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ENVIRONMENTAL NOISE IMPACT ASSESSMENT OF PORTION OF THE PROPOSED HAASENDAL DEVELOPMENT AND KUILS RIVER GOLF COURSE REDEVELOPMENT ON ERVEN 23580, 23579, 23582, 23583 AND 23584; FARM 1339; AND PORTIONS 60, 64, 67, 87 AND 106 OF FARM 222, KUILS RIVER, WESTERN CAPE

Prepared for
Guillaume Nel Environmental Consultants

Prepared by
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Architectural Acoustics Noise & Vibration Control Environmental Noise Traffic Noise Acoustical Material Research Underwater Sound Nonlinear Acoustics

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1 INTRODUCTION

Amphoria (Pty) Ltd, proposes to develop Erven 23580, 23579, 23582, 23583, 23584; FARM 1339; and portions 60, 64, 67, 87 and 106 of Farm 222, Kuils River that includes various nodes as per the Site Concept Plan B14 dated 8 May 2018, reproduced as Figure 1. The nodes comprise a number of different residential land uses, a private school with associated sports fields (node 23), and mixed use nodes which could potentially entail some retail developments. This excludes the following nodes that have already been approved:

Node 1 Existing apartments on the corner of Saxdowns Road and Bottelary Road;

Node 2 Turnberry Village comprising single residential units;

Nodes 5 to 10 Business premises along the western boundary with Saxdowns Road;

Node 13 Townhouses flanking nodes 9 and 10.

Jongens Keet Associates has been appointed by Guillaume Nel Environmental Consultants to conduct a Noise Impact Assessment (NIA) on the remainder of the proposed development as requested by the City of Cape Town Specialised Health Services Noise Control.

The "Proposed Haasendal Development and Kuils River Golf Course Redevlopment on Erf 23580, Erf 23579, Erf 23582, Erf 23583 Erf 2358,; Farm 1339; and Portions 60, 64, 67, 87 and 106 of Farm 222 in Kuils River, Western Cape– Basic Assessment Report and Environmental Management Programme" of February 2018 contains NIA for the various phases of the development. This report investigates in greater detail the potential impact of noise due road traffic generated by the development during operation phase within the constraints of available information.

