitigation measure is to ensure that construction occurs during daytime hours from (06:00 – 17:00) and during the week from Monday to Friday.

Operational Phase:

- The Process plant, including crushing, screening, grinding, milling and high-intensity magnetic separation circuits are to be installed in enclosed buildings and should be designed to limit the propagation of the noise from the plant equipment. This is to be considered in the design stage of the project.

With mitigation measures for the construction and operational phase the proposed Tenbosch Mine Project would comply to GN R154 legislation. In terms of noise assessment, the project does not present a fatal flaw. The project should be authorised in terms of noise, with mitigation measures adhered to.

1. INTRODUCTION

Acoustech Consulting was appointed by Kimopax Group (main consultant) to determine the potential noise impact of the proposed Tenbosch mining development located in the Nkomazi Municipality, Barberton District Municipality within the Mpumalanga Province.

The scope of works of this Environmental Noise Impact Assessment (ENIA) is to determine if the project complies with Government Notice Regulation (GN R) 154 legislation (Government Gazette 13717 10 January 1992). The methodologies applied in this report comply with the GN 320 of 20 March 2020 requirements.

The assessment uses the South African National Standards (SANS) 10302:2008 and SANS10103:2008 criteria, the extent of noise levels from the project operations and at the receptors (dwelling, communities, office etc.). Reference is also made in terms of Appendix 6 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

2. REPORT LAYOUT & TERMS OF REFERENCE (TOR)

The noise impact study comprised an investigation of:

- The measurements of existing noise levels at the noise sensitive areas. The subsequent determination of the baseline setting (SANS 10103:2008 Rating Level) within the area;
- The estimated noise emission from the proposed project, and assessment of the future phases including planning, construction, operational and closure (rehabilitation) noise impacts;
- Mitigation requirements and recommendations where applicable; and
- Conclusions and recommendations as well as statement whether the project should be authorised (in terms of noise).

3. INDICATIVE PROJECT DESCRIPTION

3.1. Basic Project Overview

The proposed Tenbosch mining project is located in the Nkomazi Municipality, Barbeton District Municipality in the Mpumalanga Province. It lies 28 km East of Malelane, approximately 15km South of Marloth Park and 12km west of Komatipoort.

The proposed mine will be developed as follows:

a) Tenbosch Mining will be an underground mining operation. The approximate extent of the underground mining area is 6 251 ha, and the proposed coal mining will be by decline method. There is an alternative to use a single or twin decline shafts which will comprise of two parallel shafts, one dedicated to personnel and material movement and one dedicated to coal conveying

b) These will be the up and down cast ventilation tunnels for the mine, but up-cast raise bore ventilation shafts will be developed once required and these two declines will both

be downcast. Raise bore ventilation holes will be developed as part of on-going capital as mining progresses.

c) Bord-and-pillar mining method is proposed for dipping coal seams. This entails the mining of rooms (bords) leaving pillars intact as a primary support to support the immediate roof.

d) Secondary support will be used in the form of roof bolts and any other support means as and when required into the immediate roof of the bords mined.

The Tenbosch Mine is planned as a conventional underground mining operation. The proposed infrastructure development includes:

- The shaft bank area (for the main and ventilation shafts and the immediate infrastructure associated therewith including the winder houses, the ventilation fans, materials handling equipment etc.);
- The ROM ore storage areas and underground development waste rock areas;
- Crushing and screening plant;
- Sales product storage areas and load out areas;
- Tailings storage facility;
- Surface substations and the like;
- Main access road from the N4 to the mine site,
- Stormwater management infrastructure;
- A pollution control dam;
- Buildings including workshops, change house-lamp room, offices, stores;
- Contractors' laydown area and parking;
- Power Supply infrastructure including a switching yard and electrical powerlines; Sewerage treatment package plant;
- Water Treatment Plant;
- Fuel storage; and
- Water Infrastructures including portable water tanker etc.

The proposed mining operations are anticipated to have a life span of approximately 35 years.

The project layout is indicated in **Figure 3-1**

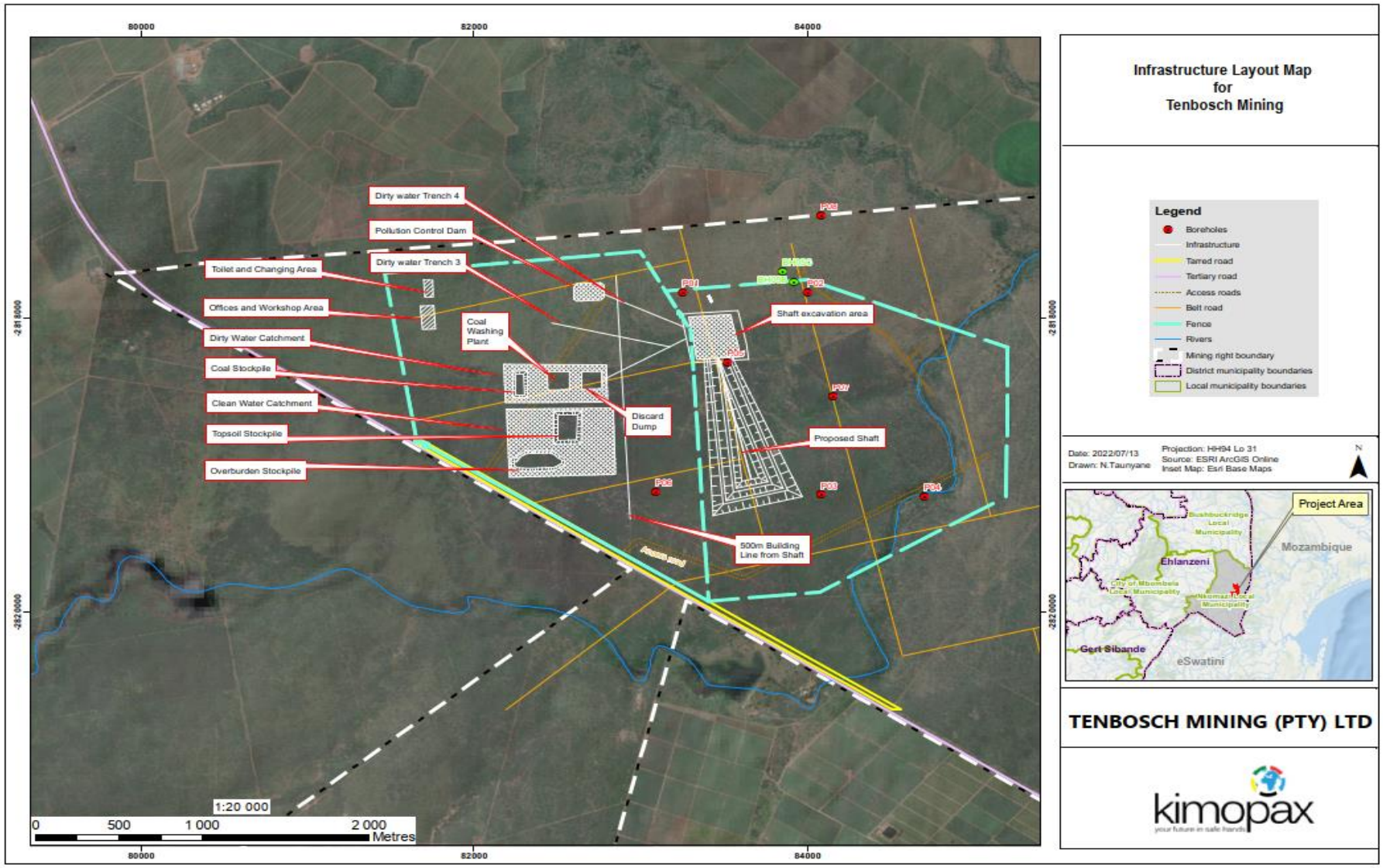


Figure 3-1: Project Infrastructure Layout

3.2. Interested & Affected Parties (I&AP's)

Nine Receptors (NR 1 – NR 9) were identified by means of desktop assessment (at various distances from the project footprint) and by information supplied by the project team.

Noise Receptors 1- 4 were identified within the proposed mining rights boundary and Noise Receptors 5-9 outside the mining rights boundary. The noise receptors and the measurement locality are presented in **Figure 3-2**. The measurement point is presented in **Appendix C** in WGS 84 coordinates.

