dBAcoustics

Wonderstone Limited Mine – Driekuil Expansion Project
Magisterial District of Ngaka Modiri Molema Municipality
Northwest Province

Submitted by: Barend van der Merwe
Date: 3 February 2022

REPORT ISSUE FORM

Client Name	**Wonderstone Limited**		
Project Name	**Driekuil Expansion Project**		
Report Title	**Noise Impact Assessment**		
Document Status	**Final**	Issue No.	**1**
Issue Date	**10 March 2022**		
Document Reference			
Author	**BJB van der Merwe**	 **4 February 2022**	
Reviewer		**Signature & Date**	
Project Manager Approval		10 March 2022	

DISCLAIMER

The findings, results, observations, conclusions, and recommendations given in this scoping report are based on the author's best scientific and professional knowledge as well as available information. The report will be based on survey and assessment techniques which are prescribed by Noise Control Regulations, 1994 and/or SANS 10103 of 2008.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must refer to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

0.0 EXECUTIVE SUMMARY

The Wonderstone mine is situated in the southern part of the North-western Province within the Magisterial District of Ngaka Modiri Molema Municipality.

The Wonderstone mine is located about 10km south of Ottosdal and is an existing mine that want to include new mining operations within the existing approved mining right area. The open cast mine and associated infra-structure is situated in the vicinity of the R505. There are some farms with houses to the north, east, south, and west of the processing plant and the opencast mine. This is an open-cast mine operation with infra-structure such as haul roads, plant activities, internal and access roads which is used on a daily basis during the day only (6h00 until 18h00). The proposed Driekuil Expansion project will consist out of the following:

- Block 1North – 15Ha – Open cast Mine;
- Block 2North – 2.5Ha – Open cast Mine;
- Block 3North – 2.1Ha – Open cast Mine;
- Block 4North – 2.1Ha – Open cast Mine;
- Block 5North – 2.9Ha – Open cast Mine;
- Two stockpile areas of 3.4Ha and 3.2Ha respectively;
- Two haul roads along the eastern and western sides of the proposed mining areas; and
- New Waste Rock Dump.

There will be no blasting and the waste rock and Pyrophyllite will be dislodged by means of hydraulic hammers and such will be hauled to the waster rock dumps and the Processing plant respectively. The residents in the vicinity of the Wonderstone mine are already exposed to the sound which is created by and associated with open cast mining activities.

,

The following noise sources prevail in the vicinity of the project area:

- Mining activities from the Wonderstone mine;
- Traffic – hauling vehicles, busses, and motor-vehicles along the abutting feeder R505 road.

0.1 Legislative Requirements

The following Legislation and Standards will be used during the Noise Impact Assessment:

- Department of Environment Affairs: Noise Control Regulations, 1994 promulgated under the Environment Conservation Act**,** (Act No. 73 of 1989), Government Gazette No. 15423, 14 January 1994;

- SANS 10328: 2008 - Methods for environmental noise impact assessments.
- SANS 10103: 2008 - The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication.
- SANS 10357:2000 The calculation of sound propagation by the Concave method.
- SANS 10210 of 2004 – The determination of road traffic noise.
- Environmental, Health and Safety Guidelines for Community Noise and Mining, World Health Organisation, Geneva, 1999.

0.2 Impact Identification

The preparation and provision of infra-structure for the proposed Driekuil expansion project will be the main noise sources during the construction, operational phase and the decommissioning phases of the project which may have a cumulative impact on the prevailing ambient noise level. This will however be assessed during the EIA process. The rehabilitation activities during the decommissioning phase may have a temporarily impact on the environment.

0.3 Terms of Reference for Environmental Impact Assessment

0.3.1 Environmental Noise study

The environmental noise study will be conducted to determine the prevailing environmental ambient noise levels within and adjacent to the proposed project area/s. This information will be used to determine the potential noise intrusion levels at the different noise receptors in the vicinity of the project area/s.

0.3.2 Area of Influence

All residential properties in the vicinity of the proposed project study area.

0.3.3 Methodology

A site visit will be conducted to determine the prevailing ambient environmental noise levels by means of a qualitative evaluation and/or a quantitative evaluation. Calibrated instruments will be used to do the environmental noise survey. The impact assessment methodology will be used to identify the area likely to be affected. In terms of the International Finance Corporation Performance Standards the area of influence is defined as:

- the project and the client's activities and facilities that are directly owned, operated, or managed (including by contractors) and that are a component of the project;

- impacts from unplanned but predictable developments caused by the project that may occur later or at a different location;

- indirect project impacts on biodiversity or on ecosystem services upon which affected communities' livelihoods are dependent;

- Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable.

- Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

0.5 Conclusion

The environmental noise survey will be conducted during the day and the night-time periods so as to determine the baseline noise levels which will be used to identify possible noise intrusion levels at the abutting noise receptors. This will assist in the management of the project in terms of noise mitigatory measures and management principles for implementation during the construction, operational and decommissioning phases of the project.

CONTENTS

TABLES

FIGURES

List of Abbreviations and Acronyms

Abbreviation	Description
dBAcoustics	dBAcoustics
dBA	Decibel in the A-weighted scale
m/s	Meters per second
m	Meters
RSA	Republic of South Africa
SA	South Africa
SANS	South African National Standards
ToR	Terms of Reference

1.0 INTRODUCTION

Wonderstone mine is located about 10km south of Ottosdal and is an existing mine that want to include new mining operations within the existing approved mining right area. The existing Wonderstone mine and processing plant is situated in the vicinity of the R505. There are some farms with houses along the boundaries of the existing mine and proposed mining area. The regional location of the mine in the North-western Province is illustrated in Figure 1.1.

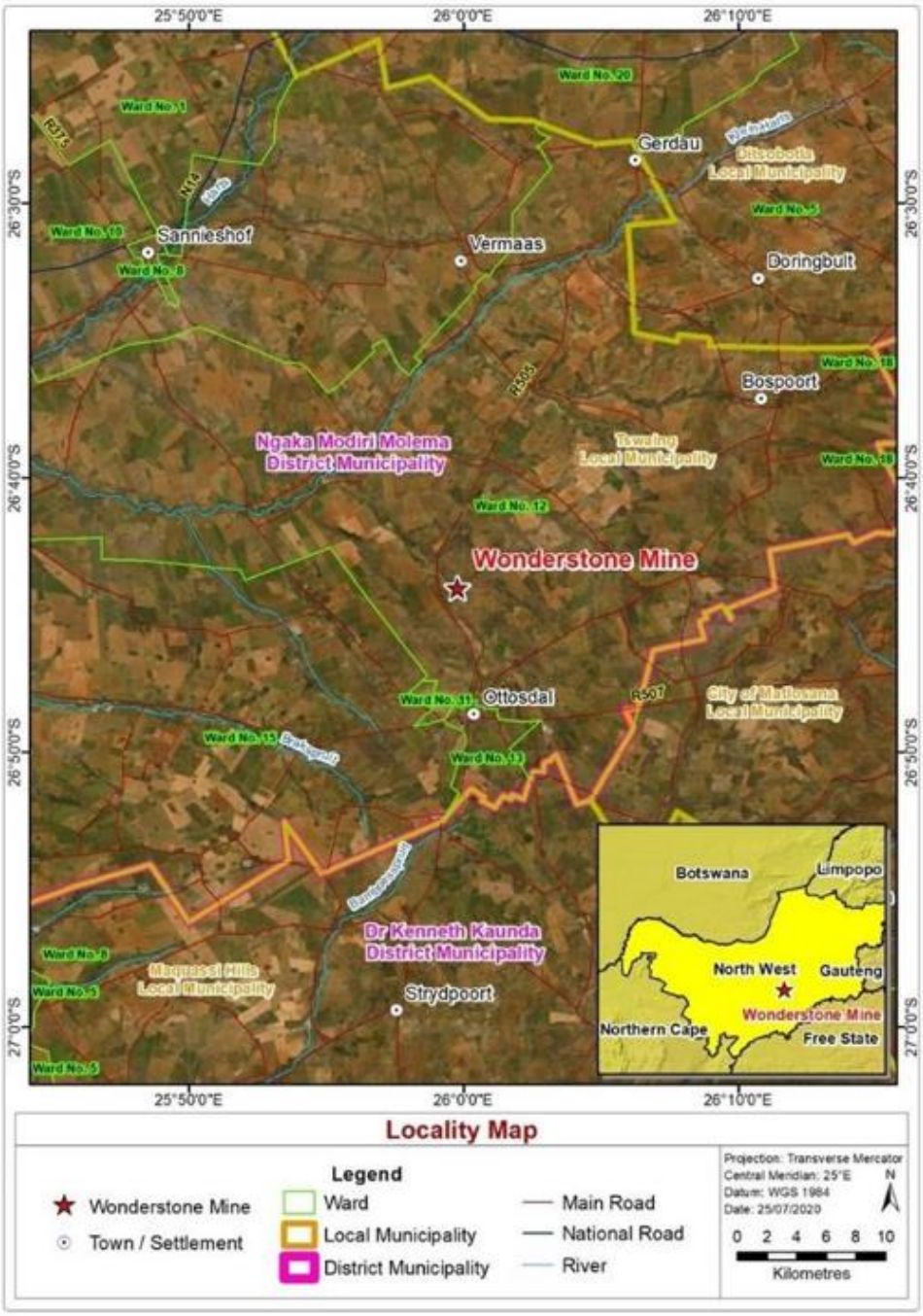

Figure 1.1: Regional location of Wonderstone mine

This will be an opencast mining operation (with no blasting) whereby the Pyrophyllite and the overburden will be dislodged by means of hydraulic hammer and the waste rock and Pyrophyllite will be transported to the waste rock and/or processing plant with hauling vehicles. The proposed Driekuil Expansion project will consist out of the following:

- Block 1North – 15Ha – Open cast Mine;
- Block 2North – 2.5Ha – Open cast Mine;
- Block 3North – 2.1Ha – Open cast Mine;
- Block 4North – 2.1Ha – Open cast Mine;
- Block 5North – 2.9Ha – Open cast Mine;
- Two stockpile areas of 3.4Ha and 3.2Ha respectively;
- Two haul roads along the eastern and western sides of the proposed mining areas; and
- Waste Rock Dump..

The proposed mining right application and mining blocks is illustrated in Figure 1.2.

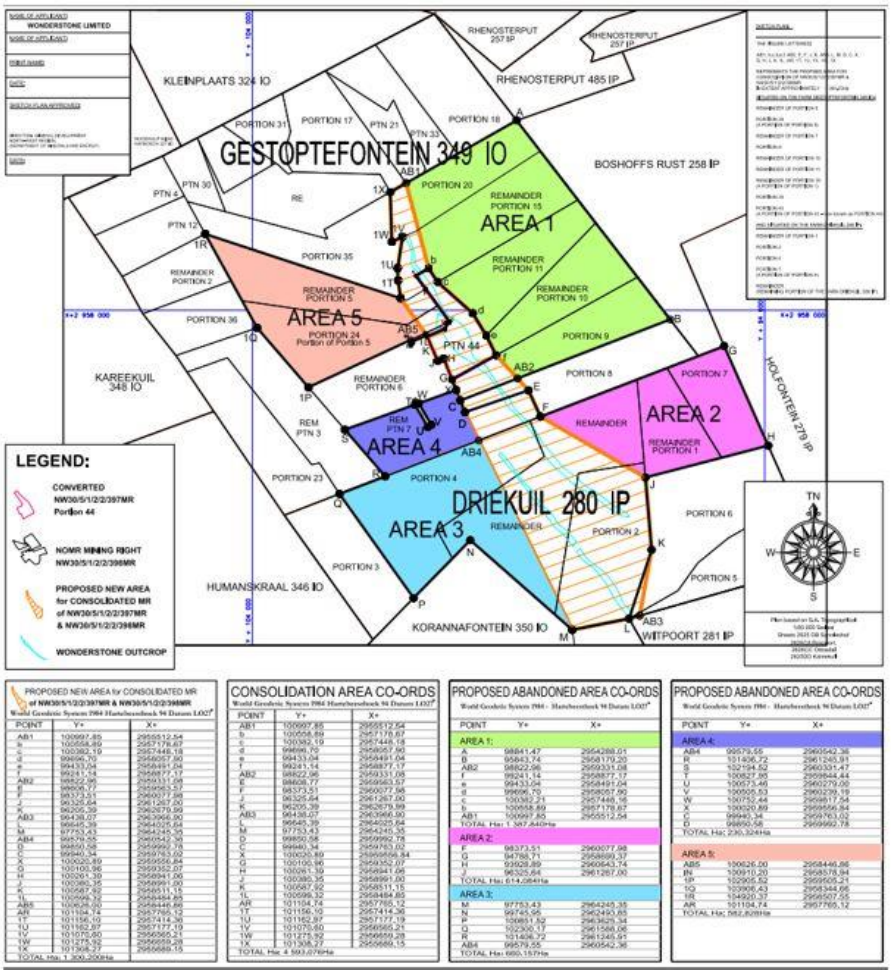

Figure 1-2: Proposed Driekuil Expansion project

The key environmental sensitivities of the area in terms of noise will be at the proposed mining expansion project area (footprint of each activity) and at the abutting noise sensitive areas.