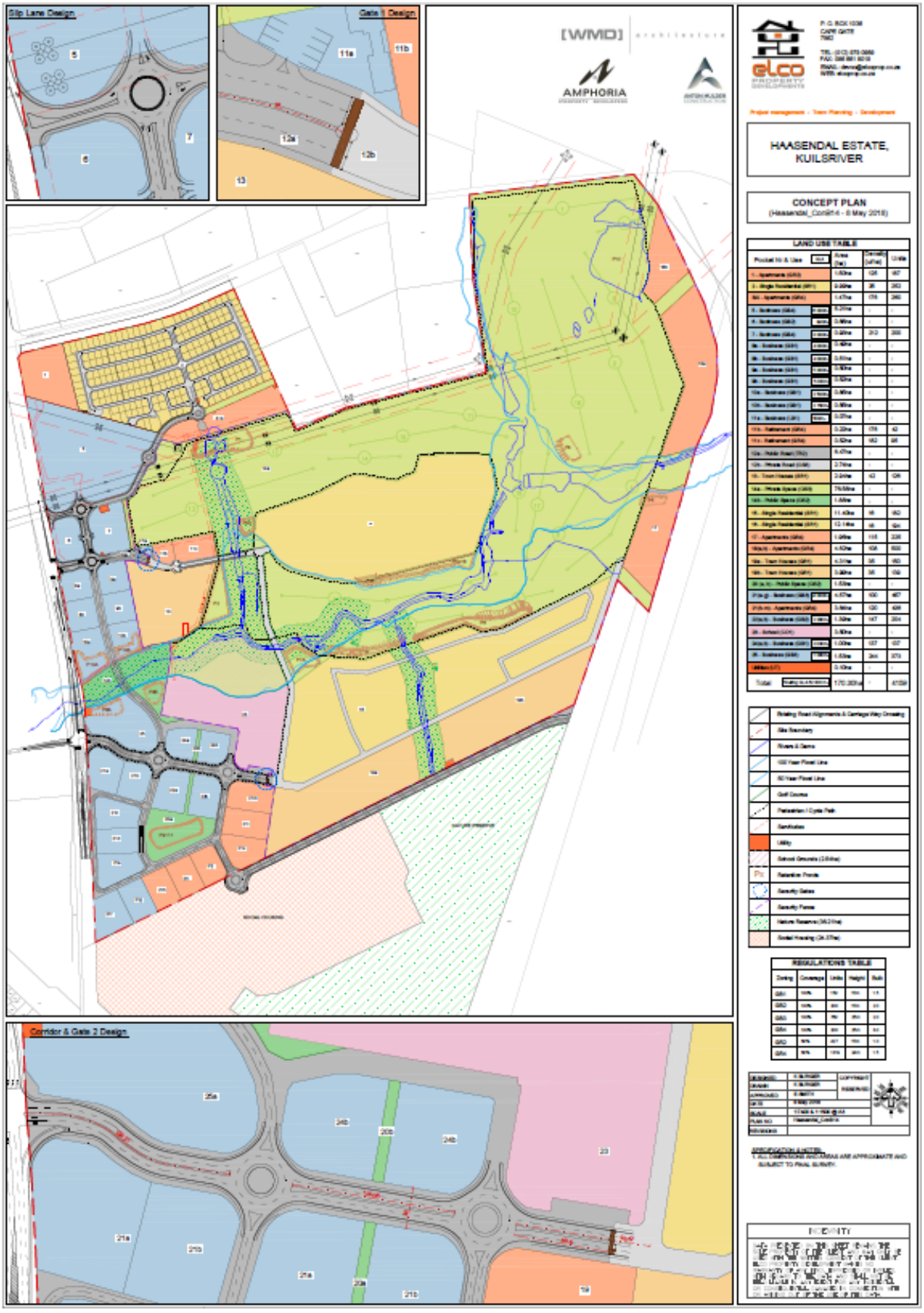

Figure 1 Site Concept Plan B14 dated 8 May 2018

2 LEGISLATIVE FRAMEWORK

In accordance with the Environment Conservation Act 73 of 1989, two procedures exist for assessing and controlling noise, respectively:

- The South African National Standard (SANS) 10328:2008 *Methods for environmental noise impact assessments*.
- The Western Cape Noise Control Regulations (NCR), 2013, P.N. 200, 20 June 2013.

The appendix contains definitions of the terminology used in the measurement and assessment of sound/noise.

2.1 SOUTH AFRICAN NATIONAL STANDARDS

SANS 10328:2008 contains procedures to be followed to predict the impact of noise of a proposed development based on objective, scientific principles. The predicted impact is assessed in accordance with SANS 10103:2008 *The measurement and rating of environmental noise with respect to annoyance and to speech communication* by determining whether the rating level, $L_{Req,T}$, of the noise will exceed the measured residual (background) noise level at recipients or, in the absence of measured residual levels, exceed the typical rating level of noise pertaining to the particular district as contained in Table 2 of SANS 10103:2008.

If the rating level, $L_{Req,T}$, of the ambient noise under investigation exceeds the measured and/or the typical rating level, it is probable that the noise would be annoying or otherwise intrusive to a community (such as residents) exposed to the noise. This excess is then related to the probable response of a community to the noise as indicated in Table 5 of SANS 10103. Tables 2 and 5 of SANS 10103 are reproduced in part hereunder.

SANS 10103:2008, Table 2 — Typical rating levels for noise in districts

1	2	3	4	5	6	7
Type of district	**Equivalent continuous rating level ($L_{Req.T}$) for noise,** dBA					
	Outdoors			**Indoors, with open windows**		
	Day-night $L_{R,dn}$[a]	**Day-time $L_{Req,d}$[b]**	**Night-time $L_{Req,n}$[b]**	**Day-night $L_{R,dn}$[a]**	**Day-time $L_{Req,d}$[b]**	**Night-time $L_{Req,n}$[b]**
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts with one or more of the following: 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

SANS 10103:2008, Table 5 — Categories of community/group response

1	2	3
Excess ($\Delta L_{Req,T}$)[a] dBA	**Estimated community/group response**	
	Category	**Description**
0 – 10	Little	Sporadic complaints
5 – 15	Medium	Widespread complaints
10 – 20	Strong	Threats of community/group action
>15	Very strong	Vigorous community/group action

In estimating the response of a community (such as residents) to a particular noise under investigation Table 5 of SANS 10103 incorporates the diversity of response of individuals of a particular community to the noise level. The estimated response to an excess of $L_{Req,T}$ of noise under investigation is thus not in discrete 5 dB changes, but in overlapping ranges of excess.

