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Nightclubs and Restaurant Bars Noise Pollution: A Case Study of Melville Community, Johannesburg

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Abstract
The majority of South Africans live in communities that are somewhat exposed to noise pollution. Noise has the capability to cause conflict between those who are generating it and those who are victims of it. People do tolerate noise to a certain extent, but when noise becomes a nuisance it infringes other people's rights and that can lead to irritation and frustration. The purpose of this study was to investigate the occurrence of environmental noise pollution emanating from nightclubs and restaurant bars on the community of Melville, Johannesburg. A quantitative research method was followed using a calibrated Sound Level Meter to measure noise at 10 different measuring points. The noise measurements were randomly sampled within the study area on weekends and public holidays during the day from 10h00 to 14h30 and at night from 22h00 to 02h30.

Results
The research findings revealed that about 87% of noise levels measured using the sound level meter did not comply with officially acceptable ambient noise levels of 40dB at night. Residents of Melville experienced high level of noise at night emanating from nightclubs and the sampled population complained about irritability, fatigue and sleeping disorders due to exposure to noise. Based on the outcome of this research, there is a need for health education on the adverse effects of noise pollution; sound insulation at places of entertainment; implementation and enforcement of a noise management policy to effectively control and manage noise pollution and to constantly monitor noise levels by collecting noise measurements.
Keywords: Quantitative research, Melville, Johannesburg, Noise pollution, Nightclubs, Restaurant bars, Random sampling, Sound level meter

Introduction

Environmental noise consists of all the unwanted sound in our communities apart from noise that originates from inside the workplace (Goines & Hagler, 2007). Environmental noise results from high population concentrations, high concentration of vehicles and intense industrial and commercial development found in urban areas. The main sources of environmental noise include traffic noise, construction and public works, industrial and institutional activity, social and economic activities (King, 2008). Despite attempts to regulate it, noise pollution has become an unfortunate fact of life across the world. In the 21st century noise has escalated so dramatically in both severity and extent that it will become a major threat to the quality of human life. Noise pollution has manifested itself in the urban environment and its impact has been a constant threat since the industrial revolution (Sigh & Rao, 2001).

Researches on noise have previously focused on occupational exposure but little has been done to examine the effect of environmental noise at community level (King, 2008). Unfortunately data on noise pollutants are scarce in developing countries (including South Africa). Moreover, there are limited resources to systematically reveal the contribution of noise pollution (Burns, 2007). Nightclubs and restaurant bars have become a major part of the entertainment for many young adults, and attending clubs has become a common recreational activity for young people. The general estimated average noise levels emanating from clubs and bars ranges from 100db A-weighted and over, and attendance times have been estimated to be from 22h00 to 02h00 during the weekends and public holidays (William *et al.*, 2010).

South Africa has recognized noise as a pollutant; however, it is a difficult pollutant to control compared to other environmental pollutants. This is due to the transient nature of noise, which prevents it from collecting in the environment like other types of pollutants. Noise can be controlled at source, which is the most effective method to prevent noise pollution. Control at source may be done either directly or indirectly related to the design process addressing causes of noise. Noise standards and planning strategies can be used effectively to abate noise at source (Bies & Hansen, 1996). If noise cannot be controlled at source, the next step is to abate it at the transmission path e.g. proper land use planning to avoid busy highways cutting across residential development or passing close to sensitive use areas. Other methods to abate noise is by placing walls as barriers

between the source and the receiver and applying acoustic absorbing materials on the walls of the room or by placing additional acoustic absorbing surfaces in the room. An effective control procedure, although expensive, is to enclose the sound source in an acoustic enclosure or enclose the receiver in a personnel booth (Barron. 2002).

The Noise Control Regulation Act No. 79 of 1999 (South Africa, 1999) forbids people to operate or play a musical instrument, drum, radio, sound loudspeakers, system or other types of device producing sound that causes a noise nuisance. It also goes further and explains that no person is allowed to play or operate instruments that exceed the acceptable ambient noise levels as classified in the Act. The local authority may take necessary steps that they deem necessary if there is noise coming from building premises therefore, any person who does not adhere to the provisions of the regulation will be guilty of an offence and liable for conviction.