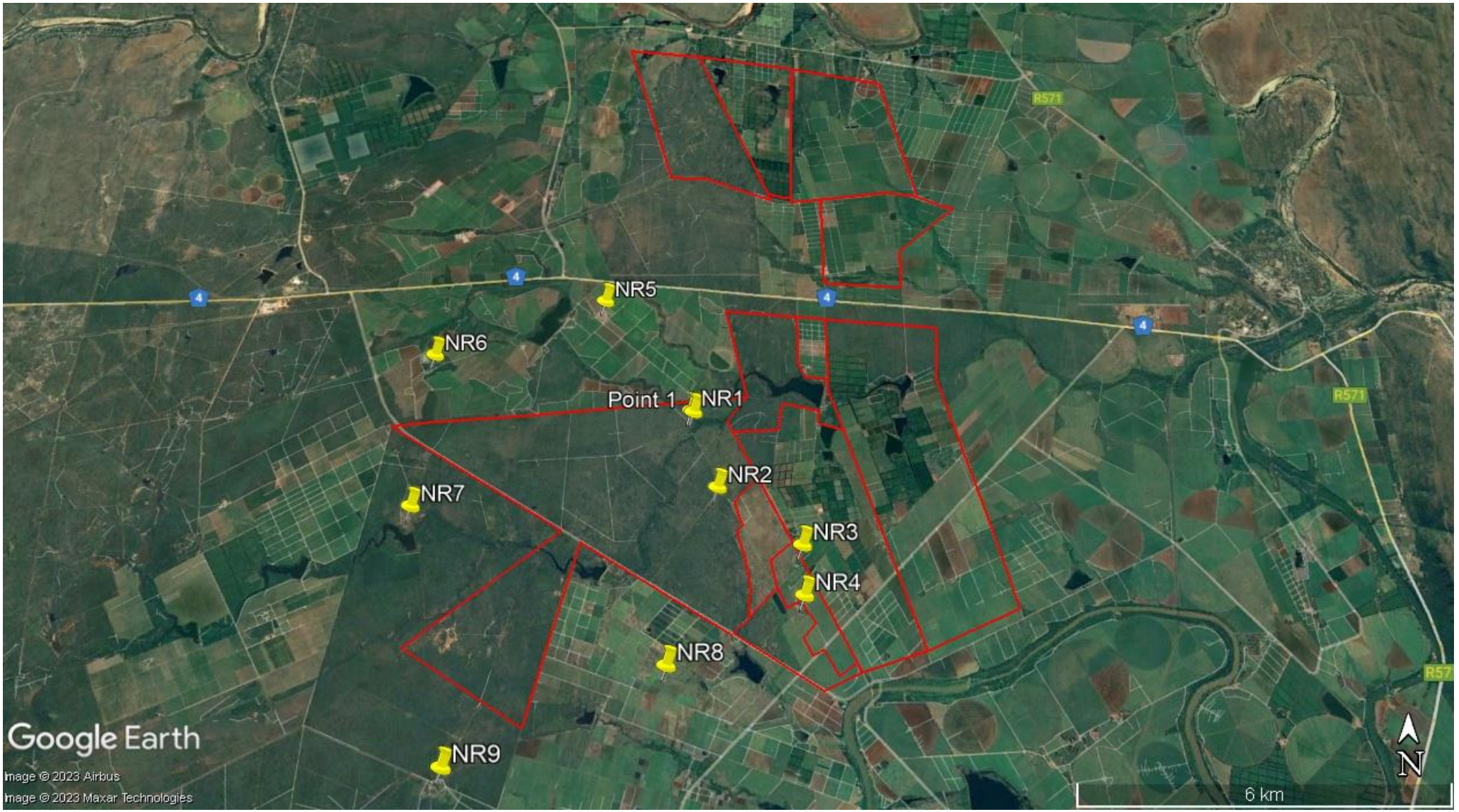


Figure 3-2: Interested & Affected Parties (Noise-Sensitive Developments)

3.3. Available Information

No comments were officially lodged regarding noise, and during the compilation of this report. No online resources were sourced for information regarding previous noise studies conducted within the study area.

Other available information as sources from the project main consultant is presented below in **Table 3-1**.

Table 3-1 : Comments received- information gathered relating to the project

Source	Comment or Information
Project team	Project layout

4. LEGAL FRAMEWORK

4.1. South African Legislation & Guidelines

4.1.1 The Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996)

This act lists noise pollution as a matter which falls under the jurisdiction of local government with assistance from the provincial government.

4.1.2 The Environmental Conservation Act, 1989 (Act No 73 of 1989)

This act makes provision for the National Noise Control Regulations, but these relate only to local authorities that request the application of such regulations. In 1996, the responsibility of administering the Noise Control Regulations was devolved to provincial level but only Gauteng, Free State and Western Cape provinces have promulgated their regulations. Although this act has been largely superseded by the National Environmental Management Act (Act No 107 of 1998), the Noise Regulations will still be promulgated in terms of the original Act.

4.1.3 The Noise Control Regulations GN R154

No noise control legislation within the Mpumalanga province exists, with reference to the National GN R154 National Noise Control Regulations. The National legislation has set pieces for industrial and controlled areas, residential or business areas. The National noise control legislation defines the following:

Section 1:

- 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 had been put into operation;
- Disturbing noise - means a noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7-dBA or more;
- Noise nuisance - means any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person.
- Controlled area is as follows –

  c) industrial noise in the vicinity of an industry -

  - (i) the reading on an integrating impulse sound level meter, taken outdoors at the end of a period of 24 hours while such meter is in operation, exceeds 61 dBA; or
  - (ii) the calculated outdoor equivalent continuous W-weighted sound pressure level at a height of at least 1,2 metres, but not more than 1,4 metres, above the ground for a period of 24 hours, exceeds 61 dBA;

It also should be noted:

Section 7 Exemptions

(1) The provisions of these Regulations shall not apply, if-

(a) the emission of sound is for the purposes of warning people of a dangerous situation; or

(b) the emission of sound takes place during an emergency."

The definition of a disturbing noise (+7 dBA from Rating Level SANS 10103:2008) forms the basis upon which a non-compliance in terms of South African legislation is made.

4.1.4 SANS Guidelines (SABS)

SANS 10103:2008, the Measurement and Rating of Environmental Noise with Respect to Annoyance, and to Speech Communication. Besides measurement techniques etc, this document provides noise levels that are expected in various areas (Rating Level). These are used by the Noise Regulations as limits of noise in the various areas. The acceptable rating levels for various districts are given in **Table 4-1,** being the maximum noise level that is acceptable at the boundary of the property for any district. It should be noted that for industries operating in an industrial zone a 24-hour 70 dBA L_{Aleq} is acceptable.

SANS 10328:2008, Methods for environmental noise impact assessments. The document sets out the methodology to compile a comprehensive

Environmental Nosie Impact Assessment. Stipulations include methodologies and minimum requirements, as well as various noise sources for investigations.

SANS10210:2004, Calculating and predicting road traffic noise. The document defines the prediction and measurement relating to road traffic noise.

Table 4-1 : Acceptable external noise levels within a district according to SANS 10103:2008

Type of District	Equivalent Continuous Rating Level for Noise ($L_{Req,T}$) (dBA)					
	Outdoors			Indoors with open windows		
	Day-night ($L_{Req,dn}$)	Daytime ($L_{Req,d}$)	Night-time ($L_{Req,n}$)	Day-night ($L_{R,Dn}$)	Daytime ($L_{Req,d}$)	Night-time ($L_{Req,n}$)
a) Rural districts	45	45	35	35	35	25
b) Suburban districts (little road traffic)	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts (with workshops, business premises and main roads)	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

4.1.5 Appendix 6 of the National Environmental, Management Act, 1998 (Act No. 107 of 1998)

The Appendix 6 of the National Environmental, Management Act, 1998 (Act No. 107 of 1998) regulations sets out minimum requirements from the authorities for a specialist to conduct an Environmental Study. The legislation checklist relevant for an ENIA has been compiled and is presented at the start of the document.

The new draft legislation promulgated on the 10th of May 2019 "Procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of Section 24(5)(a) and (h) of the National

Environmental Management Act, 1998, when applying for environmental authorisation." was applied to this assessment.

4.2. Other Guidelines Relating to Environmental Acoustics

4.2.1 Blasting & Vibrations

Blasting and Vibrations do not have methodologies or legislation in South Africa. Blasting and vibrations is a study into the effect of earthworks blasting in terms of ground, surface and air vibrations. It also studies rock blasting into the surrounding environment. The effects of blasting vary depending on the structure under consideration, the intensity of the blast, the distance of the blast etc. The vibration depends on the frequency as well as the vibration (in millimeters). Blasting is a specialist's study and could only be considered in the SANS10103:2008 as a +5 to 10 dBA (impulsive sound, however it should be noted that blasting only occurs irregularly). Blasts are a highly controlled event with warning prior to the noise.

5. APPROACH AND METHODS

5.1. Measurement Criterion

The procedures, as detailed in SANS 10328:2008 and SANS10103:2008 have been applied to the noise measurements and assessments made in this report. A summary of the approach to this study is outlined below.

5.1.1 Noise Policy Documents for the Region

No by-laws have been promulgated for the Mpumalanga Province or for the local or district municipalities.

5.1.2 Field Assessments of the Site

Field assessments in and around the site were undertaken on the 27th and 28th of July 2023. This included the identification of the noise sensitive stakeholders, existing noise sources and other baseline noise contributors. Viable and alternative measurement localities at the identified monitoring localities were further investigated to ensure measurements were not influenced by extraneous noise sources (e.g. an air-conditioning condenser unit near measured locality).

5.1.3 Existing Baseline - Noise Measurements

One baseline measurement (Point 1) was conducted on the 27th and 28th of July 2023 at the identified noise sensitive site (Rural Settlement). The noise

measurement was analysed to compile a subjective and objective determination of the Rating levels (L_{Req}) based on the L_{AIeq} measurements.

One Svantek 979 SANAS calibrated type 1 sound level meter was used to perform the noise measurements. The sound level meter was calibrated before and after the noise measurements with a 01dB sound calibrator. Further details of the sound level meter and the calibration certificates can be found in Appendix C.

$L(A)_{eq}$ values of ambient noise levels were calculated for the measurement point from the readings. The $L(A)_{eq}$ value is an A-weighted noise level integrated over the period of measurement.

The approximate weather conditions experienced during the measurement period is indicated in **Table 4-1**

Table 5-1: Approximate Weather Conditions

Measurement Date	Average Temperature (H/L)	Average Wind Speeds
27/07/2023	28 / 14 Degrees C	7 km/h
28/07/2023	27 / 14 Degrees C	11 km/h

5.1.4 Estimation of Potential Noise Impacts

The noise impact was determined with reference to legal standards (where applicable) and the specifications and guidelines provided in the SABS standards document (SANS 10103:2008). Significance of impacts can be subjective and legal minimum requirements and good engineering practice have therefore been used in each case to determine what is reasonable.

To make the judgment, we have compared the predicted noise level (as described in preceding section) at each receptor locality with each of the following:

- The measured ambient noise levels as described in measurement section above; and
- The identified SANS 10103: 2008 “typical rating levels for noise in districts” based on the measured ambient noise levels.

The extent of potential impacts has taken into consideration the probable community response to increases in sound levels, based on SANS 10103:2008. Important components and nature of the noise, such as impulsiveness and occurrence of pure tones, have also been accounted for by including correction factors as per SANS10103:2008.

5.2. Modelled Scenario

The modelled scenario was designed and based on the layout as supplied by the project team. The significant noise sources were identified, and noise contours developed. The modelled scenario took into consideration the following:

- Corrections for ground conditions (obtained from site observations) and metrological conditions;
- Ground elevation contours;
- Noise modelling based on future predicted noise climate. Sound Power Levels (SPL) will be sourced online and on our SPL Library;
- Noise contour representation will be developed focusing on pre-mitigation and post-mitigation effectiveness (if required).

5.3. Impact Assessment and Management

5.3.1 Introduction

The potential environmental impact of the proposed project was determined by identifying the environmental aspects and then undertaking an environmental risk assessment to determine the potential significant environmental impacts. The impact assessment included all phases of the project, with specific emphasis on construction, operation, and closure with rehabilitation.

