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Capital Park Service Station Proposal

Environmental Noise Professional Opinion Preliminary for client use only – Issue 1

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EXECUTIVE SUMMARY

A new Service Station is proposed on the Eastern side of Paul Kruger Street between Malherbe Street (which carries two-way traffic) and Venter Streets (which is a cul-de-sac closed by a wall at Paul Kruger Street). The proposed site is bounded on the east by existing residences and the other four corners of the intersection Paul Kruger/Malherbe are occupied by commercial sites. The site has a high ambient noise level dominated by traffic noise from Paul Kruger Street. The investigation's purpose was to assess the noise impact of the development on the surrounding residential area and generate a professional opinion thereon. This was confirmed by making spot measurements of the existing ambient noise levels at the proposed site during the evening rush hour. These are described in Section 3.5. All calculations and measurements were carried out in accordance with the relevant SABS Standard Codes of practice (Refs. 1 & 2), and as required by the regulations of the DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM.

The expected response from the proposed community to the noise impact, i.e. the increase or otherwise in the ambient noise of the area due to the development, is based on the relevant SANS document, (Ref. 1), and expressed in terms of the effects of impact, on a scale of 'NONE' to 'VERY HIGH'. This report is an overall assessment designed to predict the collective response of a noise-exposed population and therefore the impact the increase in ambient noise is likely to have on them, and is based on measured and/or predicted equivalent continuous noise levels according to the relevant SANS code of practice, (Ref. 1).

The The noise impact is rated as NONE to VERY LOW.

Good practice in the design and layout of the site and general mitigation measures, especially with relevance to the reduction of noise into the residential area to the east of the site, are recommended.

1. PURPOSE OF THE INVESTIGATION AND TERMS OF REFERENCE

A new Service Station is proposed on the Eastern side of Paul Kruger Street between Malherbe and Venter Streets. The proposed site is bounded on the east by existing residences and the other four corners of the intersection Paul Kruger/Malherbe are occupied by commercial sites. The site has a high ambient noise level dominated by traffic noise from Paul Kruger Street. The investigation's purpose was to assess the noise impact of the development on the surrounding residential area and generate a professional opinion thereon. This was confirmed by making spot measurements of the existing ambient noise levels at the proposed site at a time of maximum daily traffic flow..

2. INVESTIGATIVE METHODOLOGY

2.1 Introduction

In order to be able to assess both the quantitative and geographical extent of any potential impact, it is necessary to have measured baseline data in the form of existing ambient noise levels at the site and objective assessment of the predominant noise on site. These can then be compared to tables of acceptability of SANS 10103. The extent of community response can then be assessed according to national and international standards which take into account sociological factors as well as the noise climate.

2.2 Ambient Noise Levels at the Proposed Site

Spot measurements to confirm the existing ambient noise levels were made on Monday January 12 2015. Two positions on or near the boundary of the proposed site were chosen as properly representative of the noise situation at the site and measurements were made of the equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ using the 'I' (Impulse) dynamic response characteristic as recommended in SANS 10103:2008 (ref. 1).

2.3 Assessing the Noise Impact

The recommended noise levels in a suburban residential area are described in Table 2 of SANS 10103 (ref. 1), and Table 5 of the same document as follows.

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 $L_{R,dn}^{1)}$	Day-time $L_{Req,d}^{2)}$	Night-time $L_{Req,n}^{2)}$	Day-night $L_{R,dn}^{1)}$	Day-time $L_{Req,d}^{2)}$	Night-time $L_{Req,n}^{2)}$
RESIDENTIAL DISTRICTS						
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

NON RESIDENTIAL DISTRICTS						
d) Urban districts with some workshops, with business premises, and with 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

Day-time : 06:00 to 22:00, Night-time : 22:00 to 06:00

- 1) The values given in columns 2 and 5 are equivalent continuous rating levels and include corrections for tonal character, impulsiveness of the noise and the time of day.
- 2) The values given in columns 3, 4, 6 and 7 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness of the noise.

NOTE 1 If the measurement or calculation time interval is considerably shorter than the reference time intervals, significant deviations from the values given in the table may result.

NOTE 2 If the spectrum of the sound contains significant low frequency components, or when an unbalanced spectrum towards the low frequencies is suspected, special precautions should be taken, and specialist attention is required. In this case the indoor sound levels may significantly differ from the values given in columns 5 to 7. See also annex B.

NOTE 3 Residential buildings, e.g. dormitories, hotel accommodation, residences etc. may only be allowed in non- residential districts on condition that the calculated or anticipated indoor $L_{Req,T}$ values given in column 3 of table 1 are not exceeded.