The National Measuring Units and Measuring Standards Act No. 18 of 2006 (South Africa, 2006) states that in order to ensure that the measuring instrument to be used is checked before and after every use by using a calibration machine, the sound level meter must be verified by the specifications of accuracy of National Codes of Practices of Acoustics. The sound level meter must be calibrated by an accredited laboratory or the original manufacturer of the equipment and calibration should be done on an annual basis (Bruel & Kjaer, 2000). South African Noise Standards (SANS 10103, 2008) for measurements and rating with respect to annoyance and speech communication provide guidelines on noise impact criteria limits and standards. The standards are used by local authorities to control noise. The ambient zone noise level in suburban areas must not exceed 50dB (A) in day time and night time and not exceeding 40dB (A) if windows are opened.

The community of Melville, Johannesburg, has for the past seven years (since 2007) been complaining about high levels of noise pollution emitted from nightclubs and bars, according to the noise pollution complaints statistics from the City of Johannesburg complaint register. The Johannesburg Metropolitan Municipality has by-laws and relevant pieces of legislation regulating environmental noise in order to keep noise levels below the minimum requirement of 50 decibels. However, compliance by entertainment business owners is still a major challenge. It has been noted that most of the studies in noise pollution focus much on mobile sources (such as air traffic noise, road traffic noise and railroad noise) and little attention has been given to immobile sources such as nightclubs and restaurant bars. This research has never been done before; previous researchers have based their research on occupational noise, traffic noise and aircraft noise

The local authorities have been unable to act effectively to combat noise pollution as noise management and control is disseminated across several acts, regulations and standards. The legislation has no clear guidelines for acceptable standards related to maximum ambient noise levels, thus making the legal interpretation of specific noise problems difficult, and often limiting local authorities' from acting effectively against offenders. There are discrepancies in technical requirements across several acts, legislation and standards and this has resulted in inconsistencies in the manner in which noise pollution issues are evaluated. Currently in South Africa these challenges are being addressed through the revision of standards and the Noise Control Regulation (Calyx Environment CC, 2014).

Research Method

Study Area

The study was conducted within the bohemian Suburb of Melville, Johannesburg. It is one of the few areas of northern suburbs to have cafes, restaurants, shops, pubs, restaurant bars and nightclubs lining the streets rather than in enclosed shopping centers. Situated just a short distance from city parks, this suburb is mainly comprised of residential and commercial properties (South African Tourism, 2015). It is a meeting point and general hangout for most of the students as it is situated close to two universities, the University of Johannesburg and University of Witwatersrand. Melville falls within the boundaries of Region B, City of Johannesburg.

In this study the residents of Melville community comprised the study population. According to the City of Johannesburg (City of Johannesburg, 2015) population is estimated at just over 2983 individuals and consists of 2184 employed and 93 unemployed residence. The population is stable and economically active with high levels of education and disposable income. Melville community comprises of 1635 males and 1722 females (Frith, 2011). The majority of nightclubs are located along 7th Street, and a few relatively new nightclubs along Main Street. The sampled streets of the study area are marked in green as illustrated in Figure1.1 the boundary of the study site (Melville). This study focuses on nightclubs and restaurant bars along 7th Street and Main Street as the major source of environmental noise.

