

Investigation of Noise Compliance Towards Buffer Zone at UTHM Pagoh's Residential College

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ABSTRACT: Malaysia is a developing country in terms of economy, education, and social development, which has led to growth in manufacturing, construction, and other industries. This contributes to environmental issues such as contamination of water, air, and noise. The purpose of this study is to determine the level of compliance with regard to noise generation, which is linked to the current buffer zone near the UTHM Pagoh Residential College. Similarly, the goal of this research is to determine the sound level in an exposed region. The sound level meter was set up at three distinct locations along the UTHM Pagoh Residential College for this study. The data were collected 3 interval time during morning, afternoon and evening on Sunday, Wednesday and Friday. In general, the average noise level is higher on Sunday and Wednesday, ranging between 50 and 55 decibels. Conversely, the noise level on the weekend (Friday) is lower, averaging 48.8 decibels. The result indicates that the noise likely higher during weekdays where it is significantly shows that most of the vehicle used the road during weekdays. As a result of the findings, it can be concluded that the noise level in Residential College is less harmful because it does not exceed DOE standards.

Keywords: *Noise Compliance, Buffer zone, Residential College, UTHM Pagoh*

1. INTRODUCTION

Noise pollution is a type of environmental pollution caused by human activity and growth, which has increased in line with the existing population. It occurs when noise levels from traffic, construction sites, and other sources exceed a safe level [1]. A vibration that propagates as an acoustic wave is referred to as noise. As the humans can only hear a certain amount of sound, the resulting noise pollution undermines overall comfort. Noise pollution has been shown to have negative consequences for human physiology and psychology [2]. According to previous research, there is a definite link between noise and wellbeing, including stress-related disorders, high blood pressure, speech distortion, and hearing loss. Therefore, the area that close to the noise sources were identified and methods to overcome the problem has been studied by the current researchers. University is one of the areas affected by this noise

pollution problem.

A university is a type of higher education institution that includes both a campus and a residential college. Most university are now situated near the city centre, adjacent to roads, highways, and even building sites, for the purpose of contemporary infrastructure amenities. Although it is thought to bring about significant changes, it has a disadvantage for university residents, notably students. Noise pollution is the most significant effect. Many researchers are attempting to overcome this problem, with one of the promising technique is the use of a buffer zone to absorb and deflect noise [3]. A buffer zone is a specific area that is either naturally or artificially developed as a noise management area. Previously, researchers discovered that trees and shrubs with a width of 15 to 30 meters could lower noise pollution by 5-8 decibels. This is because plants absorb high-frequency noise than low-frequency noise [4,5]. Barrier walls, on the other hand, are more effective in noise suppression. Along the buffer zone, barrier walls are solid structures made of wood, concrete, masonry, metal, or other solid materials. Buffer zones, in particular, can help to reduce pollution inputs from noise emissions [6,7].

In this study, the selected university area is Universiti Tun Hussein Onn Malaysia Pagoh Campus (UTHM). Universiti Tun Hussein Onn Malaysia Pagoh Campus (UTHM) is one of the university that located in Pagoh Higher Education Hub, Pagoh, Johor. The UTHM is strategically located near highways and major thoroughfares to facilitate access and communication networks. Therefore, a study related to the compliance of the construction of buffer zone should be done to ensure that the problem related noise do not occur especially in the area of student residential colleges. The objective of this study is to evaluate the sound level near residential areas that are exposed to noise sources, as well as to look into the level of compliance with the buffer zone near UTHM Residential College in Pagoh.

2. METHODOLOGY

This study used an experimental method that was carried out in area near UTHM Residential College, Pagoh. The sound level near the residential area are measured using Sound Level Meter in decibels (dB) units. To ensure the accuracy of the data, the sound level meter used in this study has been tested prior data

collection day. The noise level identified based on three different days and three different times for each day which is Sunday, Wednesday and Friday while the time for each day is morning between 8:00 A.M – 9:00 AM, afternoon from 12:00 PM – 1:00 PM and evening 5:00 PM – 6:00 PM. The data were collected every 1 minute for one hour within the same location. The data obtained then were analysed and compared with the environmental compliance schedule set by the Department of Environment 2004.

3. RESULTS AND DISCUSSION

The figure below shows the average comparative noise in the Pagoh Residential College area during the weekdays and on weekends. According to the data, weekdays generated the most noise compared to weekends.