5.3.2 Methodology

As per the NEMA EIA Regulations (2017) prescribed requirements, the potential environmental impacts identified for project were evaluated according to severity, duration, extent and significance of the impact, and include the potential occurrence and assessment of cumulative impact. The Risk Assessment Methodology used for the ranking of the impacts is detailed below.

This system derives environmental significance by rating the consequence of the impact on the environment and the likelihood of the impact occurring. Consequence is calculated as the average of the sum of the severity, duration and extent ratings while Likelihood is the average of the frequency of the activity together with the probability of an environmental impact occurring during those frequencies. **Table 5-2** to **Table 5-4** detail the rating assignment process as well as the calculations applied to achieve averages and the over significance.

The methodology was applied to the identified impacts without and with the application of proposed mitigation measures.

5.3.3 Determination of Consequence

Consequence is calculated as the average of the sum of the ratings of severity, duration and extent of the environmental impact.

Table 5-2: Assessment and Rating of Severity, Duration and Extent

Rating/ Description	1	2	3	4	5
Severity	Negligible / non-harmful / minimal deterioration (0 – 20%)	Minor / potentially harmful / measurable deterioration (20 – 40%)	Moderate / harmful / moderate deterioration (40 – 60%)	Significant / very harmful / substantial deterioration (60 – 80%)	Irreversible / permanent / death (80 – 100%)
Duration	Less than 1 month / quickly reversible	Less than 1 year / quickly reversible	More than 1 year / reversible over time	More than 10 years / reversible over time / life of project or facility	Beyond life of project of facility / permanent
Extent	Within immediate area of activity	Surrounding area within project boundary	Beyond project boundary	Regional / provincial	National / international
Consequence	**(Severity + Duration + Extent) / 3**				

5.3.4 Determination of Likelihood

Likelihood considers the frequency of the activity together with the probability of the environmental impact associated with that activity occurring.

Table 5-3: Assessment and Rating of Frequency and Probability

Rating/ Description	1	2	3	4	5
Frequency	Less than once a year	Once in a year	Quarterly	Weekly	**Daily**
Probability	Almost impossible / Never	Unlikely	Probable	Highly likely	**Definite**
Likelihood	**(Frequency + Probability) / 2**				

5.3.5 Environmental Significance

Environmental significance is the product of the consequence and likelihood values:

- **Significance = Consequence X Likelihood**

Table 5-4: Determination of Environmental Significance

Significance	Description
L (1 – 4.9)	Low environmental significance
LM (5 – 9.9)	Low to medium environmental significance
M (10 – 14.99)	Medium environmental significance
MH (15 – 19.9)	Medium to high environmental significance
H (20 – 25)	High environmental significance. Likely to be a fatal flaw.

5.3.6 Impact Summary Table

Table 7-2 provides a summary of the impact assessment based on the above methodology. It further provides detail on the potential impact, the significance rating without mitigation (WoM) measures, proposed mitigation measures, and significant rating with mitigation measures (WM).

5.4. Assumptions and Limitations

5.4.1 Acoustical Measurements

There are limitations and uncertainties regarding acoustical measurements. Noise levels has the potential to fluctuate based on numerous components, including:

- The noise level may change from day to day due to activities within a community (e.g. road traffic fluctuations, see point below) or even at a singular dwelling itself. Dwelling related infrastructure (e.g. air-conditioning units, swimming pool pumps etc.) that has the potential to influence noise levels in terms of dB;
- Seasonal changes have the potential to influence sound levels directly (e.g. rain) or indirectly (influence faunal communication, see point below);
- Faunal communication measurement fluctuations due to seasonal, time of day or night etc. Certain fauna communicates during certain hours e.g. cicada may only audible during night-hours, crepuscular birds are only audible during evening or night hours, crickets may be more audible active as seasons get hotter etc;
- Measurements near mining and industries fluctuates depending on equipment in use, capacity load in use, unforeseen equipment in care and maintenance. Certain equipment may not be running optimally, with the consequence been excessive elevated noise levels (e.g. gas leaks, conveyor pulley roller squeaking, excessive vibrations (and associated noise) from unmaintained dampers on equipment etc;

- Road traffic noise fluctuates due to time of measurement investigation (e.g. peak traffic morning or evening conditions, early morning hours etc.; and
- Metrological conditions can influence noise measurements. These include inversion and diffraction in the temperature layer, change in temperature and humidity etc.

Longer-term measurements (24-hours) were conducted to counter a portion of above-mentioned limitations. The longer-term measurements enabled measurements to be analysed in terms of LAeq, percentile and octave data. Longer-term measurements are proposed in certain national and international guidelines (or legalisation), namely:

- South African GN R154 Section 1, Controlled Area (LAeq);
- ISO 1996-2:2017, Section 3 Terms and Definitions (LAeq);
- World Health Organisation Night-Time Guidelines for Europe Executive Summary, pg XVII (LNight);
- SANS 10328:2008 & SANS10103:2008 Section 3.20, Reference time interval (LAeq);
- Brüel & Kjær Environmental Noise Measurements (LAeq);
- Calculation of Road Traffic Noise 1996 (CoRTN) (L10); and
- ETS R97 (wind conditions monitoring).

6. BASELINE SOUND PRESSURE MEASUREMENTS

Measurement Point 1 is presented in **Figure 3-2** in Section 3.

6.1. Baseline Noise Measurement Results

Equivalent values (Fast setting) are presented in Table 6-1 for Point 1**.** The detailed noise histograms are shown in Appendix B.

Table 6-1: Rating level – Noise Measurements at Point 1

Measurement Point	Date and Time	Recorded Ambient Noise Level (L_{Aeq})	Comparative Rating Level (SANS10103:2008)
27th July 2023			
Point 1	**Daytime 12:46 – 22:00**	**39.6**	**Rural District (Daytime = 45dBA)**
	Night-Time 22:00 – 06:00	**33.8**	**Rural District (Night-time = 35 dBA)**
28th July 2023			
Point 1	**Daytime 06:00 – 22:00**	**41.7**	**Rural District (Daytime = 45dBA)**
	Night-Time 03:20 – 05:30	**33**	**Rural District (Night-time = 35 dBA)**

From the noise survey, the proposed Tenbosch Mining project area is located in a noisescape that has a comparative rating level of a Rural District.

7. NOISE IMPACT ASSESSMENTS

A worst-case controlled scenario was used to help identify potential issues, identify the significance rating and potential noise impacts in terms of legislation. The Sound Power Levels (SPL) were selected based on the noise levels presented in **Appendix C**.

7.1. Construction Phase

7.1.1 Envisaged Construction Noise Sources

The assessment made use of equipment operating at maximum capacity. The following construction activities have been identified below.

- The shaft bank area (for the main and ventilation shafts and the immediate infrastructure associated therewith including the winder houses, the ventilation fans, materials handling equipment etc.);
- The ROM ore storage areas and underground development waste rock areas;
- Crushing and screening plant;
- Sales product storage areas and load out areas;
- Tailings storage facility;
- Surface substations and the like;
- Main access road from the N4 to the mine site,
- Stormwater management infrastructure;
- A pollution control dam;
- Buildings including workshops, change house-lamp room, offices, stores;
- Contractors' laydown area and parking;
- Power Supply infrastructure including a switching yard and electrical powerlines; Sewerage treatment package plant;
- Water Treatment Plant;
- Fuel storage; and
- Water Infrastructures including portable water tanker etc.

A cumulative sound power of the various construction equipment was used to as a representative noise level for the general construction activity.

Equipment required for construction would vary from placing equipment, pavers, vibration and compaction and finishing equipment etc. Noise levels and equipment specifications will greatly vary.

7.1.2 Impact due to construction noise

Typical construction site noise without obstacles emits approximately 101 dBA of continuous time integrated sound pressure from activities such as grading of haul routes. The Table 7-1 indicates the noise reduction due to the distance from the noise sensitive receptors to the proposed site.

Table 7-1: Prediction of the Construction Noise at the closest noise sensitive receptors

Receiver	**Measured Baseline Noise Levels (Day / Night)** **dBA**	**Predicted Construction Noise Levels L_{Req} (dBA)**	*Predicted Daytime Excess Ambient Noise Levels* **($\Delta L_{Req, d}$) (dBA)**	*Predicted Night-time Excess Ambient Noise Levels* **($\Delta L_{Req, n}$) (dBA)**
NR1	39.6 / 33.8	43	3.4	9.2
NR2	39.6 / 33.8	38.8	0	5
NR3	39.6 / 33.8	<35	0	0
NR4	39.6 / 33.8	<35	0	0
NR5	39.6 / 33.8	38.9	0	5.1
NR6	39.6 / 33.8	36.4	0	2.6
NR7	39.6 / 33.8	<35	0	0
NR8	39.6 / 33.8	<35	0	0
NR9	39.6 / 33.8	<35	0	0

