

# Assessment of Traffic Noise in Guwahati city, India

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**Abstract** – Assessment of noise is carried out to study the noise pollution scenario of Guwahati city at different zones, i.e. commercial zones, residential zones and silence zones comprising educational institutions and hospitals and nursing homes. In the present investigation, traffic volume data and noise level data are collected simultaneously at all the identified study locations. Sound Level Meter is used for assessment of noise and manual count and video recording is used for classified traffic survey. From the study, it is observed that noise level scenario of Guwahati city is deteriorating and most of the locations are in the grip of higher noise level than the prescribed standards suggested by the by CPCB(Central Pollution Control Board ) and MoEF ( Ministry of Environment and Forest, Govt. of India. It is due to all types of crowded vehicles (private and public), narrow roads and poor traffic management. most of the hospitals, Nursing homes and educational institution premises are in the grip of higher traffic noise levels than the prescribed noise standards of 50 dB (A) and they are not safe from noise induced disturbances.

**Key Words:** Noise Level, dB (A), Sound Level meter (SLM), Commercial zone, Residential zone, Silence zone.

## 1. INTRODUCTION

Noise is one of the most significant sources of environmental pollution in modern cities. It can be defined as an unpleasant and unwanted sound, which now becomes a serious threat to urban life. Noise is like a physical form of pollutants which does not harm directly to the life supporting system namely air, water and soil. But its effects are more directly on the receiver.i.e. human being [1]. The major cause of increasing noise is rapid urbanization, industrialization and population growth. Most of the Indian cities and towns like Visakhapatnam, Kolhapur, Asansole and Balasore have also been facing serious traffic noise pollution in last few decades due to substantial growth of new vehicles, low turnover of old vehicles, inadequate road network and urbanization [2-5]. Assessment of traffic noise level is difficult in Indian cities due to the heterogeneity in traffic and environmental conditions e.g., mixed vehicle types, congestion, road conditions, frequent honking and lack of traffic sense [6, 7]. Therefore, it is important to consider such diverse factors in monitoring and assessment of traffic noise level in the Indian context. Various studies carried out in India have shown that most of the cities are under the grip of high noise level than the standards prescribed by CPCB (Central Pollution Control Board ) and

MoEF ( Ministry of Environment and Forest, Govt. of India) [8-10]. The main objective of the present study is to assess the noise levels of Guwahati city at various locations, i.e. commercial zones, residential zones and silence zones particularly educational institutions, hospitals and nursing homes, due to vehicular traffic under heterogenic traffic conditions. For this purpose, classified traffic volume and noise level are measured at different locations on roadways. In this study, traffic volume is categorized in 2-wheelers, 3-wheelers, 4-wheelers and 6-wheelers & above. Noise levels are measured for  $L_{eq}$ ,  $L_{min}$ ,  $L_{max}$ ,  $L_{10}$ ,  $L_{50}$  and  $L_{90}$ .

