



JONGENS KEET ASSOCIATES
ACOUSTICAL ENGINEERING CONSULTANTS

Telephone: +27 21 794 5643

Mobile: 082 772 1799

email: jongens@yebo.co.za

A.W.D. Jongens
8 Wingerd Avenue
7806 CONSTANTIA

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

**NOISE IMPACT ASSESSMENT OF A PROPOSED BUS DEPOT
ALONG WETTON ROAD, WYNBERG, CAPE TOWN**

Prepared for:

CHAND Environmental Consultants

Prepared by:

A.W.D. Jongens

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10 July 2021

EXECUTIVE SUMMARY

The City of Cape Town (CoCT) is proposing to establish a Wynberg bus depot along Wetton Road, Wynberg, as part of the phased expansion of the MyCiTi Integrated Rapid Transport (IRT) system.

Jongens Keet Associates (JKA) was commissioned to conduct a Noise Impact Assessment of the proposed Wynberg bus depot and associated activities.

From information received it was understood that future trunk and feeder routes originating from the Claremont Public Transport Interchange and the Wynberg Public Transport Interchange, located to the west of the study area, would extend along Wetton Road via the intersection of Rosmead Avenue with Wetton Road. Particularly, the peak hour bus movements along the aforementioned roads and the associated road traffic noise would be independent of the location of the proposed Wynberg bus depot.

The TIA report conveyed that the predicted number of buses leaving the proposed depot during AM and PM peak periods would be 61 and 155, respectively. However, no indication was given of the split and trajectory of the buses after the Wetton Road intersection with Rosmead Avenue. In addition no indication of the number, trajectories and times of buses returning to the proposed depot were given.

No impact of noise due to bus movements along the respective trajectories could therefore be calculated.

Given the limited knowledge available, the only impact of noise that could be investigated was that due to bus movements within the proposed bus depot on the Bonnytown informal settlement adjacent to the western boundary of the proposed bus depot site.

Using previously measured data (JKA, September 2017) an estimate was made of the impact of noise on the informal settlement due to bus movements close to the western boundary of the proposed bus depot site. It was calculated that provided the number of bus movements closest to the western boundary did not exceed one per minute the associated noise would be compliant with the Western Cape Noise Control Regulations, 2013 (NCR). Assessment in terms of The South African National Standard (SANS) 10103:2008 *The measurement and rating of environmental noise with respect to annoyance and to speech communication*, the relatively few bus movements during a full daytime and/or night-time reference time period, would result in the intensity of noise impact being **Negligible**.

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GLOSSARY

Terms defined in South African National Standard (SANS) 10328:2008, SANS 10103:2008 and the Western Cape Noise Control Regulations, 2013 used in the measurement, assessment and control of sound, or noise.

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 the 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:

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

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:

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

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$

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.

District

This is related to, but not necessarily equal to, "land-use zoning" applied in urban and regional planning. For example, mixed-use zoning may comprise a central business district and a residential district.

Loudness

This is a subjective term often used by people to describe the magnitude of sound. However, this is not a term used in any standard or regulation. This note describes the relationship between the subjective term, "loudness", with the objective physical quantities of sound.

We humans perceive the physical world around us by means of our senses of vision, touch, smell, taste and hearing. Each of these sensory responses are not linearly related to changes in physical stimuli but based on the logarithm of the ratio of the changes in physical stimuli.

As an example, doubling the power output of a loudspeaker (in Watts) will result in a 3 dB increase in sound pressure level at the listener. Yet, virtually all humans will not perceive any difference in what is subjectively described as "loudness". Any change or difference in sound pressure level of up to 3 dB is therefore considered to be insignificant. A 5 dB difference in level is distinctly noticeable and is considered to be significant while a 10 dB difference is generally judged to be twice, or half, as "loud".



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1 INTRODUCTION

The City of Cape Town (CoCT) is proposing to establish a Wynberg bus depot along Wetton Road, Wynberg, as part of the phased expansion of the MyCiTi Integrated Rapid Transport (IRT) system.

Jongens Keet Associates (JKA) was commissioned to conduct a Noise Impact Assessment of the proposed Wynberg bus depot and associated activities.

1.1 OUTLINE OF INVESTIGATION

The noise impact study was conducted in accordance with procedures contained in the South African National Standard (SANS) 10328:2008, *Methods for environmental noise impact assessments* as prescribed under the National Environmental Management Act Nr 107 of 1998. A summary of the procedure is outlined hereunder.