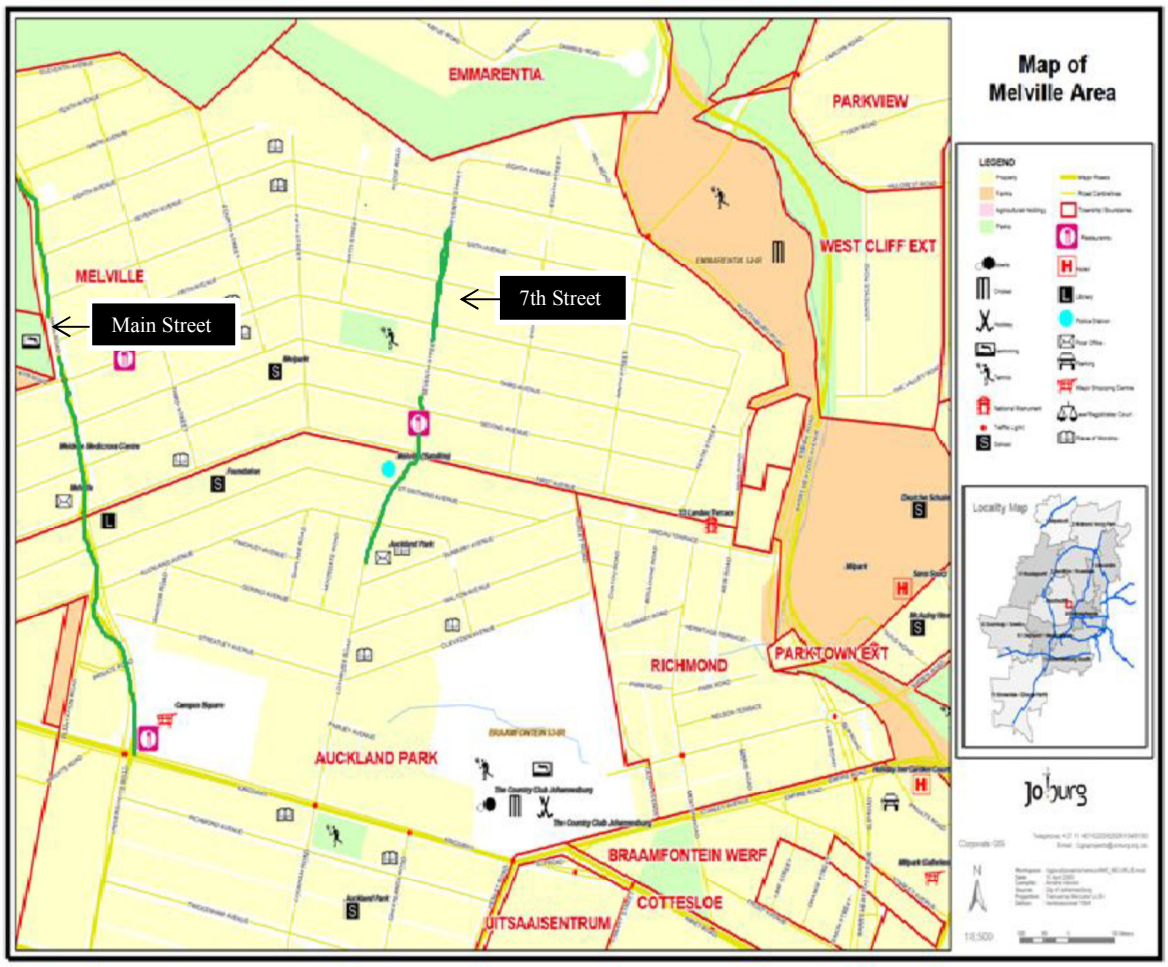

Figure 1.1 The Melville study area (City of Johannesburg, 2015)

Sampling Methods

A calibrated sound level meter (SLM) type 1 SLM Bruel & Kjaer 2238 was used to take measurements (Maxim Instrument Corp, 2015). The measuring instrument used in the study was obtained from City of Johannesburg, Environmental Health Department Region B.

The noise measurements were conducted at 10 households in Melville using simple random sampling technique to select households by putting all streets names and house numbers targeted for sampling in a hat, and the selecting of subsets by pulling out 10 residential addresses. Measuring points were set up at 10 selected households in Melville to determine the environmental noise levels (see Figure 1.2). The measuring points in the study were identified by using a Geographical Point system (GPS) and co-ordinates were recorded.

Noise measurements were taken at night between 22h00 and 02h00 and during the day between 10h00 and 14h00 during weekends and public holidays. Measurements were taken at 30 minutes intervals for a period of 2 months in July and August 2015. The measurement sites were located at least 3.5 metres from an acoustically reflective surface other than the ground. Test sites were such that the nearby obstacles such as building and topographical features did not introduce acoustic screening effects at the site that was being measured; the measurements microphone was located 1.2 above ground level.