## 2. Study Area

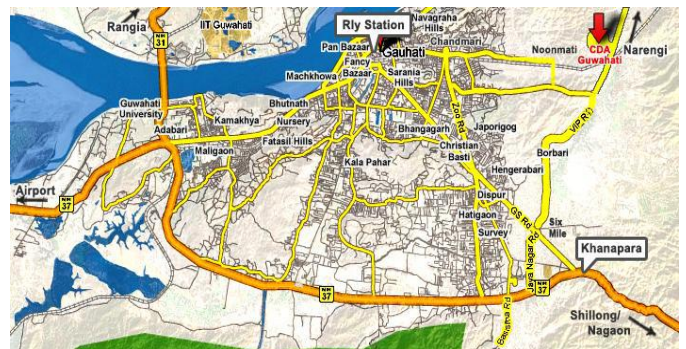


Figure -1: Map of Guwahati city

Guwahati is the capital city of the state Assam situated in the North Eastern part of India. Guwahati is the largest and fastest growing commercial, educational and industrial hub of the entire North East region. It was known by the name of “Gauhati” during British period. Geographically, Guwahati is situated along the River Brahmaputra and is bounded by the foot hills of the Shillong plateau in the southern side between 26°05’ to 26°15’N Latitude and 91°35’ to 91°55’E Longitude. It is located on an undulating plain with varying altitude of 49.5 m to 55.5 m above Mean Sea Level (MSL) (Guwahati Metropolitan Development Authority, 2006). Guwahati has a humid subtropical climate with semi dry in summer and cold in winter. The average maximum temperature is about 29.3°C in summers and average minimum temperature is about 19.1°C. The average rainfall is 1717.7 mm with average humidity is about 75 % ( Source: Climatological Table, Indian Meteorological Department). The spatial growth of Guwahati city has been accompanied by rapid industrialization, urbanization and population growth. Among all other cities in the state, Guwahati is the largest urban centre in Assam with 23.89% of the total urban population of the state and it

alone contributes 55% of the combined population of the significant towns within the state (Source: Various issues of the Census India)[11].

Guwahati has seen a rapid rise in population in the past few years. People from other parts of the state and the region migrate to the city chiefly for education and occupation.

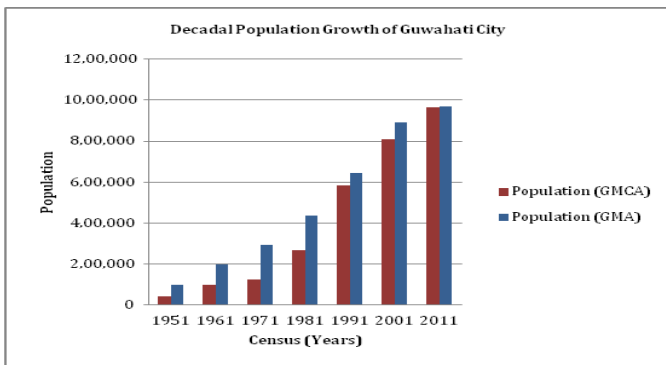


Figure -2: Decadal Population Growth of Guwahati City

Source: Office of the Registrar General and Census Commission (web), Delimitation Commission of India (web)

The traffic scenario of Guwahati city indicates a exponential increase of vehicles in the city road. The average of 71,824 vehicles entered and exited the city area at the outer cordon (OC) on an average day (GMDA, 2007).

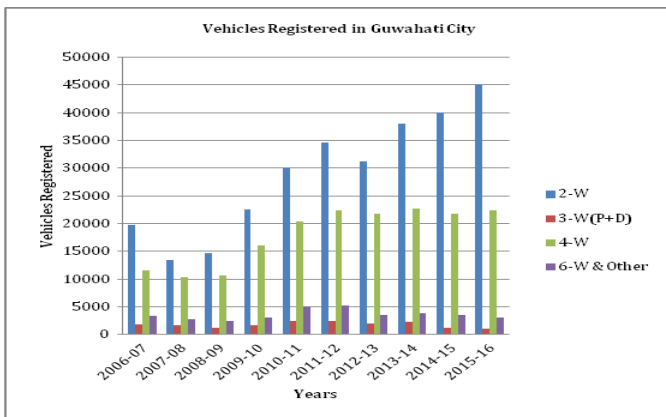


Figure -3: Vehicles Registered in Guwahati City

Source: Office of the District Transport Officer, Kamrup (Metro)(R&L), Guwahati

### 3. Materials and Methodology:

The present study is carried out to assess the equivalent noise level ( $L_{eq}$ ) and noise indices such as  $L_{10}$ ,  $L_{50}$  and  $L_{90}$  due to vehicular traffic in different zones like residential, commercial and silence zones, particularly

educational institutions, hospitals and Nursing homes in the Guwahati city, state capital of Assam, India.

The methodology used for all study locations consists of

- Monitoring and assessment of equivalent noise level ( $L_{eq}$ ) and noise indices  $L_{10}$ ,  $L_{50}$  and  $L_{90}$  at different locations such as residential, commercial, silence zones.
- Measurement of classified traffic volume along with measurement of noise equivalent levels ( $L_{eq}$ ) for each study location.
- Estimation and assessment of Noise Pollution Level (NPL) for all the study locations.