Table 1: Table 2 of SANS 10103-2008 - Acceptable rating levels for noise in districts

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
<p>a $L_{Req,T}$ should be calculated from the appropriate of the following:</p> <ol style="list-style-type: none"> 1) $L_{Req,T} = L_{Req,T}$ of ambient noise under investigation MINUS $L_{Req,T}$ of the residual noise (determined in the absence of the specific noise under investigation). 2) $L_{Req,T} = L_{Req,T}$ of ambient noise under investigation MINUS the maximum rating level for the ambient noise given in table 1. 3) $L_{Req,T} = L_{Req,T}$ of ambient noise under investigation MINUS the acceptable rating level for the applicable district as determined from table 2. 4) $\Delta L_{Req,T} =$ Expected increase in $L_{Req,T}$ of ambient noise in an area because of a proposed development under investigation. <p>NOTE Overlapping ranges for the excess values are given because a spread in the community reaction may be anticipated</p>		

Table2: Table 5 of SANS 10103-2003 – Categories of Community/Group Response

The expected response from the local community to the noise impact, i.e. the exceedance of the noise over the acceptable rating level for the appropriate district, is primarily based on

Table 5 of SANS 10103 (ref. 1), but expressed in terms of the effects of impact, on a scale of 'none' to 'very high'.

INCREASE dB	RESPONSE INTENSITY	REMARKS	NOISE IMPACT
0	None	Change not discernible by a person	None
3	None to little	Change just discernible	Very low
3 ≤ 5	Little	Change easily discernible	Low
5 ≤ 7	Little	Sporadic complaints	Moderate
7	Little	Defined by National Noise Regulations as being 'disturbing'	Moderate
7 ≤ 10	Little to medium	Sporadic complaints	High
10 ≤ 15	Medium	Change of 10dB perceived as 'twice as loud' leading to widespread complaints	Very high
15 ≤ 20	Strong	Threats of community/group action	Very high

Table 3: Response intensity and noise impact for various increases over the ambient noise

3. AMBIENT NOISE MEASUREMENTS AT THE SITE

3.1 Introduction

Noise measurements according to SANS Code of Practice 10103:2008 (Ref. 1) were carried out at the above. Ambient noise measurements were made at two points on the property boundary. These points are defined in Section 3.5.

3.2 Equipment Used:

01dB Class 1 Integrating Sound Level Meter Type SdB01+, serial number 10180, fitted with Microphone Type MCE210, serial number 001194, and windscreen. Field calibration using Bruel and Kjaer Type 4230 Sound Level Calibrator, serial number 522170.

3.3 Calibration Certificates:

All equipment with valid calibration certificates, from the testing laboratories of De Beer Calibration Services. The calibration certificates are available for viewing if required.

3.4 Procedures Used:

Measurements were carried out in accordance with SOUTH AFRICAN NATIONAL STANDARD - Code of practice, SANS 10103:2008, *The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication.*

and as required by the regulations of the DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM. NO. R. 154. *Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 (Act No. 73 of 1989).* Govt. Gaz. No. 13717, 10 January 1992.

3.5 Measurements at the Proposed Site:

Measurements were carried out at two locations on the property boundary. These locations were chosen for the following reasons:

- 1) Easily definable and with easy future access in case of need for comparison measurements after completion of the project.
- 2) Distributed round the site for representative coverage.
- 3) Representative of the two important background noise regimes, residential area on the boundary of the proposed development distant from Paul Kruger Street (location 2) and direct road traffic noise on Paul Kruger Street (location 1)

Note 1: All noise levels in this report are A-weighted noise levels expressed in dB(A).

Note 2: The L_{90} value represents the background noise in the absence of intrusive noise, i.e. that due to traffic on Paul Kruger Street.

Note 3: Noise from Paul Kruger Street completely dominates the noise climate at all points on the site.



Map of the area around the proposed site and location of the Measurement Points

Location 1

At a position 3m west of the current boundary wall of the proposed site, at 12m from the road center-line at the GPS position S25° 43.745' E28° 11.246'. See following photographs.



View south along Paul Kruger Street



View north along Paul Kruger Street



View west across Paul Kruger Street



View east into the proposed site at Venter St.

Measurement Table

Day/Date	Time	Temp °C	RH %	Wind m/s	L _{Aeq,1} dB(A)	L ₉₀ dB(A)	Comment
Mon 12/01/15	16:02-16:12	30.0	41	<0.5	67.2	54	C=295, HGV=7
Mon 12/01/15	16:14-16:24	30.0	41	<0.5	65.6	54	C=250, HGV=9
Mon 12/01/15	16:26-16:36	30.0	41	<0.5	68.9	55	C=266, HGV=27
Mon 12/01/15	17:20-17:30	30.0	41	<0.5	69.4	55	C=340, HGV=18
Mon 12/01/15	17:32-17:42	30.0	41	<0.5	71.6	55	C=288, HGV=12

Observations: These values are typical of an area in direct proximity to a highly trafficked main road, with continuous high levels of noise from passing vehicles, which dominates the noise climate. These values agree well with noise levels calculated from measured traffic flows according to SOUTH AFRICAN STANDARD - Code of practice, SANS 10210:2008, *Calculating and predicting traffic noise*.