2.2 WESTERN CAPE NOISE CONTROL REGULATIONS, 2013 (NCR)

Under **Land use**
Regulation 4.

(1) The local authority, or any other authority responsible for considering an application for a building plan approval, business license approval, planning approval or environmental authority, may instruct the applicant to conduct and submit, as part of the application –

(a) a noise impact assessment in accordance with SANS 10328 to establish whether the noise impact rating of the proposed land use or activity exceeds the appropriate rating level for a particular district as indicated in SANS 10103; or

(b) where the noise level measurements cannot be determined, an assessment, to the satisfaction of the local authority, of the noise level of the proposed land use or activity.

(3) Where the results of an assessment undertaken in terms of sub regulation (1) indicate that the applicable noise rating levels referred to in that sub regulation will likely be exceeded, or will not be exceeded but will likely exceed the existing residual noise levels by 5 dBA or more -

(a) the applicant must provide a noise management plan, clearly specifying appropriate mitigation measures to the satisfaction of the local authority, before the application is decided; and

(b) implementation of those mitigation measures may be imposed as a condition of approval of the application.

3 METHODOLOGY

The noise impact study was conducted based on procedures contained in SANS 10328:2008, *Methods for environmental noise impact assessments*. A summary of the procedures is outlined hereunder.

a.) Provide a brief description of the planned development;

b.) Provide a brief description of the existing environment;

c.) Identify and quantify noise sources that might affect the proposed development and/or surrounding land;

d.) Identify potential noise sensitive areas that could be impacted upon by noise emanating from the identified noise sources;

e.) Quantify and assess the noise impact;

f.) Investigate possible alternative noise mitigation procedures, if relevant;

g.) Prepare and submit an environmental noise impact report containing the procedures and findings of the investigation and recommend alternative noise mitigation procedures, where relevant.

3.1 DATA SOURCES

"Proposed Haasendal Development and Kuils River Golf Course Redevlopment on Erf 23580, Erf 23579, Erf 23582, Erf 23583 Erf 2358,; Farm 1339; and Portions 60, 64, 67, 87 and 106 of Farm 222 in Kuils River, Western Cape Basic – Basic Assessment Report and Environmental Management Programme", February 2018.

Existing and predicted future road traffic flow data contained in "Transport Impact Assessment for Haasendal Estate, Kuilsrivier" by Deca Consulting Engineers, 8 November 2017.

4 LIMITATIONS AND ASSUMPTIONS

4.1. PREDICTING AND ASSESSING ROAD TRAFFIC NOISE

SANS 10210:2004 *Calculating and predicting road traffic noise* is generally required to be used to predict the impact of road traffic noise.

Predicting and assessing road traffic noise requires knowledge of numerous variables including:

- The total number of vehicles passing the observation point during each hour of the day/night-time period;
- The percentage heavy vehicles during each hour;
- The mean vehicle speed.

Environmental noise impact assessments are based on comparing the Rating Level due to the noise under investigation over a 16 hour daytime period (06h00 to 22h00) and/or 8 hour night-time period (22h00 to 06h00) with applicable criteria over the same respective time periods. Thus, the exposure to the level of noise averaged over a day- or

night-time period is assessed and not short duration noise levels that may vary throughout the period.

The $L_{Aeq,T}$ due to road traffic noise at a receptor location is calculated for each hour of a 24-hour day. With reference to the appendix the time interval, T, is thus one hour and is termed the 1-hour L_{Aeq} or L_{Aeq} (1 hr).

The daytime Rating Level, $L_{Req,d}$, is then obtained by averaging (on an energy basis) the sixteen 1-hour L_{Aeq} from 06h00 to 22h00. Similarly, the night-time $L_{Req,n}$ is obtained by averaging the eight 1-hour L_{Aeq} from 22h00 to 06h00. With reference to the appendix, road traffic noise generally does not contain tonal or impulsive noise thus $L_{Req} = L_{Aeq}$.

Road traffic engineers base road design on the maximum traffic flow which occurs during morning and afternoon peak hour periods. Unless the traffic flow data during each of the other hourly periods can be determined this information does not enable the $L_{Aeq,T}$ at a receptor location to be calculated and assessed.

However, this does not exclude an estimate to be made of the relative increase in $L_{Aeq,T}$ for an increase in traffic flow over time.

Road traffic sound power emission levels are dependent on each variable, namely, the number of vehicles, percentage heavy vehicles and vehicle speed, respectively. The change in emission level due to a change in a single variable can be determined provided that all other variables remain the same.