### 3.1. Measurement of Traffic Noise Level and

#### Classified Traffic Volume:

In the present investigation, traffic volume data and noise level data are collected simultaneously at all the identified study locations. Both manual count method and video footings are adopted for traffic volume survey. Along with the noise level survey, the traffic volume (the no of vehicles passing a point in both directions) is also counted. Traffic volume is recorded under different grouping of 2-wheelers (motor cycle, Scooter etc), 3-wheelers (Auto/Auto van), 4-wheelers (car, jeep, van etc. and 6-wheelers (Bus/Truck, Tractor etc.) and above. The sources of noise in all the above cases are vehicular traffic from nearby roads. The 10 minutes of observation are made at selected locations during 7:00am – 10:00 am, 12:00 noon – 3:00 pm and 4:00 pm – 8:00 pm. The noise level data are recorded with Data logging Sound Level Meter (Model 407764, EXTECH Instruments) at the interval of 2 second intervals during the 10 minutes exposure time for assessment of Noise Levels due to vehicular traffic flow peak (7:00am – 10:00 am and 4:00 pm – 8:00 pm) and non-peak hours (12:00 noon – 3:00 pm). This sound level meter measures the sound pressure level in dB (A) i.e. decibels in A-weighted scale which denotes the time weighted average of the sound pressure level on scale 'A' which is Ambient sound levels are being compared with the prescribed standards of CPCB (Central Pollution Control Board), India. The National Ambient Air Quality Standard in respect of Noise as specified under the Noise Pollution (Regulation and Control) Rules, 2000 is being referred for the present study [12]. The sound level meter is placed at a height of 1.5 m above the ground level and at a distance of approximately 10 m from the centre line of the road. For each location, one set of reading is taken during the stated three different periods of the day. Three sets of reading are taken at each location on different week days for each time interval. Sound level meter is calibrated before taking reading in every day.

**Table 1:** Ambient Air Quality Standards in respect of Noise in India

(Source: The Noise Pollution (Regulation and Control) Rules, 2000)

Type of Area	Category of Area/Zone	Limits in dB (A) $L_{eq}$	
		Day Time*	Night Time**
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Area	50	40

\* Day Time-6:00am to 10:00pm, \*\* Night Time- 10:00pm to 6:00am

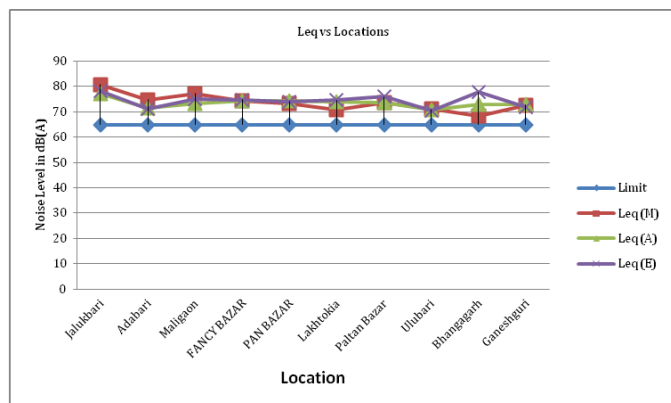
### 3.2. Parameters Measured:

In this study, assessment of noise level is carried out in different zones of the study area including commercial, residential, silence area particularly educational institutions, hospitals and nursing homes.