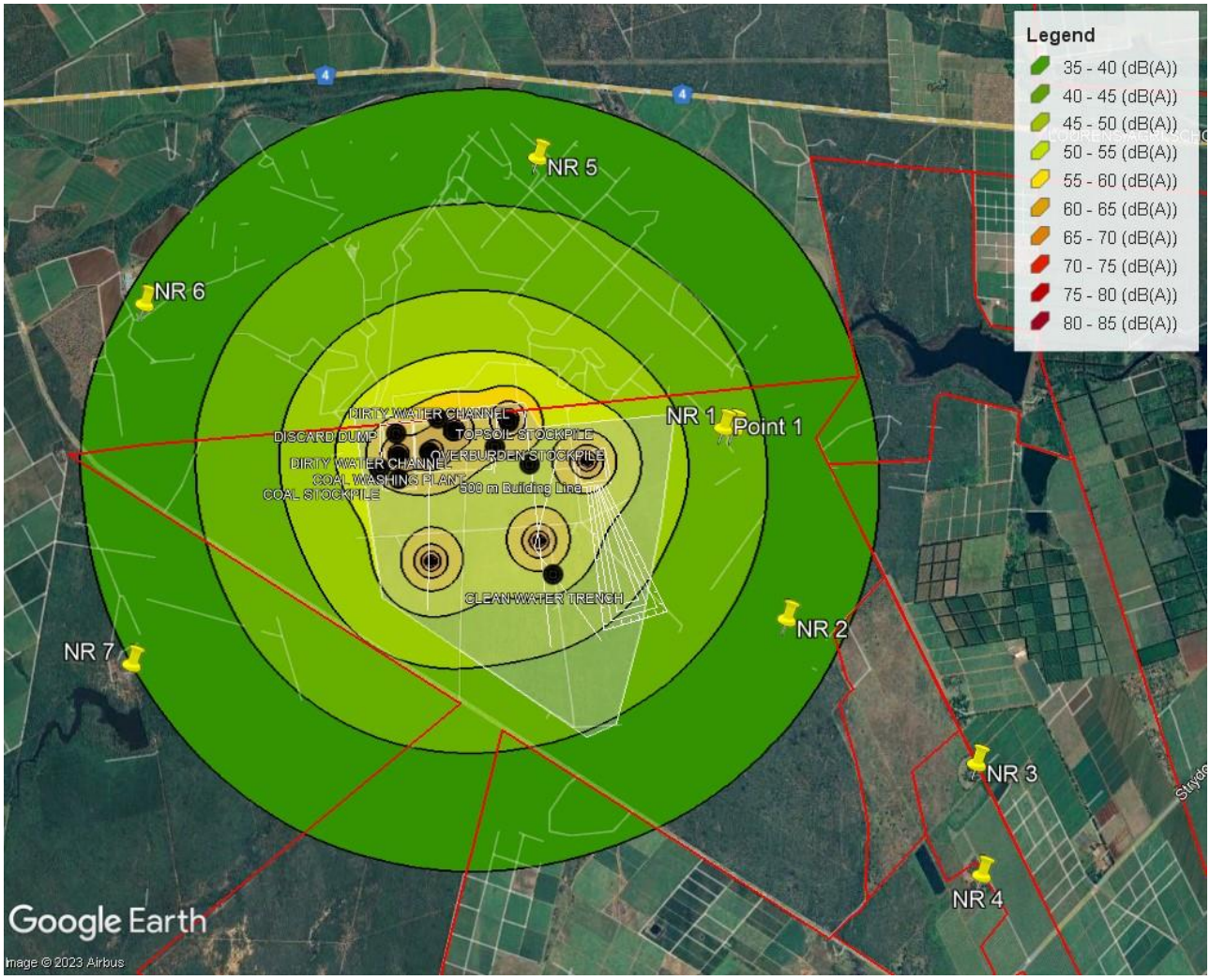


Figure 7-1: Simulation of the noise levels from the proposed Impact due to Construction Noise Levels

7.1.3 Discussion

The continuous typical construction site noise will exceed the baseline noise measurements by 3.4 dB during daytime and between 2 - 9.2 dB during the night-time period.

The noise levels during the daytime period is expected to be close to the baseline noise levels, this means the construction activities on the proposed site may be audible however it will not be considered a noise disturbance as it will not exceed 7 dB above the baseline noise levels as defined in the The Environmental Conservation Act, 1989 (Act No 73 of 1989).

The noise levels during the night-time period will exceed the baseline noise levels, this means the construction activities on the proposed site will be audible during the night-time period and will be considered a noise disturbance.

The construction phase is temporary and is typically completed within two years.

7.1.4 Mitigation Requirements

- The construction activities should be limited to daytime (6am-5pm) and Monday to Friday only which will mitigate the possibility of night-time noise nuisance claims from the noise sensitive receptors.
- Further mitigation measures for the construction noise sources include:
    a. Construction areas should be closed off with earth berms where possible if noise complaints are received.
    b. All construction vehicles must be well maintained and in good condition.
    c. Noisy equipment such as generators, air compressors, etc. should be enclosed in soundproof enclosures. Many manufacturers of the specialised equipment will have soundproof enclosures that are purpose built for the equipment in question.
    d. Construction staff working in areas where the 8-hour ambient noise is equal to or exceeds 85dBA, should be provided with ear protection equipment.
    e. Particularly noisy operations must be scheduled appropriately and conducted after notifying sensitive receptors.

7.1.5 Impact Rating of Construction Noise

The impact rating of the construction noise is given in Table 7-2:

Table 7-2: Environmental Impact Assessment – Construction Phase

Significance Points Quantification															
Proposed Sites	Impact summary	Before mitigation						After mitigation							
		Consequence			Likelihood		Significance	Consequence			Likelihood		Significance
		Severity	Duration	Extent	Frequency	Probability		Severity	Duration	Extent	Frequency	Probability (Scale)	
Site	Construction Phase	1	3	3	3	2	5.75 Low to medium environmental significance	1	3	1	1	1	1.66 Low environmental significance

7.2. Operational Phase

7.2.1 Expected Operational Noise Sources

The following main noise generating activities were considered for a modelled investigated scenario(s):

- Hydraulic excavators and articulated dump trucks
- Process plant, including crushing, screening, grinding, milling and high-intensity magnetic separation circuits.
- Service roads and haul roads to gain access to the site.

7.2.2 Simulated Operational Noise Levels

Simulated noise levels of the proposed Project's operational phase are illustrated in **Figure 7-1** in relation to sensitive receptors. **Table 7-3** shows the potential noise levels that may be experienced at the closest noise sensitive sites in conjunction with current operational noise.

Table 7-3: Simulation of the existing noise levels from the Proposed Site

Receiver	**Measured Baseline Noise Levels (Day / Night) dBA**	**Predicted Operational Noise Levels L_{Req} (dBA)**	*Predicted Daytime Excess Ambient Noise Levels* **($\Delta L_{Req,d}$) (dBA)**	*Predicted Night-time Excess Ambient Noise Levels* **($\Delta L_{Req,n}$) (dBA)**
NR1	39.6 / 33.8	47.2	7.6	13.4
NR2	39.6 / 33.8	39.8	0.2	6
NR3	39.6 / 33.8	<35	0	0
NR4	39.6 / 33.8	<35	0	0
NR5	39.6 / 33.8	39.9	0.3	6.1
NR6	39.6 / 33.8	37.2	0	3.4
NR7	39.6 / 33.8	36.3	0	2.5
NR8	39.6 / 33.8	<35	0	0
NR9	39.6 / 33.8	<35	0	0

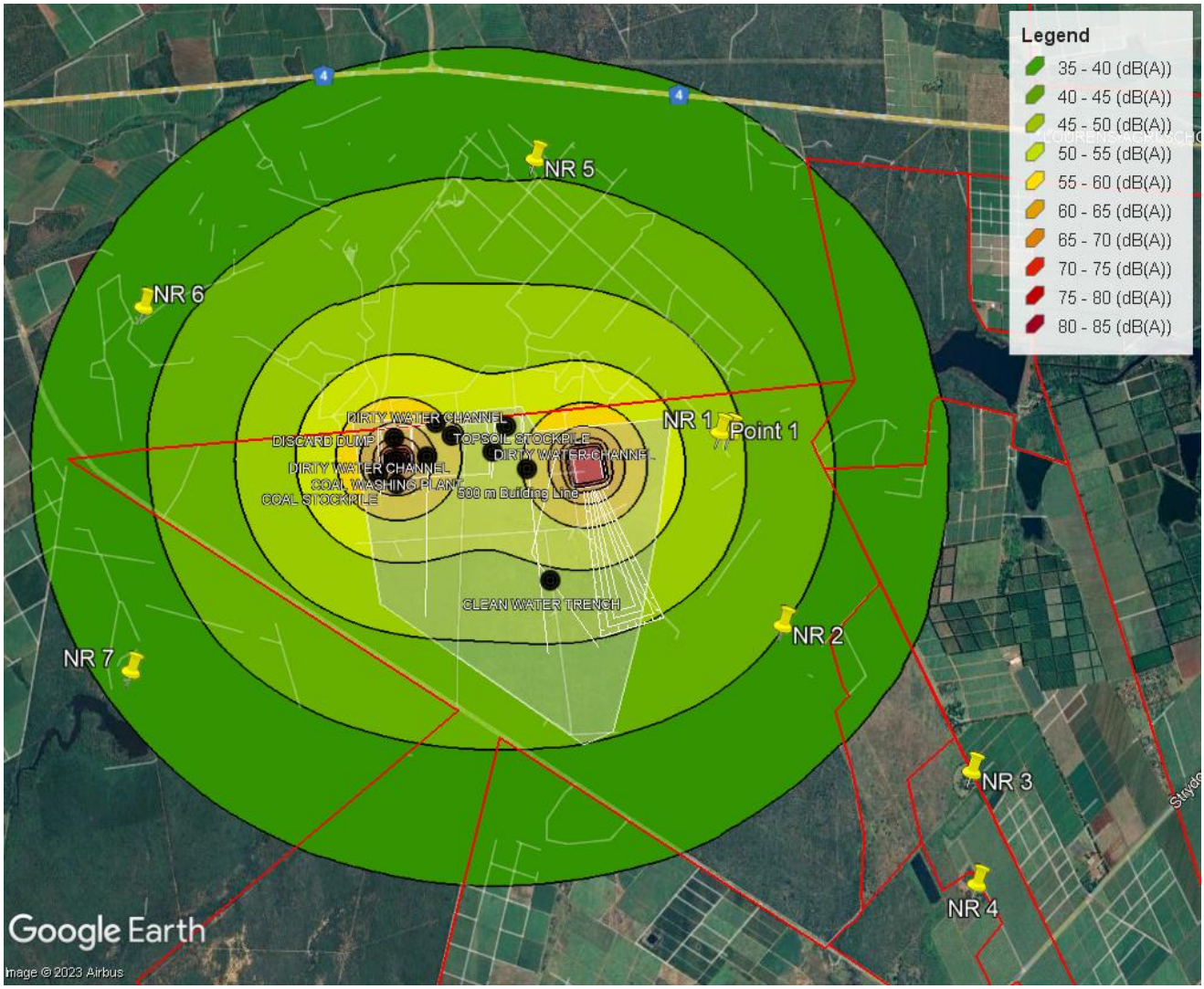


Figure 7-2: Simulation of the noise levels from the proposed Impact due to Operational Noise Levels

7.2.1 Discussion

The operational noise levels at the proposed site exceeds the existing baseline noise levels during the daytime period by 7.6 dB at (NR1).

The operational noise levels at the proposed site exceeds the existing baseline noise levels during night-time period by between 2 and 13 dB.

7.2.2 Mitigation Requirements

the following good engineering practices are recommended.

- The Process plant, including crushing, screening, grinding, milling and high-intensity magnetic separation circuits are to be installed in enclosed buildings and should be designed to limit the propagation of the noise from the plant equipment. This is to be considered in the design stage of the project.