- Present the legislative framework pertaining to the investigation;
- Provide a brief description of the existing environment;
- Determine the existing ambient sound levels in the study area;
- Determine the typical rating level for noise at identified noise sensitive areas;
- Provide a brief description of the planned development;
- Identify potential noise sources that could impacted by the proposed development;
- Calculate the expected rating level of noise due to the identified noise sources by the proposed development;
- Assess the impact of noise on the proposed development in terms of SANS 10103:2008 and the Western Cape Noise Control Regulations (NCR), 2013;
- Investigate possible alternative noise mitigation procedures, if relevant;
- Prepare and submit an environmental Noise Impact Assessment report containing the procedures and findings of the investigation and recommended noise mitigation procedures, where relevant.

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.

SANS 10328:2008 and other South African National Standards relating to noise are incorporated in the NCR and are thereby legally binding.

The glossary 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 level, 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 on the following page.

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

The **intensity** of a predicted noise impact was determined in relation to the categories of community response contained in Table 5 of SANS 10103 and is qualified as follows:

- Negligible Predicted $L_{Req,T}$ does not exceed the typical $L_{Req,T}$
- Low Predicted $L_{Req,T}$ exceeds the typical $L_{Req,T}$ by between 0 & 5 dB
- Medium Predicted $L_{Req,T}$ exceeds the typical $L_{Req,T}$ by between 5 & 10 dB
- High Predicted $L_{Req,T}$ exceeds the typical $L_{Req,T}$ by more than 10 dB

2.2 WESTERN CAPE NOISE CONTROL REGULATIONS, 2013

Certain regulations pertaining to the investigation are reproduced in this section. The reader is referred further to the complete regulations.

Prohibition of disturbing Noise Regulation 2

2. A person may not –
 - (a) cause a disturbing noise; or
 - (b) allow a disturbing noise to be caused by any person, animal, machine, devise, apparatus, vehicle, vessel or model aircraft, or any combination thereof.

Disturbing noise means a noise, excluding the unamplified human voice, which –

- (a) Exceeds the rating level by 7 dBA;
- (b) Exceeds the residual noise level where the residual noise level is higher than the rating level;
- (c) exceeds the residual noise level by 3 dBA where the residual level is lower than the rating level; or
- (d) in the case of low-frequency noise, exceeds the level specified in Annex B of SANS 10103.

[The determination of disturbing noise is based on the reading on a sound level meter for a total period of at least 10 minutes taking into account impulse, tone and night-time correction.]

Land use Regulation 4.

- 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.

2.3 DISTINCTION BETWEEN ASSESSMENT PROCEDURES

SANS environmental noise impact assessment procedures are similar to other disciplines whereby the intensity and significance of impact is identified as Low, Medium or High. However, the NCR stipulate a noise level criterion that, by law, may not be exceeded. Either the noise levels comply with the criterion or they do not. In the latter instance noise mitigation procedures must be implemented. The NCR thereby override the relative noise impact assessments in the EIA process.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 EXISTING ENVIRONMENT

The proposed development site, outlined in red is shown in Figure 1. It will be accessed directly off Wetton Road. It is bounded by Wynberg Sports Club and Bonnytown informal settlement to the west; Pro Golf golfing range to the south; and open ground to the east. The site is presently undeveloped. The sound measurement location is depicted by a sound level meter-on-tripod symbol.