The test site was free from wind influence and there were no persons present near the measuring microphone which might negatively influence the sound pressure level obtained. Noise from talking or movement was strictly excluded from the measurement site. The sound levels were reported in dB (decibels) relative to the microphone. The measuring tool had a valid calibration certificate from the external private laboratory. Environmental noise limits are stated in the South African National Standard (SANS 1013: 2008) and the Environmental Conservation Act (Act No: 73 of 1989).

Figure 1:2 Ten (10) measuring points in Melville.

Figure 1.3 shows an example of a photograph taken during the day at a measuring point.

Figure 1.3: Measuring point 4 during the day (57 5th Avenue Melville)

Results

The data collected during the research were captured in a Microsoft Excel spread sheet. These data were then analyzed using descriptive statistics. The results were presented in Tables using percentages and in addition some of the results were presented by means of photos.The research finding revealed that about:

- 87% of noise levels measured with the sound level meter did not comply with officially acceptable levels of 40dB at night.
- 69% of respondents indicated that the main source of noise is pollution is nightclubs.
- 78% of respondents described noise as annoying, disturbing and unwanted.
- 57% of respondents indicated that members of their household have suffered from sleeping disorders due to noise activities at night disrupting their sleep patterns and resulting in irritability and fatigue.

The noise measurements were taken on weekends and public holidays during the day from 10h00 to 14h30 and at night from 22h00 to 02h30. The research findings revealed that the residents of Melville experienced high level of noise at night with nightclub as major source of noise and as a result the majority of the sampled population complained about irritability, fatigue and sleeping disorders due to exposure to noise.The outcome of this research indicated the need of health education on the adverse effects of noise pollution and the need of sound insulation at places of entertainment. Implementation of a noise management policy is needed in order to effectively control and manage the noise pollution in its area of jurisdiction and regular noise level monitoring by constantly taking noise measurements by law enforcement officers.

Noise levels for measuring points 1- 10 during the day

Noise levels were taken in 10 respective measuring points during the day. SANS 10103 (2008) specifications were used for the purpose of measuring and rating levels of noise. Table 2 shows measurements that were taken at 10 measuring points during the day. The total average noise was 32.64dB (A) during the day in the month of July 2015 and 34dB (A) in the month of August 2015. The results for both months are below the acceptable zone sound level for noise.

Table 1: Noise levels for measuring points 1-10 at day time

points	Distance from source		Day	Time	Average dB(A)	GPS Co-ordinates	
						Longitude	Latitude
	7th Street	Main Street					
1	174m	861m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	10h00 14h30 14h30 10h00	37.1 30.4 30.4 31.3	28°00’34,5”E	26°10’40”S
2	42.7m	804m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	10h30 14h00 14h00 10h30	20,2 35.8 39.4 34.3	28°00’32,0”E	26°10’38,2S
3	77m	708m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	11h00 13h30 13h30 11h00	30.7 33.2 35.5 38.8	28°00’28.8”E	26°10’35.4”S
4	217m	760m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	11h30 13h00 13h00 11h30	37.2 36.3 39.3 44.4	28°00’28,6”E	26°10’28.5”S
5	235m	675m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	12h00 12h30 12h30 12h00	30.9 37.7 38.7 39.4	28°00’25.7”E	26°10’29.65”S
6	756m	241m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	12h30 12h00 12h00 12h30	34.6 31.5 25.2 32.7	28°00’047”E	26°10’30.4”S
7	620m	570m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	13h00 11h30 11h30 13h00	26.9 36.2 26.7 37.6	28°00’41.7”E	26°10’23.3”S

Noise levels for measuring points 1- 10 at night

Noise levels were taken in 10 respective measuring points at night (see Table 1.3). SANS 10103:2008 specifications were used for the purpose of measuring and rating levels of noise. A total of 40 noise level measurements undertaken, only 5 measurements were below the SANS 101103 (2008) threshold of 40dB at night. This implies that only 12.5 % complied with officially acceptable levels and 87 % of the measurements did not comply with SANS 10103 (2008) standard levels. The range of noise levels higher than the acceptable levels was from 40.2 dB measured at 23h30 on the 18 July 2015 at point 9 to 78.1 dB measured at 02h00 of same day at point 2. Figure 3 shows an example of a photograph taken during the night at a measuring point.