With an increase in traffic flow on a particular road over a period of time the composition of the traffic flow and mean vehicle speed generally does not change significantly. The only variable to change is the total number of vehicles.

If the number of vehicles during a time period, T, doubles then the sound power emitted during the same period doubles. The sound power emission level then increases by 10 Log (2/1) = 3 dB

Thus, although the actual $L_{Aeq,T}$ at each receptor location cannot be determined and assessed in accordance with SANS 10103:2008 and NCR in this investigation, the increase in $L_{Aeq,T}$ for an increase in traffic flow can be estimated. The same increase occurs at each location throughout the study area.

5 DESCRIPTION OF STUDY AREA

The proposed development is displayed in Figure 1 and an enlarged portion in Figure 2 displaying Bottelary Road and the proposed development access roads off Saxdowns Road.

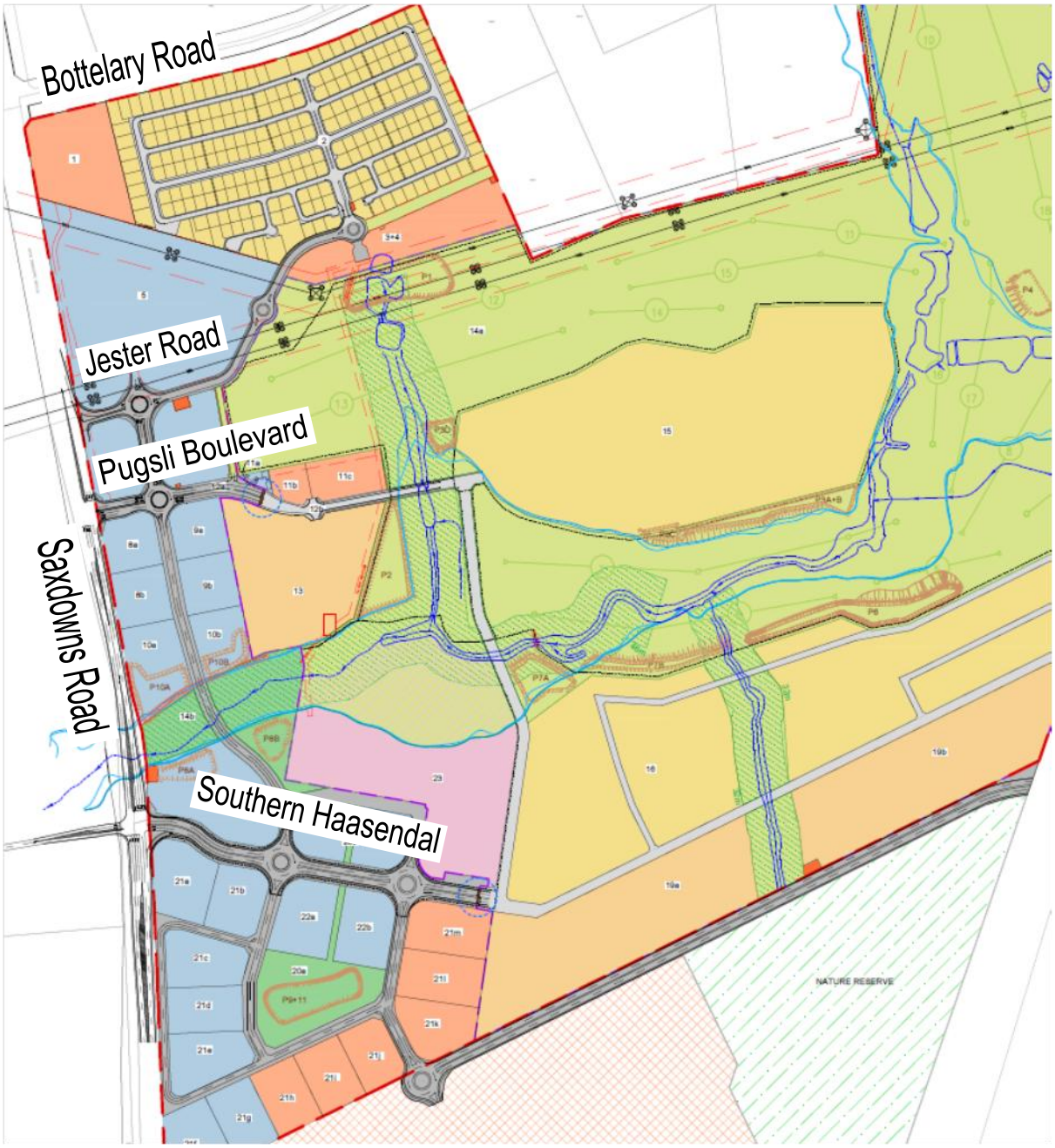

Figure 2 Enlarged portion of the proposed development with access roads

Existing apartments (node 1) and single residential units within Turnberry Village (node 2) are located along the northern boundary of the site along Bottelary Road.