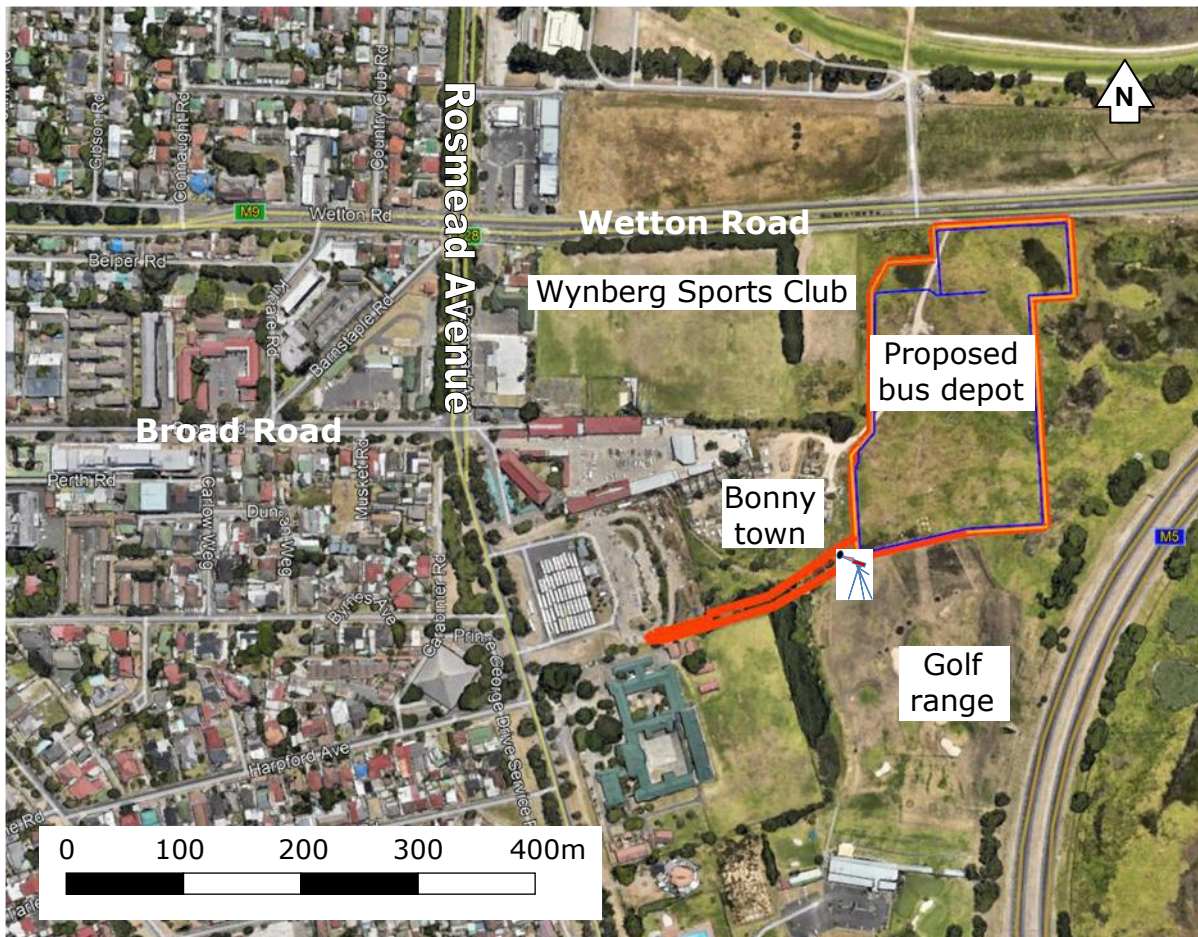


FIGURE 1 Study area showing the proposed bus depot outlined in red.

3.2 PROPOSED DEVELOPMENT

The site development plan of the proposed bus depot dated 25 March 2021, prepared by GIBB (Pty) Ltd. is reproduced, in part, in Figure 2.