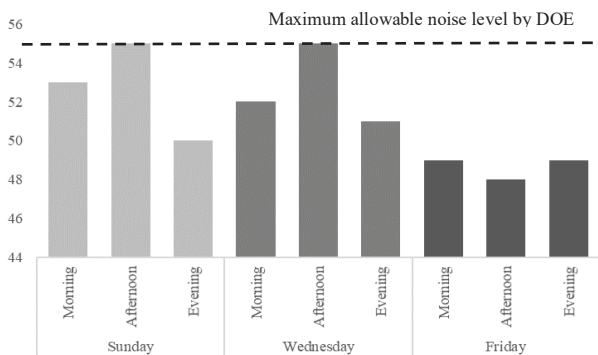


Figure 1: Average noise level

The graph indicates that noise levels are low in the morning, increase in the afternoon, and decrease in the evening. On weekdays, the figure decreases in the morning, decreases in the afternoon, and keeps increasing in the afternoon. Furthermore, the highest noise level measurement is 55 dBA, which occurs between 12.00 and 1.00 pm. This is owing to the comparatively large number of cars, and one of the causes is was due to most of the buses entering and exiting the Pagoh campus's main gate.

Table 1 Median and mean of noise level

Day	Time	Median of Noise (dB)	Mean of Noise (dB)
Sunday	Morning	50	53
	Afternoon	51	53
	Evening	54	54
Wednesday	Morning	52	52
	Afternoon	53	55
	Evening	51	51
Friday (weekend)	Morning	49	49
	Afternoon	47	48
	Evening	50	48

The table 1 demonstrates that noise levels are greater on weekdays than weekends, with Sunday and Wednesday having the highest mean values. Following that, the median value for weekdays ranged from 50 to

55 dB, with 54.2 being the highest median recorded on Sunday evening. Meanwhile, the weekend's median range is merely 47 to 50 decibels. This is due to the fact that the usage of cars, motorcycles, and trucks on weekend is greater than weekday. Aside from that, the greatest peak noise level depending on each day is 67 dB, which occurred on Sunday evening, and 66.2 dB, which occurred in the afternoon on Wednesday.

4. CONCLUSION

Based on the findings, it can be conclude that the noise level near the UTHM Residential College, Pagoh complies with the Guidelines for Environmental Noise Limits and Control from the Department of Environment. The guidelines give noise acceptability criteria that could be used to create a quantitative noise assessment. As a matter of fact, the permissible sound level in a low densities residential area during the day is 55 dB. Thus, the level of compliance towards buffer zone in the residential college is acceptable, as the average of the sound level on Sunday, Wednesday and Friday are less than 55 dB

REFERENCES

- [1] Department of Environment, The Planning Guidelines for Noise Labelling and Emission Limits of Outdoor Source, Department of Environment, Ministry of Natural Resources and Environment, 2004.
- [2] Bert De Coensel, A.L. Brown & Deanna Tomerini, (2016), A road traffic noise pattern simulation model that includes distributions of vehicle sound power levels, (Waves Research Group, Department of Information Technology, Ghent University, Belgium)
- [3] Eva M. Andersson, Mikael Ogre, Peter Molnar, David Segerström, Annika Rosengren, Leo Stockfelt, (2020) Road traffic noise, air pollution and cardiovascular events in a Swedish cohort, (Department of Occupational and Environmental Medicine, Sahlgrenska University Hospital, Gothenburg, Sweden).
- [4] Jesper S. Schou, (2005) Economic and environmental analysis of buffer zones as an instrument to reduce ammonia loads to nature areas, (National Environmental Research Institute, P.O Box 358, Roskilde, Denmark).
- [5] Qi Meng, Jingwen Zhang, Jian Kang, Yue Wu, (2019) Effects of sound environment on the sleep of college students in China, Harbin Institute of Technology, 66 West Dazhi Street, Nan Gang District, Harbin 150001, China.
- [6] Hilmi, M., Abd, I., Kasim, N., & Shafii, H. (2014). Buffer Zone Implementation at Residential Area. (IEEE Colloquium on Humanities, Science and Engineering.
- [7] Darabi, H., Irani Behbahani, H., Shokoohi, S., & Shokoohi, S. (2020). Perceptual buffer zone: a potential of going beyond the definition of broader preservation areas. (Journal of Cultural Heritage Management and Sustainable Development, 10(3), 271–291.)