### 4. Result and Discussion:

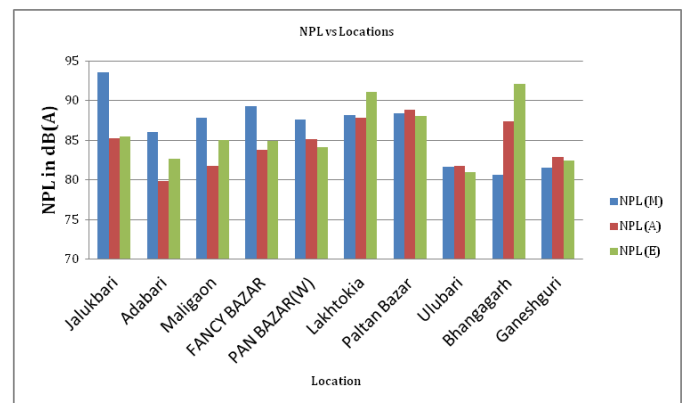
Present study reveals that the noise levels of Guwahati city in most of the places are higher than the standard prescribed by CPCB and BIS “The Noise Pollution (Regulation and Control) Rules, 2000” (Table-1). The noise scenario of the city is deteriorating with population growth, exponential increase of vehicles, lack of parking space, poor and narrow condition of roads and in appropriate traffic management.

#### 4.1. Commercial Locations:



**Figure - 4:** Noise Levels ( $L_{eq}$ ) in some Commercial locations in the Guwahati city

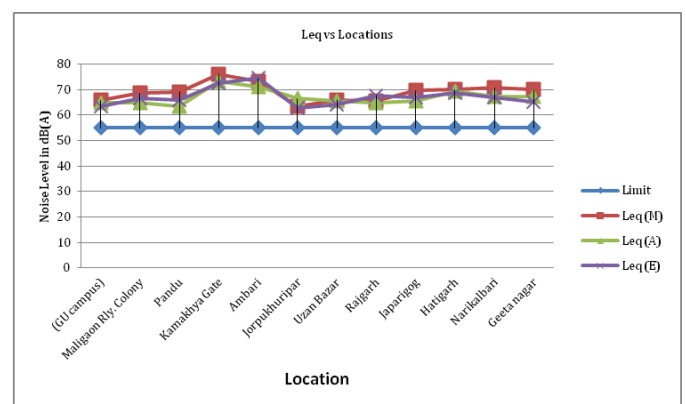
From the noise survey, It has been observed that the variations of noise level,  $L_{eq}$  in commercial locations of the city is ranged from 66.54 dB (A) to 80.81 dB (A) with standard deviation 3.25 ; 61.18 dB (A) to 77.24 dB (A) with S.D. 3.12 ; and 59.95 dB (A) to 78.24 dB (A) with S.D. 3.92 during 7:00 am to 10:00 am; 12:00 noon to 3:00 pm and 4:00 pm to 8:00 pm respectively. There is almost constant level of noise prolongs for day duration except two or three locations. The noise levels of all locations are above permissible limit 65 dB (A) except Silpukhuri site during 7:00 am to 8:00pm. This due to all types of crowded vehicles mostly commercial, narrow roads and poor traffic management.



**Figure - 5:** Noise Pollution Level (NPL) in some Commercial locations in the Guwahati city

Noise Pollution Level (NPL) gives an idea of noise pollution caused by fluctuating noise level. The average Noise Pollution Level (NPL) varies in the range of 78.68 dB (A) to 93.56 dB (A), 71.68 dB (A) to 88.82 dB (A) and 68.45 dB (A) to 92.19 dB (A) during 7:00 am to 10:00 am, 12:00 noon to 3:00 pm and 4:00 pm to 8:00 pm respectively

#### 4.2. Residential Locations:



**Figure - 6:** Noise Levels in some Residential locations in the Guwahati city

Similarly, residential areas of Guwahati city have shown higher noise levels than the prescribed noise

standard 55dB (A). Some of the residential locations situated nearby roadside show noise levels more than 70 dB (A).