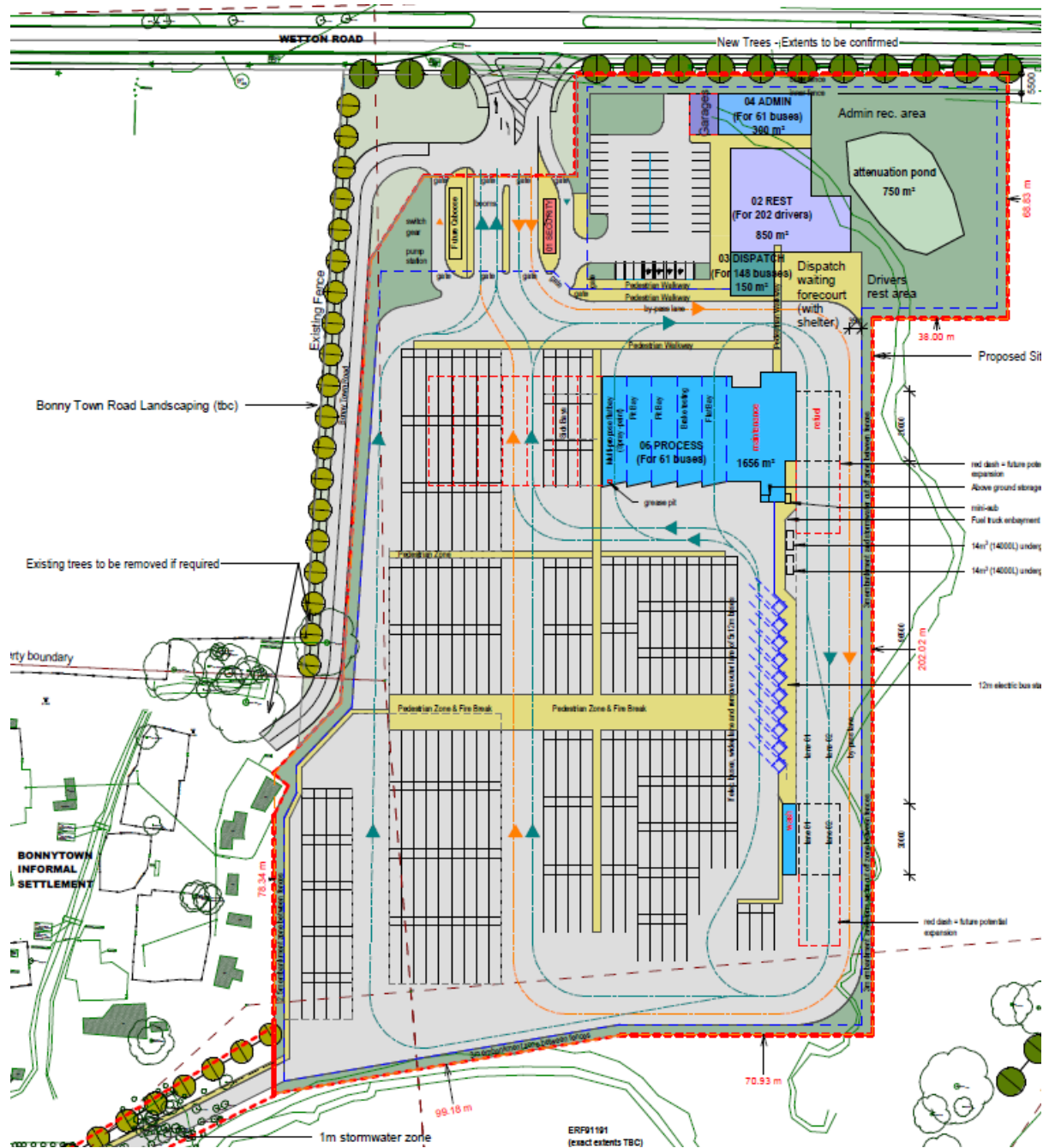


FIGURE 2 Site development plan of the proposed Wynberg bus depot.

It is proposed that the bus depot is to accommodate approximately 202 12 m and 18 m buses; administration building; rest facility for bus drivers; conventional fuelling and electric charging bays; and a maintenance area. A new road linking the Bonnytown informal settlement with Wetton Road is included.

3.3 LIMITATIONS, KNOWLEDGE GAPS AND ASSUMPTIONS

The *Wynberg Depot Transport Impact Assessment* (TIA) report (GIBB (Pty) Ltd. 7 July 2021) contains AM and PM peak hour background and future traffic counts at the intersection of Rosmead Avenue with Wetton Road. However, from additional communication with K. Liebenberg of GIBB, it was understood that future trunk and feeder routes originating from the Claremont Public Transport Interchange and the Wynberg Public Transport Interchange, located to the west of the study area, would extend along Wetton Road via the intersection of Rosmead Avenue with Wetton Road. Particularly, the peak hour bus movements along the aforementioned roads and the associated road traffic noise would be independent of the location of the proposed Wynberg bus depot.

The TIA report conveyed that the predicted number of buses leaving the proposed depot during AM and PM peak periods would be 61 and 155, respectively. However, no indication was given of the split and trajectory of the buses after the Wetton Road intersection with Rosmead Avenue. In addition no indication of the number, trajectories and times of buses returning to the proposed depot were given.

No impact of noise due to bus movements along the respective trajectories could therefore be calculated.

Given the limited knowledge available, the only impact of noise that could be investigated was that due to bus movements within the proposed bus depot on the Bonnytown informal settlement adjacent to the western boundary of the proposed bus depot site.

3.4 AMBIENT SOUND LEVELS

The Bonnytown informal settlement is located approximately 180 m east of Rosmead Avenue but screened from road traffic noise by adjacent municipal buildings and earth berms of the municipal dump. The M5, Kromboom Parkway is located approximately 240 m to the east.