Location 2

At a position towards the rear boundary of the proposed site 8m from the centre-line of Malherbe Street, and 60m from the centre of the traffic signal controlled intersection of Paul Kruger Street, at the GPS position S25° 43.710' E28° 11.367', as shown in the following photographs.



View west along Malherbe to Paul Kruger St



View west along Malherbe



View across Malherbe to the proposed site



View north into houses on Malherbe

Measurement Table

Day/Date	Time	Temp °C	RH %	Wind m/s	L _{Aeq,1} dB(A)	L ₉₀ dB(A)	Comment
Mon 12/01/15	15:30-15:40	30.0	41	<0.5	64.9	53	No Count
Mon 12/01/15	15:42-15:52	30.0	41	<0.5	65.3	50	C=62, HGV=0
Mon 12/01/15	16:51-17:01	30.0	41	<0.5	65.2	54	C=100, HGV=0
Mon 12/01/15	17:03-17:13	30.0	41	<0.5	64.7	52	C=70, HGV=2

Observations: These values are typical of an area in direct proximity to a highly trafficked main road, with continuous noise from passing vehicles, which dominates the noise climate. These values agree well with noise levels calculated from measured traffic flows according to SOUTH AFRICAN STANDARD - Code of practice, SANS 10210:2008, *Calculating and predicting traffic noise*.

4. IMPACT ASSESSMENT

4.1 General

The site is adjacent to a main through road, Paul Kruger Street, which is continuously and heavily trafficked during most of the day, including the weekend. The noise level measured during the peak daytime period, is higher at the site boundaries, even without any mitigation measures being taken, than noise levels predicted at a service station. It is therefore unlikely that any noise impact will be experienced from activities at the site.

4.2 Continuous Equivalent Noise Levels and Individual Noise Events

This report is an overall assessment designed to predict the collective response of a noise-exposed population and therefore the impact the existing environmental noise is likely to have on them, and is based on measured and predicted equivalent continuous noise levels according to SANS 10103. It will be possible to detect and distinguish individual noise events, even if the noise impact is assessed as NONE, or VERY LOW, i.e. where a person with normal hearing will not be able to detect the predicted increase in ambient noise level over the acceptable rating value for the applicable district, but where an individual intrusive noise may nevertheless be audible to that person.

4.3 Predicted Impact of Noise from the Development on the Surroundings

The ambient noise measurements, dominated by the traffic noise from Paul Kruger Street and Venter Street at position 2, representing the boundary of the development which is closest to the residential area and furthest from Paul Kruger Street, see section 3.5, are already 10dB greater than the suggested daytime values for urban residential districts, according to the relevant section (Table 2) of the recommendations of SANS 10103:2008 as follows:

Type of Residential District	Daytime	Night-time
Urban Districts	55	45

Reference to Table 5, application 3, of SANS 10103:2008 (Table 2 above) also indicates that no reaction would be registered. The impact of the proposed development on the existing noise climate is likely to be NONE or VERY LOW.

It is not likely that any additional noise generated by the arrival and departure of vehicles out of the normal traffic flow will be significant in comparison with the noise generated by the normal traffic flow on Paul Kruger and Malherbe Streets.

Note that all assessments are based on comparison with actual measured values. The current assessment is to give guidelines to the developer as to where problems might arise from noise and how to avoid them in the planning stage, where this is possible.

4.3.3. Mitigation measures

The careful placement of potentially noisy machinery such that openings for air intakes, for example for compressors, air conditioning, or pumping machinery, face Paul Kruger or Malherbe Streets, and not the boundary wall to the hosing to the east, careful landscaping, and siting of walls and auxiliary buildings on or near the residential boundary can form a useful noise barrier for activities on the site, and as an added benefit, will reduce noise from the existing roads. The magnitude of such barrier effects will depend on the detailed layout of these buildings and their effective 'solidity' as a noise barrier.

5. REFERENCES

1. SOUTH AFRICAN STANDARD - Code of practice, SANS 10103:2008, *The measurement and rating of environmental noise with respect to annoyance and to speech communication.*
2. SOUTH AFRICAN STANDARD - Code of practice, SANS 10210:2008, *Calculating and predicting traffic noise.*
3. SOUTH AFRICAN STANDARD - Code of practice, SABS 10357: 2008, *The calculation of sound propagation by the Concawe method.*
4. SOUTH AFRICAN STANDARD - Code of practice, SABS 10328:2008, *Methods for environmental noise impact assessments.*
5. DEPARTMENT OF ENVIRONMENTAL AFFAIRS. NO. R. 154. *Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 (Act No. 73 of 1989).* Govt. Gazette. No. 13717, 10 January 1992.
6. Fuggle, R. F. and Rabie, M. A. et al., *Environmental Management in South Africa.* Juta & Co, Ltd., 1992
7. Gauteng province, Department of Agriculture, Conservation and Environment, Notice 5479 of 1999. *Noise control regulations, 1999,* Provincial gazette extraordinary, 20 august 1999