1.1 Specialist Expertise

I, Barend JB van der Merwe of 43th Street, Linden Johannesburg am an environmental noise and ground vibration specialist for the last 20 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 researched 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 rehabilitation 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: Amec Foster Wheeler, Gibb, Royal Haskoning DHV, Coffey Environmental, Golder Associates Africa (Pty) Ltd, GCS Environmental (Pty) Ltd, Knight Piesold Environmental (Pty) Ltd and SRK Engineering (Pty) Ltd.

Qualifications

- MSc Environmental Management – University of Johannesburg;
- BSc Honours in Geography and Environmental Management – University of Johannesburg;
- National Higher Diploma in Environmental Health - Witwatersrand Technikon;
- National Diploma in Public Health - Cape Town Technikon;
- National Certificate in Noise Pollution - Technikon SA;
- National Certificate in Air Pollution - Technikon SA;
- National Certificate in Water Pollution - Technikon SA;
- Management Development Diploma - Damelin Management School; and
- Advanced Business Management Diploma - Rand Afrikaans University.

1.1.1 Declaration of Independence:

I, Barend Jacobus Barnardt van der Merwe act as the independent environmental noise specialist in the environmental authorisation and EMP amendment processes for the establishment of the Driekuil Expansion project. I will perform the work relating to the environmental authorisation

applications 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 expertise in conducting the noise and vibration specialist study and report relevant to the environmental authorisation applications. I confirm that I have knowledge of the relevant Environmental Acts, Regulations and Guidelines/Standards that have relevance to the proposed activity and my field of expertise and will comply with the requirements therein.

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

- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has, or may have, the potential of influencing any decision to be taken with respect to the application by the competent authority; and

- The objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority;

1.2 Scope of Work

The following needs to be undertaken:

- Initial baseline noise measurement survey to determine existing ambient noise levels at the proposed site boundaries and potential affected parties;
- The prediction of the future noise regime outside the boundaries of the site;
- Recommendation of mitigation methods should these be necessary or appropriate;
- Noise modelling.

It is proposed to make use of the following six-stage process approach to assessment and mitigation:

Step 1- Define the project requirements and noise problem – gather technical support information
Step 2 – Agree on the assessment criteria, establish baseline noise environment, and determine extent of the noise impact of initial proposal
Step 3 – Identify and agree on noise mitigations options
Step 4 – Assess noise impact against criteria of Step 2 and evaluate key considerations and significance for each mitigation option
Step 5 – Determine optimal noise control solution
Step 6 – Review, implement, monitor, and audit.

Objectives of the environmental noise specialist study:

- Update and gain a detailed understanding of the baseline noise environment in the vicinity of the proposed mining expansion areas;

- Identify areas that should be avoided due to irreplaceable sensitivity or irreversible environmental impact or by identifying mitigation measures to overcome these impacts;
- Determine and assess the impacts to noise receptors in the vicinity of the proposed development;
- Development of environmental management measures so that the possible negative impacts may be mitigated, and positive benefits enhanced;
- Assist in the feedback to stakeholders; and
- Provide guidance about any further legal requirements in terms of environmental noise issues.

1.2.1 Zone of Influence

The abutting residential areas in the vicinity of the proposed mine expansion.

1.3 Scoping Process

The proposed noise assessment will include the following:

- Desktop review of existing noise data;
- Site visit will be carried out to identify key strategic noise sources, to avail the assessor with the study area and to determine possible noise monitoring points;
- Noise survey of the study area at all the key noise sources and noise receptors during the day and night-time periods;
- The survey will be conducted in terms of the requirements as provided by the Noise Regulations and SANS 10103 of 2008;
- All collected data will be analysed for flaws so as to do a follow-up noise survey.