Sound level measurements were recorded at 11h30 on Friday 12th March 2021 at the western end of the boundary between the bus depot site and the golf range; approximately 40 m from the nearest informal settlement. The weather was partly cloudy; temperature 23°C; wind northerly 2 m/s. A photograph looking northwest onto the informal settlement from the measurement location is displayed in Figure 3.

The equivalent continuous A-weighted sound pressure level, L_{Aeq} , was measured using a Type 1 Larson Davis LxT1L precision integrating sound level meter (SLM) (Serial Nr 0001138) mounted on a tripod with the microphone positioned 1,4 metres above the ground and at least 3 metres from any large sound-reflecting surface. The microphone was fitted with a windshield. Prior to and after the measurements the calibration of the meter, performed by M and N Acoustic Services cc, was checked using a Brüel & Kjaer type 4230 Calibrator (Serial Nr 930792).

An L_{Aeq} of 46 dBA was recorded at the end of a 11 minute measurement duration. Audible noise was road traffic on the M5 and intermittent distant building construction noise. With reference to Table 2 of SANS 10103: 2013 the area could be described as a suburban district with little road traffic with an associated typical daytime rating level of 50 dBA.



FIGURE 3 View northwest from the sound measurement location.

4 CONSTRUCTION PHASE NOISE IMPACT

The construction activities will include clearing of vegetation; mass earthworks; transportation of materials to site; installation of civil and electrical services; preparation and construction of roads and hard surfaces; and construction of building structures.

There are many different factors and variables occurring during the preparation of land, installation of services, construction of roads, preparation of building sites and construction of structures. These vary from project to project. It would require knowledge of the process (earth moving, grading, surfacing, etc.); details of the type, mechanical power and number of machinery; and estimation of the duration of each activity during each period of the construction process. This information is seldom available in the detail required to enable a realistic prediction of associated noise impact to be made with any confidence of preparation of the proposed development site and subsequent construction.

However, all construction processes are to comply with the following standard best practice:

- All construction equipment utilised and activities undertaken must be compliant with the Western Cape Noise Control Regulations, P.N. 200/2013.
- Restrict construction activities generating noise outputs of 85 dB (A) or more to the hours of 08h00 to 17h00 Mondays to Fridays. Should the Contractor need to do this

work outside of these hours, the approval of the ECO must be obtained and surrounding communities must be informed prior to the work taking place.

- No amplified music shall be allowed on Site. The use of audio equipment shall not be permitted, unless the volume is kept sufficiently low so as to be unobtrusive. The Contractor shall not use sound amplification equipment on Site, unless in emergency situations.
- If excessive noise is expected on the boundary of the site, neighbouring residents must be informed in writing and in advance of when the high noise levels will occur and for how long they will occur.
- The Contractor must post signage indicating contact details of the Contractor and/or ECO on the site to allow for reporting of complaints.

5 OPERATION PHASE NOISE IMPACTS

5.1 NOISE IMPACT OF BUS MOVEMENTS WITHIN BUS DEPOT

With little information available, an attempt was made to obtain an estimate of the potential impact of noise due to bus movements within the proposed bus depot on the adjacent informal settlement and separately to determine whether such noise would be considered to be a disturbing noise in terms of the NCR.

During a previous investigation (JKA, September 2017) sound levels were recorded of each of several MyCiti diesel buses approaching a stop sign and subsequently accelerating beyond the stop sign. The time duration of each bus movement was approximately 30 seconds. The average 30-second L_{Aeq} was 62 dBA at 10 m from the stop sign. The major component of the noise produced occurred during acceleration.

The distance between the western boundary of the proposed bus depot and the nearest informal settlement would be approximately 20 m. The site development plan in Figure 2 displays 20 bus parking areas close to the western boundary adjacent to the informal settlement. It was judged that the nearest bus movement would be approximately 10 m from the western boundary and thus 30 m from the nearest informal settlement. At this distance, over open ground, the 30-second L_{Aeq} would be 52 dBA.

5.2 ASSESSMENT

In the previous section it was estimated that the movement of a single bus nearest to the western boundary of the bus depot site would result in a L_{Aeq} of 52 dBA over a duration of 30 seconds at the nearest informal settlement. With reference to Section 2.2, when averaged over 10 minutes (on a logarithmic basis) this would amount to 39 dBA; significantly lower than the measured residual L_{Aeq} of 46 dBA as well as the typical rating level of 50 dBA. A single bus movement along the nearest trajectory would thus be compliant with the NCR.