The highest levels of noise were measured at point 2 and 3 respectively possibly because they are relatively closer to the sources on 7th street as compared to other points. The lowest noise levels were measured at point 7 and 9, which are intermediate distances. The readings marked in red are higher than the acceptable noise levels according to SANS 10103 (2008) (see Table 1.3).

Table 2: Noise levels for measuring points 1-10 at night

Points	Distance from source		Day	Time	Average dB(A)	GPS Co-ordinates	
						Longitude	Latitude
	7th Street	Main Street					
1	174m	861m	04 Jul 2015 18 July 2015 10 Aug 2015 21 Aug 2015	22h00 02h30 02h30 22h00	54.3 53.2 60.5 56.3	28°00’34,5”E	26°10’40”S
2	42.7m	804m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	22h30 02h00 02h00 22h30	75.2 78.1 74.2 70.3	28°00’32,0”E	26°10’38,2S
3	77m	708m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	23h00 01h30 01h30 23h00	70.3 70.2 69.5 67.4	28°00’28.8”E	26°10’35.4”S
4	217m	760m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	23h30 01h00 01h00 23h30	49.8 57.1 57.8 54.3	28°00’28,6”E	26°10’28.5”S
5	235m	675m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	00h00 00h30 00h30 00h00	57.5 55.2 53.4 51.2	28°00’25.7”E	26°10’29.65”S
6	756m	241m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	00h30 00h00 00h00 00h30	55.3 53.5 50.5 50.7	28°00’047”E	26°10’30.4”S
7	620m	570m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	01h00 23h30 23h30 01h00	38.5 32.2 36.8 40.4	28°00’41.7”E	26°10’23.3”S
8	465m	1.163m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	01h30 23h00 23h00 01h30	40.4 40.8 45.3 49.3	28°00’38.6”E	26°10’24.1”S
9	464m	1.228m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	02h00 23h30 23h30 02h00	42,5 40.2 37.6 35.2	28°00’46.3”E	26°10’28.15”S
10	939m	156m	04 Jul 2015 18 Jul 2015 10 Aug 2015 21 Aug 2015	02h30 00h00 00h00 02h30	59.6 62.3 63.3 62.8	27°59’57.8”E	26°10’37.2”

Total average noise levels- July 2015:54.11dB (A) & August 2015: 54.34dB (A)

Figure 1.4 Measuring point 4 at night (57 5th Avenue Melville)

Efforts in Developing Countries to Control Noise Pollution

The urban areas in the developing countries have increased not only in size but also in terms of the living conditions; as a result there has been a notable increase in noise pollution, which has become part of day-to day life. The situation requires looking at various control measures available in South Africa and other developing countries to establish if they are effective and efficient (Kumar *et al.,*2004).

South African context

Development in urban areas, traffic, aeroplanes, taxis and construction sites are among the many sources of noise that pollutes our cities. People tolerate the noise but when it becomes annoying or irritating it infringes upon the rights of people's quality of life and peace and as a result it needs to be dealt with (Zichariou & Gladwin, 2014).

According to Zichariou and Gladwin (2014) when noise nuisance occurs the first available option is for an individual to lay a complaint with the local authority by either a written statement or telephonically. Most of the local authorities in South Africa have departments dealing with noise control; these departments are given powers to take reasonable steps necessary to control the noise and associated complaints. Law enforcement officials conduct investigations to determine the extent of the problem. If the person causing the noise nuisance is found guilty of an offence they are instructed to reduce the noise and if they don't comply, they are issued with a fine and in some instances the equipment is confiscated. If the offender persists with the noise the courts can be approached (Zichariou & Gladwin, 2014).

Nigerian context

Noise pollution in Nigeria is a major problem and it exceeds the specified noise criteria standards and limits (Oyedepo, 2009). The study conducted in Nigeria reveals that the noise levels in the city is above 3dB (A) to 10dB (A) above the upper limit of 82dB (A). In Nigeria the main sources of noise are generator plants, vehicular engines, and household noise, noise from religious worship and nightlife noise (Ijaiya, 2014). Nigeria does not have existing law enforcement dealing with the problem of noise or its management. Noise issues are dealt with under the common law perspectives through the court of law. The person found causing a noise nuisance is charged and issued an injunction restraining them from further act of noise nuisance. The common law remedy through court action is not a permanent solution to abating noise in Nigeria (Ijaiya, 2014)