Existing residential properties are located on the northern side of Bottelary Road.

Land immediately west and south of the site is vacant and undeveloped although some informal settlements occur to the south.

Agricultural activities occur to the east of the site.

An existing noise sensitive residential suburb of Rouxville is located along Saxdowns Road southwest of the site.

During a site inspection on 6 June 2018 Jester Road and Pugsli Boulevard access roads and traffic circles were being constructed. The part of Jester Road past Turnberry Village (node 2) had already been constructed and surfaced. No other development was observed.

6 POTENTIAL NOISE SOURCES

6.1 CONSTRUCTION PHASE

Potential noise impacts including mitigation during construction phase are adequately contained in Section F.6(a) of the Basic Assessment Report and Environmental Management Programme, February 2018.

6.2 OPERATION PHASE

Potential noise impacts including mitigation during operation phase are contained in Section F.6(b) of the Basic Assessment Report and Environmental Management Programme, February 2018.

Beyond a general statement regarding existing busy roads the question whether there would be a significant increase in noise impact on land along Saxdowns Road due to road traffic to and from the proposed development was not specifically addressed. This is investigated in Section 7 of this report.

No other potential noise sources were identified that might impact on land within or outside the proposed development.

6.3 DECOMMISSIONING PHASE

Potential noise impacts including mitigation during decommissioning phase are adequately contained in Section F.6(c) of the Basic Assessment Report and Environmental Management Programme, February 2018.

7 IMPACT OF ROAD TRAFFIC NOISE GENERATED BY THE PROPOSED DEVELOPMENT

The Transport Impact Assessment report of 8 November 2017 contains traffic counts conducted during morning and afternoon peak hour periods on 19 April 2017 at the Bottelary Road / Saxdowns Road intersection. The percentage heavy vehicles were not recorded. From the measured data background traffic volumes not due to the development and traffic volumes generated by the proposed development were estimated for various scenarios during the year 2022 at each of the intersections within and at those providing access to the development.

Applicable to the present investigation were the following scenarios with the applicable figures of the TIA report included in brackets:

Background Traffic based on April 2017 traffic counts plus with trips generated by Farm 222 Portions 28, 90, 91, 25, 17 and 29 (Figure 2). These properties do not form part of Haasendal but are enclosed by Haasendal land thereby using the road infrastructure.

Commercial Trips generated by the full development (Figure 4) comprising trips related to Nodes 5 to 10 already authorised and Nodes 21, 22 and 24.

Total Traffic generated by the development as well as Farm 222 Portions 28, 90 and 91 (Figure 6).

The traffic generated by the development subsequent to the already authorised Nodes 1, 2, 5 to 10 and 13 was estimated as follows:

At each of the Jester Road, Pugsli Boulevard and Southern Haasendal intersections the traffic trips into and out of each intersection were recorded for Background Traffic, Commercial Trips and for Total Traffic. The respective trips for Background Traffic and Commercial Traffic (excluding Nodes 21, 22 and 24) were then subtracted from the Total Traffic. The resultant two-way traffic due to the development on Saxdowns Road south and north of the development, respectively, were thereby obtained.

There was no clear way of extracting the non commercial traffic trips associated with the already authorised nodes such as the Haasendal Mall (Node 5). Those trips were thus retained in the development traffic trips subsequent to the already authorised nodes.

7.1 INCREASE IN ROAD TRAFFIC WHENCE INCREASE IN NOISE EMISSION LEVELS

The number of two-way trips during 2022 on Saxdowns Road south and north of the Haasendal development, respectively are displayed in Table 1. The numbers of trips not related to the development are displayed in column 2 and those due to the development are displayed in column 3. Column 4 displays the fractional increase due to the development. The associated increase in noise emission levels are displayed in column 5.