- Contractors should install acoustical mufflers are recommended on the exhaust outlets of all heavy vehicles working on waste rock dump footprint area.
- Reverse alarms on the waste rock dump (from articulated dump trucks etc.) has the potential to cause a noise nuisance. Reversing on the waste rock dump should be designed to ensure minimal use of reverse alarms. The mine should consider reverse alarms that do not generate a high noise nuisance due to its tonality. Although heavy vehicle reverse alarms are exempt from noise legalization (GN R154) and needs to meet occupational health and safety standards, certain reverse alarms are less intrusive (less tonal more broadband character etc.). Broadband (white noise) reverse alarms are available and should be installed on vehicles operating in the mining area.

7.2.3 Impact Rating of Operational Noise

The impact rating of the construction noise is given in Table 7-6:

Table 7-4: Environmental Impact Assessment – Operational Phase

Significance Points Quantification														
Proposed Sites	Impact summary	Before mitigation						After mitigation (No Mitigation Required)						
		Consequence			Likelihood		Significance	Consequence			Likelihood		Significance
		Severity	Duration	Extent	Frequency	Probability		Severity	Duration	Extent	Frequency	Probability (Scale)	
Site	**Operational Phase**	1	4	3	3	2	**6.5 Low to medium environmental significance**	1	4	2	1	1	**2.3 Low environmental significance**

7.3. Closure Phase

The impact will be similar or lower than the busier construction phase (refer to section **7.1**).

8. RECOMMENDATIONS FOR IMPACT MANAGEMENT AND MITIGATION

8.1. Mitigation Options All Phases

Recommendations for mitigation and management are provided in Table 8.1.

Table 8-1: Recommended mitigation measures

Potential Impact	Mitigation, management and control measure(s)
Project Phase: Construction	
Construction Noise	• Construction areas should be closed off with earth berms where possible. • All construction vehicles must be well maintained and in good condition. • Noisy equipment such as generators, air compressors, etc. should be enclosed in soundproof enclosures. Many manufacturers of the specialised equipment will have soundproof enclosures that are purpose built for the equipment in question. • Construction staff working in areas where the 8-hour ambient noise is equal to or exceeds 85dBA, should be provided with ear protection equipment. • Noisy activities to be scheduled and communicated to the community.
Project Phase: Operational	
Operational Noise	• The Process plant, including crushing, screening, grinding, milling and high-intensity magnetic separation circuits are to be installed in enclosed buildings and should be designed to limit the propagation of the noise from the plant equipment. • Contractors should install acoustical mufflers which are recommended on the exhaust outlets of all heavy vehicles. • Reversing on the waste rock dump should be designed to ensure minimal use of reverse alarms. The mine should consider Broadband (white noise) reverse alarms which are available and should be installed on vehicles operating in the mining area.
Project Phase: Closure Phase	
Decommissioning Noise	• Decommissioning areas should be closed off with earth berms where possible. • All construction vehicles must be well maintained and in good condition. • Staff working in areas where the 8-hour ambient noise is equal to or exceeds 85dBA, should be provided with ear protection equipment. • Noisy activities to be scheduled and communicated to the community.

8.2. Environmental Noise Monitoring Programme

The Environmental Monitoring Programme is presented below in **Table 8-2**.

Table 8-2: Environmental Noise Monitoring Programme

Environmental Noise Monitoring Programme
– Annual noise measurements to be conducted at receptors where potential impacts could occur. Measurements near or at receptors (Point 1) should be conducted. Should the annual measurements indicate that there is no impact on at the receptors, the noise survey may be taken biennially to ensure noise compliance with the noise requirements stated in this report as activities on the site will change location within the proposed site property boundaries during the lifetime of the project. No measurements are to be conducted if the receptors are relocated. The Environmental measurements should be conducted at I&AP's i.e. farmsteads, receptors, communities; – The measurements should be conducted prior to commencement of any phase to ensure baseline findings. Measurements should further be conducted during all phases including construction, operational and closure phases; – The methodology as proposed by SANS10103:2008 should be used. Compliance with the Noise Control Regulations should be met (no increase of +7dBA from identified Rating); – Measurements should be conducted in terms of equivalent values (impulse), with statistical and octave data proposed for further assessment. Metrological (wind) conditions should be logged. – Where feasible longer term (+24 hours) unattended (also include shorter-term attended) measurements should be conducted.

9. NOISE IMPACT ASSESSMENT SUMMARY

A summary of the noise impact assessment for the proposed Tenbosch mine is provided in Table 9.1.

Table 9-1: Summary of the Noise Impact Assessment

Phase	Noise Impact Before Mitigation	Noise Impact After Mitigation
Construction Phase	Low to medium environmental significance- Impact is of a low order and therefore likely to have little real effect. Project can be authorised with low risk of environmental degradation. Mitigation is either easily achieved or little mitigation is required.	Low environmental significance - Zero impact (High Confidence)
Operational	Low to medium environmental significance- Impact is of a low order and therefore likely to have little real effect. Project can be authorised with low risk of environmental degradation. Mitigation is either easily achieved or little mitigation is required.	Low environmental significance - Zero impact (High Confidence)

The outcome of the assessment indicated that some mitigation options are required during the construction and operational phase. Key mitigation options include:

Construction Phase

- Mitigating measures should be implemented to minimise the possibility of noise nuisance complaints from the noise sensitive receptors.
- The most important mitigation option is to ensure that construction occurs during daytime hours only (06:00 -17:00) and during the week from Monday to Friday.

Operational Phase

- The most important mitigation option is to ensure noise mitigation is implemented to reduce the noise impact on the noise sensitive sites.
- The Process plant, including crushing, screening, grinding, milling and high-intensity magnetic separation circuits are to be installed in enclosed buildings and should be designed to limit the propagation of the noise from the plant equipment.
- Annual noise measurements programme is recommended initially and then biennially after the initial findings during the operational phase.

With mitigation measures for the construction and operational phase the proposed Tenbosch Mine Project would comply to GN R154 legislation. In terms of noise assessment, the project does not present a fatal flaw. The project should be authorised in terms of noise, with mitigation measures adhered to.

10. REFERENCES

1. Environment Conservation Act, 1989 (Act 73 of 1989).
2. National Environment Management Act (NEMA 2006).
3. Noise Control Regulations (Attached to the Act No 73 of 1989).
4. Occupational Health and Safety Act, 1993.
5. SANS 10328: 2008. 'Methods for environmental noise impact assessments.'
6. SANS 10103:2008. 'The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication.'
7. SANS 10357: 2004. 'The calculation of sound propagation by the Concawe method.'
8. "SoundPLAN, designing a sound environment." URL http://www.soundplan.com/.
9. The Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996).

APPENDIX A

Appendix A: Glossary of Terms & Acronyms

To ensure that there is a clear interpretation of this report the following meanings should be applied to the acoustic terminology.

- **Ambient sound level** or **ambient noise** means that the totally encompassing sound in a given situation at a given time, and usually composed of sound from many sources, both near and far. Note that ambient noise includes the noise from the noise source under investigation. The use of the word *ambient* should however always be clearly defined (compare with *residual noise*).
- **A-weighted sound pressure level (SPL) (noise level) (L_{pA}), in decibels:**

  The sound pressure level of A-weighted sound pressure is given by the equation:

  $L_{pA} = 10 \log (p_A/P_o)^2$ where:

  P_A is the A-weighted sound pressure, in Pascals; and

  P_o is the reference sound pressure (p_o = 20 micro Pascals (µPa))

  Note: The internationally accepted symbol for sound pressure level, dB(A), is used.
- **dB(A)** means the value of the sound pressure level in decibels, determined using a frequency weighting network A. (The "A"-weighted noise levels/ranges of noise levels that can be expected in some typical environments are given in Table A1 at the end of this appendix).
- **Disturbing noise** means a noise level that exceeds the outdoor equivalent continuous rating level of the time period and neighbourhood as given in Table 2 of SANS 10103:2004. For convenience, the latter table is reproduced in this appendix as Table A1.
- **Equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$)** means the value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, has the same mean-square should pressure as a sound under consideration whose level varies with time.
- **Equivalent continuous rating level ($L_{Req,T}$)** means the equivalent continuous A-weighted sound pressure level during a specified time interval, plus specified adjustments for tonal character and impulsiveness of the sound and the time of day.
- **Equivalent continuous day/night rating level ($L_{R,dn}$)** means the equivalent continuous A-weighted sound pressure level during a reference time interval of 24-hours, plus specified adjustments for tonal character and impulsiveness of the sound and the time of day. (An adjustment of 10dB is added to the night-time rating level).

- **Integrating sound level meter** means a device that integrates a function of the root mean square value of sound pressure over a period of time and indicates the result in dBA.
- **LoP –** means Life of Project.
- **Min.** means minimum.
- **Noise** means any acoustic phenomenon producing any aural sensation perceived as disagreeable or disturbing by an individual or group. Noise may therefore be defined as any *unwanted* sound or sound that is *loud, unpleasant or unexpected*.
- **Noise climate** is a term used to describe the general character of the environment with regard to sound. As well as the ambient noise level (quantitative aspect), it includes the qualitative aspect and the character of the fluctuating noise component.
- **Noise Control Regulations** means the regulations as promulgated by the Department of Environmental Affairs and Tourism and to be used by the provincial authorities to prepare their specific regulations. The Gauteng and Free State Provinces have promulgated their own regulations and thus sections of the project are governed by the Gauteng Noise Control Regulations and the Noise Control Regulations for the Free State Province.
- **Noise impact criteria** means the standards applied for assessing noise impact.
- **Noise level** means the reading on an integrating impulse sound level meter taken at a measuring point in the presence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such a meter was put into operation, and, if the alleged disturbing noise has a discernible pitch, for example, a whistle, buzz, drone or music, to which 5dBA has been added. (the ”A” weighted noise levels/ranges of noise levels that can be expected in some typical environments are given in Table A2 at the end of this appendix).
- **Noise nuisance** means any sound which disturbs or impairs or may disturb or impair the convenience or peace of any reasonable person considering the quantitatively measurable such as barking dogs, etc. (compared with disturbing noise which is measurable).
- **Noise-sensitive Development** means and Interested or Affected Party (I&AP), receptor or any other party that has a concern about an activity.
- **Residual sound level** means the ambient noise that remains at a position in a given situation when one or more specific noises are suppressed (compare with *ambient noise).*

Sound exposure level or SEL means the level of sound accumulated over a given time interval or event. Technically the sound exposure level is the level of the time-integrated mean square A-weighted sound for stated time or event, with a reference time of one second.