1.4 Report Structure

The noise impact assessment following should be included in your specialist report:

- Title page including names of authors and contact details;
- Executive summary detailing the major findings and actions to be taken;
- Table of Contents;
- Introduction, including a project description;
- Scope of work (as per your proposal, attached)
- Overview of the relevant legislation to your specific field of study;
- Methodology;
- Baseline information in terms of the respective specialist field. Baseline information from existing specialist studies and EMPs will be utilised to assist in the baseline environment definition;
- Objectives for each environmental aspect (specialist specific);

- Environmental impact assessment per activity for pre-construction, construction phase, operational phase, decommissioning phase and closure and post closure phases as per the methodology detailed in section 5 below;
- Any cumulative impacts identified;
- Address comments from authorities and stakeholders (if required);
- Proposed management and mitigation measures per activity;
- Concurrent and ongoing monitoring measures;
- Concurrent and ongoing management measures for rehabilitation;
- Assumptions and knowledge gaps;
- Conclusion;
- References; and
- Any other information as you deem necessary and appropriate to the assessment and mitigation measures.

2.0 DESKTOP REVIEW AND STATUS QUO

2.1 Background

The environmental noise study area will include the abutting noise receptors, boundaries of the study area and any other areas which may be influenced by the opencast mining activities.

2.2 Project Context

The study area is illustrated in the following aerial imagery of the proposed mine expansion in Figure 1.1.

2.3 Desktop Study

The noise data of previous noise reports will be incorporated in the noise survey which needs to be done.

2.4 Status Quo

The existing noise levels of Wonderstone mine, noise from the abutting agricultural activities, and traffic noise will contribute to the prevailing ambient noise levels of the study area.

2.5 Management and Monitoring Programmes

No environmental noise monitoring programme is in place for the expansion project and a monitoring programme will be designed to conform to the proposed noise management plan for the proposed mining activities.

2.6 Introduction

This section contains the national and international requirements related to noise requirements and recommended levels.

2.7 South African Legal Framework

Provincial Noise Control Regulations

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

SANS 10103 of 2008

The South African National Standards provide the guidelines for the different recommended prevailing ambient noise levels and how to evaluate when a specific operation or activity is creating a noise disturbance and what reaction can be expected if a noise disturbance is created.

SANS 10210 of 2004

This national standard is applied to determine or project road traffic noise which is associated with a new development.

SANS 10357:2000

The calculation of sound propagation by the Concave method.

2.8 International Standards, Guidelines and Requirements

The recommended noise level for a noise sensitive area is 55.0dBA during the day and 45.0dBA during the night (World Bank, 2005).

3.0 IMPACT IDENTIFICATION

Potential noise impacts which may be associated with the project, and which have to be further investigated as part of the specialist investigations and environmental Noise Impact Assessment phase:

Construction phase

- Civil construction;
- Removal of topsoil;
- Construction of waste/overburden/rock dump sites;
- Infra-structure construction;
- Increased traffic.

Operational phase

- Opencast mining activities;
- Additional traffic to and from the Wonderstone mine;
- Hauling along haul roads;
- Processing plant activities.

It is important that interactions that could lead to potential impacts which may result from the project aspects, or interactions that could lead to potential impacts which may be intensified as a result of the project aspects, during the construction, operational and closure phases (including potential areas of impact) to assist in focusing the specialist investigations.

3.1 Methodology

An aspect and impact matrix will be used to assist in identifying potential interactions between environmental and social receptors and project activities. Where interactions are

deemed likely, the interaction is further rated to determine if impacts could potentially be created which should be further investigated. The matrix makes provision for the identification of potential interactions for all phases of the project (either positive or negative).

The impact assessment methodology that will be utilised when assessing the impacts of the proposed project activities is as follows:

Generally, the impact assessment is divided into three parts:

- **Issue identification** - evaluate the 'aspects' arising from the project description and ensure that all issues in your area of expertise have been identified;

- **Impact definition** - positive and negative impacts associated with these issues (and any others not included) need to be defined. The definition should include the activity (source of impact), aspect and receptor as well as whether the impact is direct, indirect, or cumulative. Fatal flaws should also be identified at this stage; and

- **Impact evaluation** – this is not a purely objective and quantitative exercise. It has a subjective element, often using judgement and values as much as science-based criteria and standards. The need therefore exists to clearly explain how impacts have been interpreted so that others can see the weight attached to different factors and can understand the rationale of the assessment.

3.1.1 Impact significance rating

The impact significance rating system is presented in and involves three parts:

- **Part A:** Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/population, and duration;
- **Part B:** Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A; and
- **Part C:** Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from Part B) and the probability of occurrence.

The significance of the impacts associated with the identified impacts will be done in terms the impact assessment matrix provides by EnviroGistics (Pty)Ltd.