Table 1 Increase in $L_{Aeq,T}$ due to development road traffic

Location along Saxdowns Rd	2-way traffic trips		Fractional increase	Increase, dB
	Not related to development	Due to development		
South of development	2432	4801	1.97	3 (2.95)
North of development	3026	4329	1.43	2 (1.56)

7.2 ASSESSMENT OF RESULTS

The road traffic generated by the proposed development would result in just under a doubling of traffic on Saxdowns Road south of the development and thus passing existing residential suburbs. The associated increase in $L_{Aeq,T}$ would be just under 3 dB.

Most humans cannot perceive a change in "loudness" for a change in sound/noise level of 3 dB or less. The rise in $L_{Aeq,T}$ of 3 dB due to road traffic noise would thus be negligble.

The increase in noise level of less than 2 dB along Saxdowns Road north of the development would similarly be insignificant.

Table 2 Environmental noise impact summary

Nature of impact	Increase in noise level along Saxdowns Road due to development road traffic
Extent and duration	Long Term
Intensity of impact	Low
Probability of occurrence	Possible
Degree to which impact can be reversed	
Degree to which the impact may cause irreplaceable loss of resources	Not probable
Cumulative impact prior to mitigation	Low
Significance rating of impact prior to mitigation	No significance
Degree to which impact can be mitigated	Low
Proposed mitigation	N/A
Cumulative impact post mitigation	N/A
Significance rating of impact after mitigation	N/A

8 CONCLUSIONS

Due to insufficient road traffic flow information a noise impact assessment of noise due to road traffic generated by the proposed Haasendal development could not be conducted strictly in accordance with SANS 10103:2008 and NCR. However, the relative increase in the $L_{Aeq,T}$ due to road traffic generated by the development could be estimated and was found to be negligible.

APPENDIX

Terms defined in South African National Standard (SANS) 10328:2008 and SANS 10103:2008 Their meanings are in certain instances loosely described to facilitate understanding.

Ambient noise
the totally encompassing sound in a given situation at a given time, and is usually composed of sound from many sources, both near and far. It includes the noise from the noise source(s) under investigation.

Decibel
The human ear subjectively judges the relative "loudness" of two sounds by the logarithm of ratio of the two sound powers or power related quantities. Thus,

Sound power level, L_W
The sound power level, in decibels, emitted by a sound source relative to a reference sound power. It is given by the following equation:

$$L_w = 10 \text{ Log} \left(\frac{w}{w_{ref}}\right) \text{ dB} \qquad w_{ref} = \text{reference sound power} = 10^{-12} \text{ Watt}$$

Sound power is proportional to (sound pressure)^2 whence,

A-weighted sound pressure level, L_{pA}
The sound pressure level, in decibels, relative to a reference sound pressure, p_0, and incorporating an electrical filter network (A-weighted) in the measuring instrument corresponding to the human ear's different sensitivity to sound at different frequencies. It is given by the following equation:

$$L_{pA} = 10 \text{ Log} \left(\frac{P_A}{P_0}\right)^2 \text{ dBA} \qquad p_0 = \text{reference sound pressure} = 20 \text{ micro Pascal}$$

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ ("sound or noise level")
A formal definition is contained in SANS 10103. The term "equivalent continuous" may be understood to mean the "average" A-weighted sound level measured continuously, or calculated, over a period of time, T. It is often loosely termed "sound level" or "noise level".

Equivalent continuous rating level, $L_{Req,T}$
The equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$, measured or calculated during a specified time interval T, to which is added adjustments for tonal character, impulsiveness of the sound and the time of day. An adjustment of 5 dB is added for any tonal character, if present. If the noise is of an impulsive nature an adjustment of 5 dB is added for regular impulsive noise and 12 dB for highly impulsive noise. Where neither is present, such as road traffic noise, the $L_{Req,T}$ is equal to the $L_{Aeq,T}$.

Reference time interval
The time interval to which an equivalent continuous A-weighted sound level, $L_{Aeq,T}$, or rating level of noise, $L_{Req,T}$, is referred. Unless otherwise indicated, the reference time interval is interpreted as follows:

- Day-time: 06:00 to 22:00hrs T=16 hours when $L_{Req,T}$ is denoted $L_{Req,d}$
- Night-time: 22:00 to 06:00hrs T=8 hours when $L_{Req,T}$ is denoted $L_{Req,n}$

Residual noise (often referred to as background noise)
The ambient noise that remains at a given position in a given situation when one or more specific noises (usually those under investigation) are suppressed or absent.