- **Sound power level** indicates the total acoustic energy that a machine, or piece of equipment, radiates to its environment.

- **Sound (pressure) level** means the reading on a sound level meter taken at a measuring point.
- SANS 10103 means the latest edition of the South African Bureau of Standards Code of Practice SANS 10103 titled The Measurement and Rating of Environmental Noise with Respect to Land *Use, Health, Annoyance and to Speech Communication.*
- **SANS 0210** means the latest edition of the South African Bureau of Standards Code of Practice SANS 0210 entitled *Calculating and Predicting Road Traffic Noise.*
- **SANS 10328** means the latest edition of the South African Bureau of Standards Code of Practice SANS 10328 titled *Methods for Environmental Noise Impact Assessments.*
- **SEL** - Sound Exposure Level
- **Sound** means the aural sensation caused by rapid, but very small, pressure variations in the air. In quantifying the subjective aural sensation, "loudness", the letters dBA after a numeral denote two separate phenomena:

  "dBA", short for decibel, is related to the human's subjective response to the change in amplitude (or largeness) of the pressure variations.

  The "A" denotes the ear's different sensitivity to sounds at different frequencies. The ear is very much less sensitive to low (bass) frequency pressure variations compared to mid-frequencies.

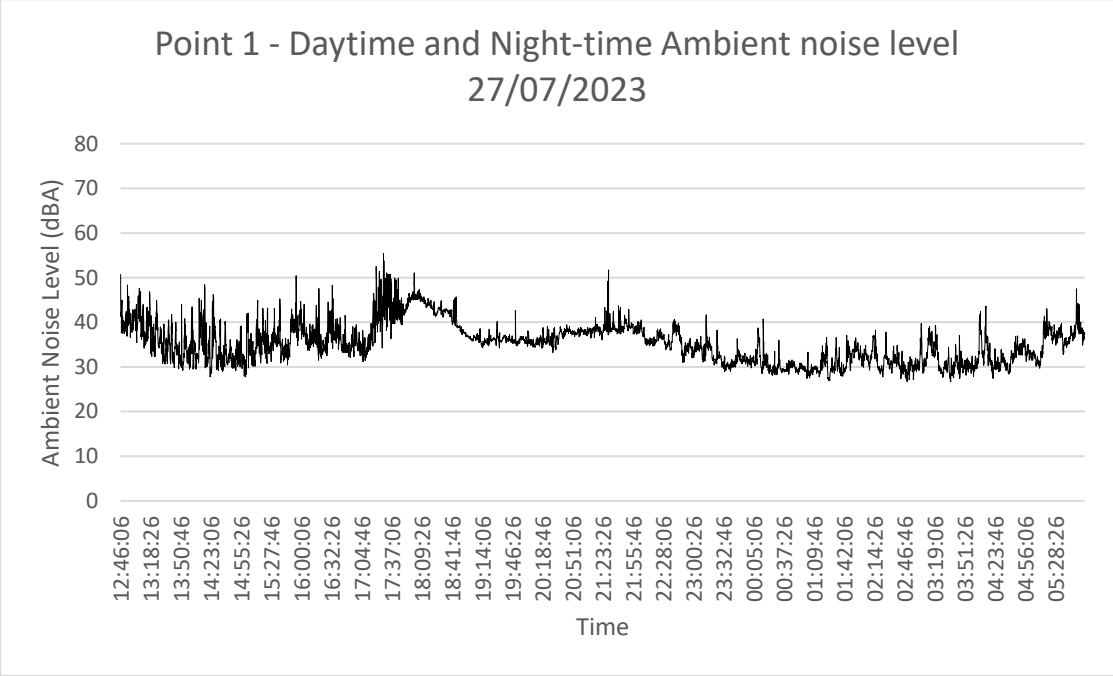
  The level of environmental sound usually varies continuously with time. A human's subjective response to varying sounds is primarily governed by the total sound energy received. The total sound energy is the average level of the fluctuating sound, occurring during a period of time, multiplied by the total time period. In order to compare the effects of different fluctuating sounds, one compares the average sound level over the time period with the constant level of a steady, non-varying sound that will produce the same energy during the same time period. The average energy of sound varying in amplitude is thus equivalent to the continuous, non-varying sound. The two energies are equivalent.

Refer also the various South African National Standards referenced above and the Noise Control Regulations for additional, in some instances, more detailed definitions.

APPENDIX B

Appendix B: Noise Histograms & Photos of measurement Points

Point 1 – Ambient Noise level Measurement (27 July 2023)



Point 1 – Ambient Noise level Measurement (28 July 2023)

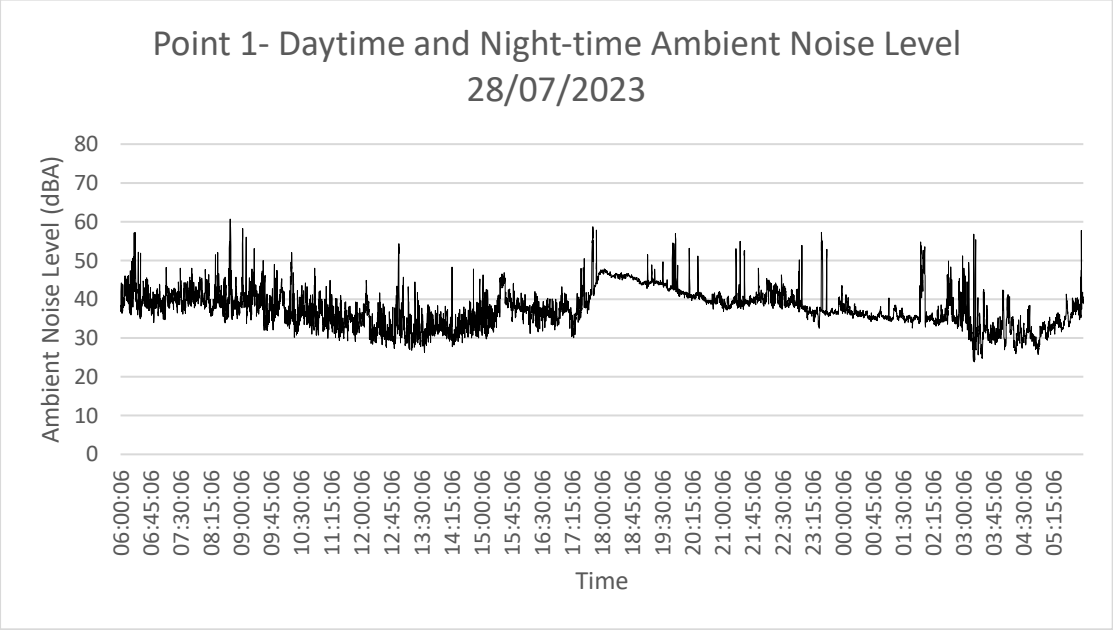


Photo of measurement Point 1

APPENDIX C

Appendix C: Sound Power Levels of Typical Noise Sources

Table 10-1: Sound power levels of construction equipment and assorted noise sources[1].

Noise Source	Sound Power (dBA)		Constant Operating Sound Power (dBA)
	Max (peak)	Min	
Pile driver (Impact noise)			132
Pneumatic chip hammer	131	121	
Jack Hammers, Rock Drills	130	112	
Rock drill			130
Trucks (All types)	127	99	
Tractors	126	108	
Front End/Wheel loader	125	70	
Backhoes	124	101	
Scrapers, Graders	124	111	
Pneumatic Wrenches	121	116	
Concrete Mixers	120	106	
Crane max	120	107	
Mechanical shovel			120
Pavers			120
Pneumatic breaker			120
Air Compressors	119	106	
Concrete joint cutter	119	116	
Portable saw	119	105	
Jawcrusher diesel ca 250 kW			118
Stud welder			118
Bulldozer	117	110	
Breaker, mini-robot mounted			115
Piling, vibrating hammer			115
Concrete Pumps	114	109	
Roller Compactor	114	104	
Earth Tamper	113	107	
Generators	113	103	
Saws	113	101	

[1] www.fhwa.dot.gov

Concrete Vibrator	112	101	
Cutter, circular, steel (electric)			112
Hammer	112	104	
Impact crusher			112
Earthmover	111	104	
Drill rig, rotary type (diesel)			110
Road grinder (petrol)			108
Road sweeper			107
Water jetting unit (diesel)	107	94	
Dredger, Suction, Grout pumps	105	103	
Road ripper, excavator mounted			105
Paint line remover			104
Concrete crusher	103	94	
Soil pump			103
Poker, vibratory, hand-held (electric)			102
Generator, portable			100
Power pack (diesel)			100
Power swivel			100
Trucks (Typical onsite)			99

Noise Source	Constant Operating Sound Power (dBA)
Jig-saw, hand-held, wood (electric)	99
Road ripper, mini-robot mounted	97
Air blower (electric)	95
Excavator, mini-robot mounted	94
Agitator (electric)	90
Concrete buster	90
Grout mixer	90
Drill, hand-held (battery)	89
Gantry Operational Noise (onsite)	89
Pump Noise (onsite)	89
Paint line marker (low pressure)	87

Table 2: Estimated equivalent sound power levels for typical noise generated by general site operations.