In terms of SANS 10103:2013, noise is assessed over a 16-hour daytime period and/or 8-hour night-time period (refer to glossary). The intensity of noise impact of a single bus movement would be **Negligible**.

5.3 MITIGATION PROCEDURES

With reference to Section 2.2, in order to comply with the NCR definition of disturbing noise (c), the 10-minute L_{Aeq} of $46 + 3 = 49$ dBA may not be exceeded. This would require that no more than 10 bus movements occur per respective 10 minute periods or one bus movement per minute on the trajectory nearest to the western boundary of the bus depot site.

In terms of SANS 10103:2013, the relatively few bus movements during a full daytime and/or night-time reference time period, would result in the intensity of noise impact being **Negligible**.

5.4 NOISE IMPACT SUMMARY

A summary of the noise impact is contained in Table 1.

Table 1 Summary of the noise impact

Alternative:	Proposed Development : Both Layout Alternatives	No-go/ no development alternative
PLANNING, DESIGN AND DEVELOPMENT PHASE		
Potential impact and risk:	Construction- related noise- to be controlled through EMPR and aligned with NCR	
OPERATIONAL PHASE		
Potential impact and risk:	Impact of noise on nearest noise sensitive receptors (i.e. the Bonnytoun informal settlement)	Impact of noise on nearest noise sensitive receptors (i.e. the Bonnytoun informal settlement)
Nature of impact:	Neutral	Not Applicable - no impact
Extent and duration of impact:	Medium (on site and surrounds) and long-term	
Consequence of impact or risk:	Noise nuisance/irritation to Bonnytoun settlement residents	
Probability of occurrence:	Medium	
Degree to which the impact may cause irreplaceable loss of resources:	None	
Degree to which the impact can be reversed:	Low	
Indirect impacts:	None	
Cumulative impact prior to mitigation:	None	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Negligible	
Degree to which the impact can be avoided:	High- already avoided through proposed layout which keeps buses an appropriate distance from the settlement	
Degree to which the impact can be managed:	High- already managed through intended use of sight to limit number of buses to 202, This would require that no more than 10 bus movements occur per respective 10 minute periods or one bus movement per minute on the trajectory nearest to the western boundary of the proposed bus depot site.	
Degree to which the impact can be mitigated:	Not Applicable	
Proposed mitigation:	Not Applicable	
Residual impacts:	Not Applicable	
Cumulative impact post mitigation:	Not Applicable	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Not Applicable	
DECOMMISSIONING AND CLOSURE PHASE		
Potential impact and risk:	Not Applicable as Applicant does not intend to decommission	

6 CONCLUSIONS

The object of this investigation was to predict and assess the impact of noise associated with a proposed bus depot to be located along Wetton Road, Wynberg close to the intersection of Wetton Road with Rosmead Avenue.

From information received it was understood that future trunk and feeder routes originating from the Claremont Public Transport Interchange and the Wynberg Public Transport Interchange, located to the west of the study area, would extend along Wetton Road via the intersection of Rosmead Avenue with Wetton Road. Particularly, the peak hour bus movements along the aforementioned roads and the associated road traffic noise would be independent of the location of the proposed Wynberg bus depot.

The TIA report conveyed that the predicted number of buses leaving the proposed depot during AM and PM peak periods would be 61 and 155, respectively. However, no indication was given of the split and trajectory of the buses after the Wetton Road intersection with Rosmead Avenue. In addition no indication of the number, trajectories and times of buses returning to the proposed depot were given.

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Given the limited knowledge available, the only impact of noise that could be investigated was that due to bus movements within the proposed bus depot on the Bonnytown informal settlement adjacent to the western boundary of the proposed bus depot site.

Using previously measured data (JKA, September 2017) an estimate was made of the impact of noise on the informal settlement due to bus movements close to the western boundary of the proposed bus depot site. It was calculated that provided the number of bus movements on the trajectory closest to the western boundary did not exceed one per minute the associated noise would be compliant with the NCR. Assessment in terms of SANS 10103:2013, the relatively few bus movements during a full daytime and/or night-time reference time period, would result in the intensity of noise impact being **Negligible**.

REFERENCES

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SANS 10103:2008 The measurement and rating of environmental noise with respect to annoyance and to speech communication.

Western Cape Noise Control Regulations, P.N. 200, 20 June 2013.

Jongens Keet Associates, September 2017. *Noise Impact Assessment of the proposed establishment of MyCity Mitchells Plain and Khayelitsha bus depot between Mitchells Plain and Khayelitsha.*