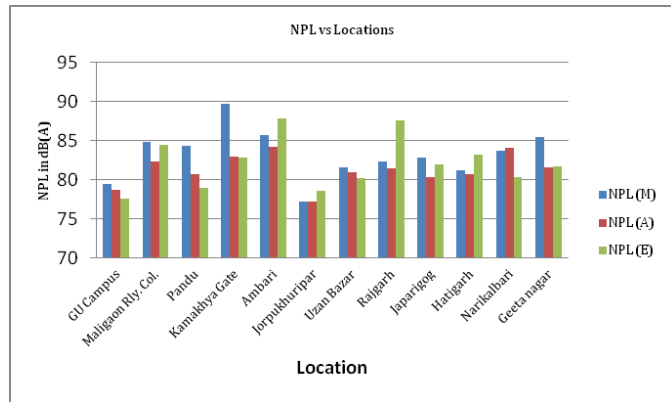


Figure - 7: Noise Pollution Level (NPL) in some residential locations in the Guwahati city

The average Noise Pollution Level (NPL) of some residential area in the Guwahati city varies in the range of 77.29 dB (A) to 89.69 dB (A), 77.27 dB (A) to 85.59 dB (A) and 77.66 dB (A) to 87.85 dB (A) during 7:00 am to 10:00 am, 12:00 noon to 3:00 pm and 4:00 pm to 8:00 pm respectively.

### 4.3. Educational Institutions:

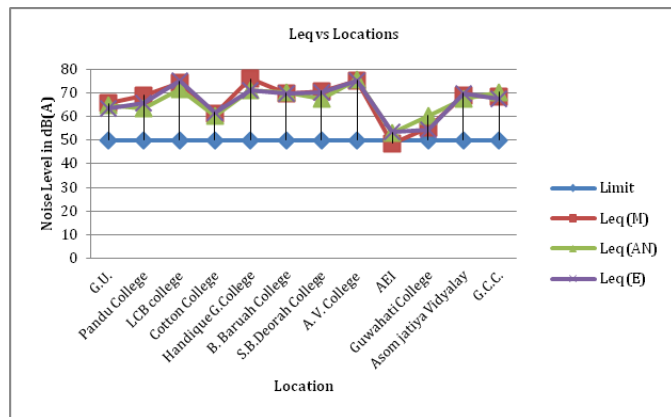


Figure - 8: Noise Levels in some Educational Institutions in the Guwahati city

It has been observed that the variations of noise level, Leq in some educational institutions of the city is ranged from 48.68 dB (A) to 76.0 dB (A) with standard deviation 6.8 ; 53.23 dB (A) to 75.7 dB (A) with S.D. 5.7 ; and 53.54 dB (A) to 75.83 dB (A) with S.D. 6.8 during 7:00 am to 10:00 am; 12:00 noon to 3:00 pm and 4:00 pm to 8:00 pm respectively.

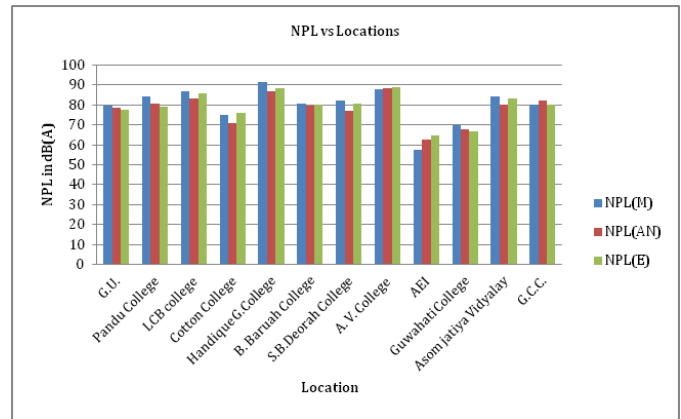


Figure - 9: Noise Pollution Level (NPL) in some educational institutions in the Guwahati city

The average Noise Pollution Level (NPL) in some educational institution premises in the Guwahati city varies in the range of 57.68 dB (A) to 91.6 dB (A), 62.73 dB (A) to 88.4 dB (A) and 64.74 dB (A) to 91.1 dB (A) during 7:00 am to 10:00 am, 12:00 noon to 3:00 pm and 4:00 pm to 8:00 pm respectively.