General Site Operation	Sound Power (dBA)		Constant Operating Sound Power (dBA)
	Max (peak)	Min	
Construction site noise	132	N/A	112

APPENDIX D

Appendix D: Site Investigation Localities & Equipment/Calibration

Table 10-2: Site investigation localities (WGS 84 UTM)

Measurement Locality	Latitude	Longitude
Measurements		
Point 1	25°27'49.75"S	31°50'47.50"E

Receptor Locality	Latitude	Longitude
Measurements		
NR 1	25°27'48.85"S	31°50'46.22"E
NR 2	25°28'37.94"S	31°51'3.31"E
NR3	25°29'13.14"S	31°51'55.88"E
NR4	25°29'42.53"S	31°51'56.35"E
NR5	25°26'34.70"S	31°49'47.70"E
NR6	25°27'12.77"S	31°47'57.54"E
NR7	25°28'49.75"S	31°47'51.74"E
NR8	25°30'22.09"S	31°50'33.27"E
NR9	25°31'16.82"S	31°48'25.88"E

Table 10-3: Equipment & Calibration

Equipment	Calibration	Certification number Laboratory (M & N) Acoustic Services
Svantek 979, 69437 SLM)	10 – 13 March 2023	2023-AS-0337
01dB Calibrator	15 August 2022	2022-AS-1018

APPENDIX E

CV

Oliver Knoppersen

Acoustic Consultant

Profile

Oliver worked for Pro Acoustic Consulting Engineers from 2009 to 2015 in an internship that shaped his knowledge of acoustics. In 2015 he joined Acoustech Consulting. He specialises in many areas of acoustics, but his main interests lie in building acoustics, Industrial acoustics, Studio Acoustics and Environmental Acoustics. He has been involved in a number of projects in South Africa as well as on the African Continent. He has been involved in Green Star Rated buildings, offices, studios, a number of industrial projects and environmental projects in South Africa and abroad. Some of his most prestigious projects include Menlyn Park Shopping Centre, , YFM Radio Studios (South Africa), Kusile Power Station (South Africa), Ingula Power Station (South Africa), KCM Copper Mine (Zambia) and the initial phase of Hillside Aluminium Plant.

Experience and skills

Oliver's skills and experience include a working knowledge of all SABS standards (SANS, South African National Standards) South African Regulations, ISO Acoustic Standards and international best practice relating to architectural and environmental acoustics.

As a consultant, the ability to assess existing layouts and designs, and provide carefully designed solutions in cross disciplinary environments is critical. Oliver brings the following skills to the team – Environmental acoustic modelling and simulation -SoundPLAN), manipulation and creation of dxf/dwg drawings, internal acoustical design, sound insulation design, noise mitigation design, noise measurement & analysis, project management, producing design documentation and excellent communication.

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Selected Projects

Stats SA

Acoustic Quality Testing. Completed early 2017. Project value R 1.2bil.

Kusile Power Station

Design of the desulphurisation Plant to meet max. 85dBA at 1 m from the plant façade. Completed 2012

KMC Copper Mine, Zambia

Noise reduction to meet the noise specifications for an adjacent hospital. Ongoing

Ingula Pump Storage Scheme, South Arica

Internal Noise Control from pumps and generators. Completed 2017

Richards Bay Hillside Aluminium Smelter

Industrial Noise Survey in order to provide Noise Control Recommendations. Ongoing

YFM Radio Studios

Broadcast Studio Design and Project Management. Completed in 2010

Menlyn Park Shopping Centre IEQ-12 Green Star Phase 1 Design and Audit and Phase 2 Design

Design recommendations and noise level audit of the refurbishment of the shopping centre in line with Green Star Acoustic Requirements . Phase 1 Completed 2016 and Phase 2 in 2018.

Bidvest Quarry 2 Extension Durban Noise Impact Assessment

Noise Impact Assessment at a terminal at the Durban Harbour. Completed in 2016

Revelation Church of God Music Studio

Music Studio Design and Project Management. Completed 2015

National Multi Product Pipeline (NMPP) – Noise Impact Assessment and Noise Mitigation Design

Pipeline from Durban to Jameson Park with Pump Stations. Noise Impact Assessment and Noise Control Recommendations.

Position

Director and Acoustic Consultant

ID Number

8608245163086

Nationality

South African

Languages

English

Residential address

24 Orwell Street
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Johannesburg
2094

Contact detail

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082 807 4895
011 648 4998

Formal qualifications

AMIOA Institute of Acoustics (IOA UK) 2018

Key skills

Architectural Acoustics
Industrial Acoustics
Noise Control
Environmental Acoustics
Broadcasting Studios Acoustics

Experience

10 years

References

Mark Ransom
QA
Project Manager
0824571508

Yovka Raytcheva-Schaap
Aurecon
Environmentally Sustainable Design (ESD) Consulting & Project Management
082 7792551

Professional Experience

2009-2015: Trainee Consultant: Worked for Pro Acoustic with two professional engineers (Jean Knoppersen and Ivan Lin) and my colleague Steven Liddell (Now owner of Venta Acoustics UK) in the field of acoustics.

I underwent training in the use of Soundplan to produce large scale terrain models; acquire and interpret source noise levels for use in the model, run calculations using the appropriate methodologies/standards; interpret the results of the noise model calculations; assess the results against appropriate criteria and write reports in preparation for issue to clients, subject to checks by senior staff.

Understood GreenStar Assessment (a rating system similar to BREEAM), Prepared technical letters and reports under guidance from senior staff;

I attended client meetings and design team workshops with senior staff to gain experience and understanding. I would usually action the items discussed.

I understood Environmental Noise Surveys, source noise measurements and sound insulation testing. Initially, this was under the supervision of experienced staff. Later I undertook this work on my own.

Assistant project manager in the design and construction of radio studios, working closely with a specialist contractor including frequent site visits. Gained exposure to practical operational requirements of the studios, construction methodologies and consideration of onsite factors and limitations,

I was responsible for the maintenance and calibration of equipment (sound level meters).

2015 to Present: Worked with a professional engineer (Jean Knoppersen) in the field of acoustics.
I was responsible for the maintenance and calibration of equipment (sound level meters).

I understood Environmental Noise Surveys, source noise measurements and sound insulation testing. I undertook this work on my own.

Prepared technical letters and reports under guidance from senior staff;

I attended client meetings and design team workshops. I would usually action the items discussed.

Proficient at Noise prediction modelling to produce large scale terrain models; acquire and interpret source noise levels for use in the model, run calculations using the appropriate methodologies/standards; interperate the results of the noise model calculations; assess the results against appropriate criteria and write reports in preparation for issue to clients, subject to checks by senior staff.

2019: Promoted to Directorship in Acoustech Consulting

Project List

Nedcore Sandton
9-hour Noise Measurements - Green Star Design

Mpower Radio Studio Witbank
Studio Design + Project Management

NMPP Pipeline and Pump Stations
24-hour Noise Measurements

O.R Tambo Hotel
Sound Insulation Measurements

Tanza Night Club
Noise Measurements

VOPAK (Chemical Storage Facility)
Industrial Noise Measurements + Noise Modelling (Soundplan)

YFM Radio Studio Craighall Park
Studio Design + Project Management

Stark TV Studios
Sound Insulation Measurements

Department of international Relations & Cooperation Conference Room
Room Acoustics + Sound Insulation Measurements

Discovery Data Centre
Noise Measurements

Holiday Inn Express Hotel Roodepoort
Sound Insulation Measurements

Jacaranda FM Radio Studio Nelspruit
Studio Design + Project Management

Park Inn Hotel Sandton
Sound Insulation Measurements

KPMG Campus
Noise Measurements

Menlyn Maine
Noise Measurements

Nedcor Phase 2 Greenstar
Green Star Internal Noise Measurements

NMPP Pipeline and Pump Stations
Enclosure Design + Noise Modelling

Radioheads Radio Studio
Studio Design+Project Management

Voice of WITS (University Radio Studio)
Design+Project Management

Zouk Night Club
Noise Measurements

ABSA Towers West Green Star
Measurements

Able Partitions
Sound Insulation Measurements+Report

CheckersHyper Mayville
HVAC Measurements

Danone Factory
Factory Noise Measurements

Gautrain Sandton Extract Fans
Fan Noise Measurements

Hilton Hotel Sandton
Noise+ Sound Insulation
Measurements+Report

Jan Smuts Research Project
Road Traffic Noise
Research+Presentation

Kusile Power Station
Industrial Noise Modelling+Report

Middelburg Eastern Bypass
Road Traffic Noise Modelling+Report

Nedbank Newtown Noise
Measurements+Report

Ilanga Mall HVAC Noise
Measurements

NMPP
Site Inspection+Noise Measurements

Planet Fitness Bedfordview
Structural borne Investigation+Noise
Measurements+Report

Planet Fitness Village Walk
Noise Measurements

SCAW Metals
Environmental Noise
Measurements+Report

South Point Braamfontein
Office HVAC Noise Measurements

Vodafone Innovation Centre
Noise Measurements and Façade
Design

WITS Generators
Generator Noise Measurements

8 Melville Road
Noise survey + Report

90 Grayston Drive
Green Star 9 hour Noise survey +
Report

102 Rivonia Road
Green Star 9 hour Noise survey +
Report

Erf 108 Corlett Drive
1 hour Measurement

DSTV City Green Star
9 hour Noise survey + Report

Formula One Hotel
Sound Insulation Measurements +
Report

Grayston Sun Hotel
Noise survey + Report

Grosvenor Studio (EWH)
Studio Design and Project
Management

Grundfos Green Star
9 hour Noise survey + Report

Hyundai Head Office
Green Star 9 hour Noise survey +
Report

Jet Blast and Drilling Middelburg
Sound Insulation Measurements

Kusile Power Station Noise Study
Review
Industrial Noise Modelling+Report

Lakeside Office Park
1 hour Measurement+Report

Market Theatre
STI+Reverb+room Impulse Response
Measurements

Newtown Junction Green Star
9 hour Noise survey + Report

Newtown Majestic Green Star 9
hour Noise survey + Report

NWU Potchesfstroom Amphitheatre
Room Impulse Response
Measurements

Pentad Office Pretoria
Office Measurements+Report

Swaziland Broadcast Studios (SBIS)
Project Management

Unilever depot
Noise
Modelling+Measurements+Report

USAID Pretoria Green Star
9 hour Noise survey + Report

Vodacom Data Park
Noise Measurements+Façade
Design+Report

Vopak Revision (Chemical Storage
Facility)
Industrial Noise Modelling+Report

Abbotts College
Room Impulse Response
Measurements (Study with Ecophon)

The Baron Restaurant, Bryanston
Room Acoustics

Kathleen Close Apartment Building
Attenuator Design for Heat
Exchangers

Michelangelo Legacy Hotel Nightclub
Measurements+Report

MTN Gallo Manor Call Centre
Open Plan Office Measurements

Primedia 94.7 Radio Studio
Independent Consulting on Studio
Building to ensure compliance with
clients specifications

ABSA Tower South+270RR
HVAC Measurements+ Noise
Modelling

MIS Engineering
Noise Measurements+Report

5 Packard Street
Road Noise Study – Noise Modelling
and Noise Mitigation Design

ABSA Contact Centre Service Yard
12-hour Noise Measurements
Mechanical Noise Mitigation Design