Brazilian context

In Brazil several studies have been conducted to determine the ambient noise levels and motor vehicles came out

as the highest source of noise pollution, followed by noise from barking dogs, audio entertainment, loudspeaker equipment and appliances (Jamir *et al*., 2014). Sao Paolo, one of the major cities in Brazil, implemented a noise management programme aimed at controlling ambient noise levels in the city, ensuring that the health and well-being of the population is protected. The noise standards in Brazil specify that the maximum limit for environmental noise in residential areas should not exceed 50dB (A) respectively (De-Sousa & Cardoso, 2002).

Argentinian context

According to Schweimier (2010) noise pollution is increasing year after year in Argentina and as a result Argentina has become the fourth loudest country in the world. The main sources of noise in Argentina are from hand tools, staff turnover, light vehicles, mobile equipment and machinery and entertainment equipment.

The Argentinean government has come up with stringent laws to eliminate noise pollution, but is not improving. The WHO states that noise levels should not exceed 55dB (A) during the day and 45dB (A) at night, but measurements that have been taken in Argentina's cities exceed these limits. Policies and regulations developed to combat the noise problem have still not been effective (Schweimier, 2010).

Indian context

Noise is a major problem in India and unfortunately most of the people are unaware of the dangers it can cause. During the last decade (2001-2011) the highest average level of 73,33dB (A) day-time noise was detected at silence zones not less than 100m from hospitals, educational institutions and religious places, and the lowest of 63.5dB (A) in residential areas. The highest average noise level of 71.18dB (A) experienced at night (Jamir *et al*.; 2014). The main sources of noise in India are from automobiles on roads, construction activities, fireworks and loudspeakers. The Central Pollution Board in India has implemented noise standards for different sources of noise and strict legislation to solve the problem of noise pollution has been a matter of urgency (Kumar *et al.*, 2004).

Conclusion

Developing countries have made efforts to control the noise nuisance but their efforts are not adequate to curb the problem of noise. Due to advancement of science and technology the problem of noise pollution has increased to a large extent. Therefore, developing countries need to implement strict laws and increase public awareness about the problem of noise pollution.

Melville falls under a suburban area in according with the requirements prescribed in SANS 10103: 2008 guidelines. During the noise survey it was discovered that 87% of noise levels measured with the sound level meter did not comply with officially acceptable levels of 40dB at night as prescribed by Sans 10103: (2008) which indicates that Melville residence experience higher levels of noise at night with nightclubs as major sources of noise pollution.

The outcome of this research indicated the need of: health education on the adverse effects of noise pollution; sound insulation at places of entertainment; implementation and enforcement of a noise management policy to effectively control and manage noise pollution; and to constantly monitor noise levels by collecting noise measurements. Regular noise measurements of the nightclubs and restaurant bars should be conducted to ascertain their compliance in accordance with noise control regulations, South African Noise Standards (SANS) and the World Health Organization (WHO). Noise assessments are only done retroactively when complaints are lodged with the local authority, but law enforcers should be proactive in this regard.

The City of Johannesburg Metropolitan Municipality has to consider having its own noise management policy in order to effectively control and manage the noise pollution in its area of jurisdiction. The policy will take into account the requirements of the Gauteng Provincial Government Noise Control Regulation that were promulgated in August 1999. The noise management policy will assist in setting acceptable noise level standards and noise impact criteria for the City of Johannesburg Metropolitan Municipality. The policy will provide the necessary internal procedures for Environmental Health Department in the City of Johannesburg Metropolitan Municipality which need to be tasked with aspects of noise management and control. The policy will also identify legal powers necessary for the City of Johannesburg to effectively combat noise issues in the city.

Nightclubs and restaurants in Melville should be sound-proofed to control the amount of noise generated by loud music and patrons. The owners of the entertainment businesses in Melville should consider reducing noise through a range of architectural and sound insulation methods. This can be done by consulting with sound acoustic specialists or experts certified by South African Bureau of Standards in accordance with South African National Standards (SANS 10103, 2008) to provide advice on acoustic methods that need to be used.

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