### 4.4. Hospitals and Nursing Homes:

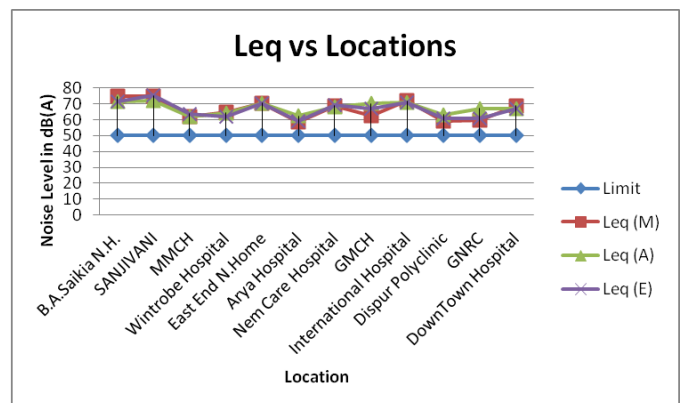
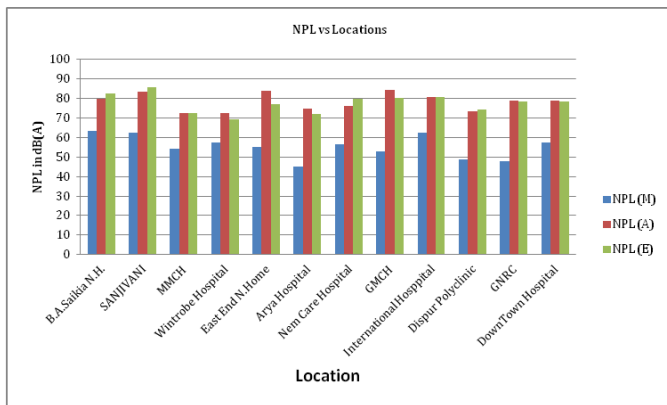


Figure -10: Noise Levels in some Hospitals and Nursing Homes in the Guwahati city

The noise level at some hospitals and nursing homes in the city is varied in the range from 58.6 dB (A) to 74.74 dB (A) with standard deviation 5.6; 59.8 dB (A) to 74.12 dB (A) with S.D. 4.1; and 59.1 dB (A) to 75.24 dB (A) with S.D. 4.9 during 7:00 am to 10:00 am; 12:00 noon to 3:00 pm and 4:00 pm to 8:00 pm respectively.



**Figure - 11:** Noise Pollution Level (NPL) in some hospitals and nursing home in the Guwahati city

The Noise Pollution Level (NPL) of some hospitals and nursing homes in the Guwahati city varies in the range of 45.1 dB (A) to 63.4 dB (A), 68.2 dB (A) to 90.4 dB (A) and 68.1 dB (A) to 89.1 dB (A) during 7:00 am to 10:00 am, 12:00 noon to 3:00 pm and 4:00 pm to 8:00 pm respectively.

Most alarming situation is with high noise levels in the silence zone of the city. According to “The Noise Pollution (Regulation and Control) Rules, 2000, the silence zone is an area comprising not less than 100 meters around hospitals and educational institutions. But from this study, it has been found that most of the hospitals, Nursing homes and educational institutions are established in either commercial places or nearby heavy traffic plying roads. Consequently, most of the hospitals, Nursing homes and educational institution premises are in the grip of higher traffic noise levels than the prescribed noise standards of 50 dB (A) and they are not safe from noise induced disturbances.

## 5. Conclusion:

The noise level assessment of the Guwahati city has explicitly revealed that the noise levels are more than the permissible limits in all the investigated sites. Moreover, it is clearly indicates that the vehicular traffic is one of the major contributors to noise in the city. It is due to exponential growth of vehicles, growing populations, lack of sufficient parking spaces, narrow roads and inappropriate traffic management. The health of city dwellers may be at high risk in the long run due to noise related diseases.

However, some remedial and preventive measures must be considered for betterment and improvement of noise environment of Guwahati city. Creating more parking spaces, broadening of linking roads, constructing noise barriers where is necessary, constructing flyovers and over bridges, strict enforcement of law and planting more trees in roadside for sound cushioning are a few of them.

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