Anglo-American 55 Marshall Street
Site Inspections of implementation
of boardroom acoustic design

Bretton Wood Apartment Building
Heat Exchangers
Noise Mitigation Design

Davar Partners International
Studio Design and Project
Management

Oscar Pistorius Trial
Noise Modelling and Research

Joe Public Voice Over and Recording
Studio
Studio Design

Margate Indoor Shooting Range
Noise Mitigation and Internal
Acoustic Design

Planet Fitness Gym Bedfordview
Sound Insulation Measurements and Noise Mitigation Design

Rheinmettal Denel Munitions
Noise Mitigation and Internal Acoustic Design

SAMHS Military Hospital Generators
Noise Measurements and Noise Mitigation Design

Universal Music Studio
Music Studio Design and Project Management

Vodacom MTB Data Building
Occupational Noise Measurements and Report

Advantedge Generator
Generator Noise Measurements and Report

Big Brother House
Sound Insulation Recommendations and Noise Survey

Bounce
16-hour Noise Survey and Report

DSTV
Mechanical Noise Investigation

Johnny's Restaurant Generator
Noise Measurements and Report

Kansanshi Smelter Zambia
Industrial Noise Measurements and Report

Life Wilgers Hospital
Mechanical Noise Measurements and Noise Mitigation Report

Menlyn Park Shopping Centre
Green Star Acoustic Analysis and Report

Quantum Foods
Mechanical Noise Mitigation Design

Rebel Foods
Mechanical Noise Mitigation Design

Revelation Church of God Music Studio
Music Studio Design and Project Management

SASRIA Generator
Generator Noise Mitigation Design

Southlands Food Depot
12 Hour Noise Measurements, Noise Nuisance Assessment and noise mitigation design

St Andrews School for Girls
New Hall Internal Acoustic Design

St Johns College
Room Acoustic Design

USAID Southern Africa
Green Star Internal Noise Audit

Waterkloof Glen Pretoria
9-Hour Noise Measurements

Sun City Casino Entertainment Centre Refurbishment
Sound Insulation and Room Acoustic Design

Times Square Menlyn Maine Casino, Arena and Hotel
Façade Design, Sound Insulation and Room Acoustics Design, Hotel Room Acoustic Design, Conference Centre Design, Arena Acoustic Design

Bidvest Chemical Storage Terminal
Noise Measurements, Noise Modelling and Environmental Noise Impact Assessment

Bloemfontein Advocate Office Building Sound Insulation Measurements and recommendations

Broadwalk Office Park
Noise Measurements

Econet
Acoustic Investigation into existing TV Studios and provided recommendations to achieve better acoustic performing studios.

Krank'ed Up Music Festival
Noise Monitoring during a Music Festival

Menlyn Park Shopping Centre Phase 1
Green Star As Built Audit Retail Tool

Optimum Mine Ventilation Shaft
Environmental Impact Assessment

Statistics of South Africa Office Building
Sound Insulation Measurements to ensure compliance with clients specifications

Studio Blu Conference Venue
Noise Impact assessment and noise mitigation design

Unilever Dust Extractors
Noise Measurements and noise mitigation design to reduce noise from dust extractors to the rest of the plant area.

Assemblies of God Church Nelspruit
Noise Impact Assessment

BMW M Festival
Noise Monitoring during the Music Festival

El Devino Complex Noise Complaint
Noise Nuisance Assessment

Houghton Hotel Conference Centre
Internal Acoustic Design

I4C Office
Measurement Reverberation Time Measurement before and after acoustic treatment

Ingula Pump Storage Eskom
Noise Mitigation Design

Jehovah Witness Hostel Rwanda
Acoustic Recommendations to reduce noise from the city (Night clubs, restaurants and a stadium) to the existing hostel

Midstream College Music Festival
Noise Monitoring during a Music Festival

NOOA Petroleum Chemical Storage
Noise Measurements, Noise Modelling and Environmental Noise Impact Assessment

199 Bryanston Drive Office Park Generator
Noise Measurements and Noise Mitigation Design

Accenture Office Building
Sound Insultation measurements to ensure compliance with clients specifications

Andiccio24 Restaurant
Noise Nuisance Assessment

Booysens Magistrate Court
Sound Insultation measurements to ensure compliance with the acoustic design

Discovery Head Office Boardroom
Acoustic recommendations

DSTV Delicious Festival, Kyalami
Noise Management Plan and Noise Monitoring during a Music Festival

Formfunc Office
Greenstar IEQ 5 Audit

FSM
Sound Insulation Tests of existing prefabricated mining accommodation

Generator Noise Wapadrand
Noise Measurements of a Generator

Hillside Aluminium Smelter Richards Bay
Noise Survey to assess the noise levels that the employees experience with a view to provide noise mitigation measures. Next phase would be to provide noise mitigation design for each area.

Jolly Roger Tavern Pretoria
Noise Nuisance Assessment and noise mitigation design

KCM Copper Mine Ball Mills
Noise Impact Assessment, Noise Mitigation Design. The project is awaiting the go ahead for the implementation of the noise mitigation (approx. $6 million project)

Menlyn Park Shopping Centre Phase 2
Green Star Acoustic Design Retail Tool

Nampak House Boardroom
Acoustic recommendations

Natural Dehydrated Foods Nelspruit
Noise Impact Assessment

Silver Stream Office Park Generator
Noise Measurements and Noise Mitigation Design

Talco Grain and Milling
Noise Measurements, Mechanical Noise Mitigation Design

Times Square: Sun Arena
Compliance Measurements: Reverberation Time, Sound Insulation Tests, HVAC noise Measurements

Vodacom Boardroom
Acoustic recommendations

South32 Wolvekrans Colliery Mega-facility
Noise Impact Assessment

Fort Ikapa Cape Town Shooting Range
Noise Impact Assessment

ACOUSTIC ENGINEERING CONSULTANTS

Summary CV

Duduzile Skhosana

Assistant Consultant

Profile

Duduzile is currently working for Acoustech Consulting as an Assistant Consultant with vast experience providing administrative skills in office settings. Accustomed to addressing the changing needs of an office and supporting colleagues and superiors with excellent assistance skills. Works closely with a professional engineer and an Acoustics Consultant aiding in various projects that involve environmental noise surveys, noise monitoring, sound insulation testing and source noise measurements. She brings forth high quality organizational skills and a self-motivated drive to achieve excellence. Proficient in various software applications and filing systems, A commitment to handle confidential tasks safely and professionally.

Duties

Ad Hoc Administrative duties

Assists with quotations for new work opportunities.

Assists with preparations of reports in line with the terms of reference of some projects.

Assists with collection of data and analysis for various project through noise surveys, source noise measurements, sound insulation testing and run calculations using appropriate standards to interpret results of the noise model calculations with Svan PC++

Selected Projects

Bokpoort PV Plant

Assisted with noise measurements for the Noise Impact Assessment. (2020)

Sudor Coal

Assisted with ambient noise measurements (2020)

Monchique Apartments

Noise investigation between two apartments – Assisted with noise measurements (2020)

Castle Gate Lifestyle Centre

Generator Noise Assessment – Assisted with noise measurements and report (2020)

Sky Hotel Sandton

Sound Insulation Tests- Assisted with tests and calculations (2020)

New Way Power

Generator Noise Assessment – assisted with noise measurements and reports (2021)

Broadway Sweets

Noise Survey – Assisted with noise measurements tests (2021)

Swiss Reinsurance

Assisted with sound insulation tests (2021)

ABinBev

Assisted with sound insulation tests (2021)

Croft & Co

Reverberation Time Measurements – Performed measurements before and after installation of Ecophon Solo Panels (2021)

Virgin Active Morningside

Noise Investigation between gym and resident (2021)

WKC

Assisted with ambient noise measurements (2021)

Sibanye-Stillwater

Biennial Noise Monitoring for - Driefontein, Kloof, Rand Uranium, Ezulwini, Burnstone & Beatrix mine (2021)

Paper & Pulp Industries

Assisted with noise measurements and report (2021)

Rainbow Skyreach

Assisted with light aircraft noise measurements and report writing (2021)

Smart P.E.T Factory

Assisted with noise survey (2021)

Africrest

Assisted with sound insulation testing of refurbished apartments (2021)

Bayport Sandton Generator Noise Assessment

Generator Noise Assessment – Conducted noise measurements and assisted in report writing (2021)

Altitude Beach Fourways

Noise Monitoring (2021 & 2022)

GIBS

Sound insulation testing of a studio (2022)

St John's College (Hall)

Performed Sound Insulation Tests (2022)

50 Coleraine Drive Estate

Generator Noise Assessment – Assisted with noise measurements and report (2022)

Feltex Auto Trim Silverton

Factory Noise Measurements (2022)

Clarina Ext 43 Township

Conducted a noise impact assessment (2022)

Ukhuni Business Furniture

Assisted with an acoustic assessment on meeting capsule pods - Sound Insulation (2022)

Sandton Mosque

Assisted with noise measurements (2022)

Zwavelstream Clinic

Performed noise measurements (2022)

ABSA

Assisted with an acoustic noise survey at various branches (2022)

Ekandustria

Performed a noise survey and assessment

Tasbet Park Extension 3 Township

Conducted a noise impact assessment

75 Sandpiper Street Generator Noise Assessment – Assisted with noise measurements and report writing

Acoustech Consulting (Pty) Ltd REG 2015/098932/07
Directors: J Knoppersen Pr Eng BSc Eng (Wits) GDE (Wits); O Knoppersen AMIOA (IOA)
Associates: W Meyer BSc Eng (Mech) (UKZN)

GREEN BUILDING COUNCIL SOUTH AFRICA MEMBER 2021

Position
Assistant Consultant

ID Number
9206010109084

Nationality
South African

Languages
English

Residential address
162 Anderson Street
Marshalltown
Johannesburg
2001

Contact detail
dudu@acoustech.co.za
071 164 8193
011 648 4998

Formal qualifications
BA Geography & Environmental Science (Monash University)

Key skills
Environmental Acoustics

Experience
1 year 8 Months

References

Jean Knoppersen

082 456 0977

Oliver Knoppersen

082 807 4895

Grace Langa
Sibanye-Stillwater
Superintendent Environmental Compliance Coordinator

011 278 9770
083 375 5770