3.1.2 Activities to be rated

The proposed project will be evaluated for the activities which may generate high noise levels during the construction, operational and decommissioning/closure phases.

4.0 GAP ANALYSIS

A noise survey will be conducted at the measuring points which will be selected once information about the mining right boundaries and the proposed Wonderstone Expansion project areas are available in KMZ format.

5.0 BASELINE INFORMATION

The following mine related infrastructure and associated activities will form part of the expansion project:

- Block 1North – 15Ha – Open cast Mine;
- Block 2North – 2.5Ha – Open cast Mine;
- Block 3North – 2.1Ha – Open cast Mine;
- Block 4North – 2.1Ha – Open cast Mine;
- Block 5North – 2.9Ha – Open cast Mine;
- Two stockpile areas of 3.4Ha and 3.2Ha respectively;
- Two haul roads along the eastern and western sides of the proposed mining areas.

The following formula will be used to determine the noise impact at the different noise sensitive areas during the construction and operational phases:

Noise intrusion levels

$$Lp = Lw - 20\log R - 5dB$$

Where, Lp is the sound level at a distance from the source in dBA;

Lw is the sound level at the source in dBA;

R is the distance from the source.

The increase in the prevailing ambient noise level will be calculated in the following manner:

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

where,

*L*Req,T (post) – noise level after completion of the project – projected or calculated noise levels;

*L*Req,T (pre) – noise level before the proposed project – ambient noise level.

The criteria for assessing the magnitude of a noise impact are illustrated in Table 5.1.

Table 5-1: Noise intrusion level criteria

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

6.0 SAMPLING METHODOLOGY

Measuring equipment

Integrating sound level meter configuration, that complies at least with the accuracy requirements specified for a class 1 instrument in SANS 656, SANS 658, and SANS 61672-1. A windscreen of a type specified by the manufacturer as being suitable for the particular microphone, and that does not detectably influence the accuracy of the meter under the ambient conditions of the test, shall be used.

Sound calibrator which complies with the requirements prescribed for a class 1 calibrator in SANS 60942.

Calibration of equipment

Calibration

All items of the sound measuring equipment used should be calibrated against the requirements of SANS 656, SANS 658, SANS 60942, and SANS 61672-1 (by an accredited laboratory), at intervals not exceeding one year for the sound calibrator, and two years for the rest of the equipment, that they comply with the requirements for accuracy.

Discrete measurement positions

The noise survey will be carried out at the following measuring points (1 to 12). The microphone will be placed at a height of between 1, 2 m and 1, 5 m for general investigations, and, if practicable, at least 3, 5 m away from walls, buildings, and other large flat vertical surfaces. The vibration levels will be measured with a tri-axle seismograph.

Figure 6-1: Measuring points at the Wonderstone Expansion project

6.1 Analyses

The noise data will be used to determine the prevailing levels at the abutting noise receptors and the proposed project area.

6.2 Management and Monitoring Programme

A detailed description of the activity of the elements of the proposed expansion activities will have to be compiled and a map of the study area will illustrate the infra-structure and environmental sensitivity areas. The following aspects will be dealt with:

- Management objectives, identify impacts and risks, mitigation measures and monitoring programme;
- Monitoring of the different processes during the construction, operational and decommissioning phases;
- Method and frequency of monitoring will be provided.

7.0 CONCLUSION

The environmental Noise Impact Assessment will be done by means of approved scientific methods and the expertise of the specialist will ensure that the impact assessment will be done with utmost sensitivity towards the receptors in the vicinity of the Wonderstone expansion project and associated infra-structure.

Barend van der Merwe – MSc UJ
Environmental Noise Specialist

8.0 REFERENCES

Environmental Protection Agency (EPA). Office of Environmental Enforcement (OEE) Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). April, 2012. http://*www.epa.ie* › About Us › Organisational Structure. *Accessed 12 July 2012.*

Google Earth, 2010, http//www.google.com/earth/download-earth.html.
Accessed 12 May 2016.

SANS 10103: 2008 - The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication*. Published by Standards South Africa, 2008.*

SANS 10357:2000 The calculation of sound propagation by the Concave method. *Published by Standards South Africa, 2000.*

SANS 10210 of 2004 – The determination of road traffic noise. *Published by Standards South Africa, 2008.*

World Bank, 1995, Guidelines for community noise. *International Finance Corporation General Concerns*. http://www.who.euromat.org.
Accessed 20 July 2012.