

**REPORT ON MONITORING OF AMBIENT NOISE POLLUTION OF  
METROPOLITAN CITIES OF MAHARASHTRA, 2011**



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### ABBREVIATIONS

CPCB	Central Pollution Control Board
dB	Decibel
dB(A)	Decibels with "A" weighting
EPA	Environmental Protection Act, 1986
Hz	Hertz
MPCB	Maharashtra Pollution Control Board
kHz	Kilo Hertz
$L_{Aeq}$	Equivalent continuous A-weighted sound pressure level (dB)
$L_{max}$	Maximum sound pressure level (dB)
$L_{min}$	Minimum sound pressure level (dB)
SPL	Sound Pressure Level

## 1. INTRODUCTION

The Environmental Protection Agency defines noise as “unwanted or disturbing sound”. Sound becomes unwanted when it either interferes with normal activities such as sleeping, conversation, or disrupts or diminishes one’s quality of life. Though for some, the persistent and escalating sources of sound can often be considered an annoyance. This “annoyance” can have major consequences, primarily to one’s overall health. Noise pollution adversely affects the lives of millions of people. Studies have shown that there are direct links between noise and health. Problems related to noise include stress related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity. Noise Induced Hearing Loss (NIHL) is the most common and often discussed health effect, but research has shown that exposure to constant or high levels of noise can cause countless adverse health affect.

The lack of infrastructure and fast paced life in major metropolitan cities of India has made the urban environment extremely crowded, busy as well as noisy and as a result the people living these major metropolitan areas are suffering from the impacts of noise pollution. In order to access the impact of noise pollution, an Ambient Noise Level Monitoring Program is being initiated by Maharashtra Pollution Control Board in six major Metropolitan cities across the state for a period of 24 hours. The survey is being conducted on 18<sup>th</sup> and 19<sup>th</sup> of December, 2011.

### 1.1 Effect of Noise Pollution on Human Health

Noise health effects are the health consequences at elevated sound levels. Elevated workplace or other noise can cause hearing impairment, hypertension, ischemic heart disease, annoyance, premature ejaculation, bowel movements, sleep disturbance, death and decreased sexual performance (WHO). Changes in the immune system and birth defects have been attributed to noise exposure, but evidence is limited. Although some presbycusis may occur naturally with age, in many developed nations the cumulative impact of noise is sufficient to impair the hearing of a large fraction of the population over the course of a lifetime. Noise exposure has also been known to induce tinnitus, hypertension, and other cardiovascular impacts. Beyond these effects, elevated noise levels can also create stress, increase the workplace accident rates, and stimulate aggression and other anti-social behaviors. The most significant causes are vehicle and aircraft noise, prolonged exposure to loud music, and industrial noise.

### 1.2 Noise Measurement and Standards:

Sound is usually made up of a wide range of different frequencies. The spread of sound energy across the audible frequency “spectrum” (about 20Hz – 20 kHz) is one factor that helps to make it identifiable to the human ear. The human ear is a very sensitive system with an extensive dynamic range. To accommodate this very large range, sound levels are measured using the **decibel (dB) scale**.

A sound level meter theoretically has a flat response, in other words it responds exactly the same at different frequencies. Unlike a sound level meter, the human ear responds differently at different frequencies, so a weighting, or filter, can be used so that the meter responds more like the human ear. The most commonly used weighting is referred to as the ‘**A**’ weighting and readings are usually measured in dB(A).

Fast response (125 to 200 milli-seconds) was selected to measure noise levels. The human response to noise depends upon the frequency of the sound, the type of noise (continuous, intermittent or impulsive) and the time (day or night) it occurs.

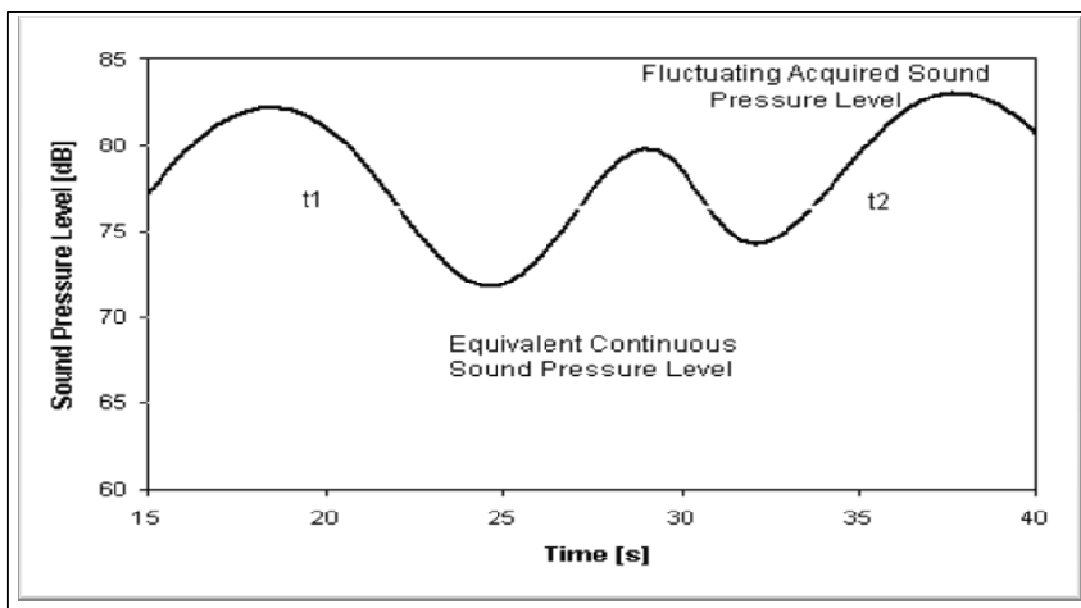
In most cases, the sounds and noises we hear are not steady. Apart from variation in tones, the magnitude or the sound pressure level of a sound or noise changes with time. The equivalent

continuous noise level ( $L_{eq}$ ) is the sound pressure level of a steady sound that has, over a given period, the same energy as a fluctuating sound in question. It was calculated using following equation:

$$L_{eq,T} = 10 \log \left( 1 / n \sum_{i=1}^n 10^{\frac{L_i}{10}} \right)$$

Where,  $L_i$  = levels observed at  $n$  equally spaced times during interval  $T$ .

The "**Sound Pressure Level**" (**SPL**) is twenty times the logarithm to the base 10 of the ratio of the effective pressure ( $p$ ) of a sound to the reference pressure ( $P_r$ ) of 20  $\mu$ Pa. Thus the sound pressure level in dB = 20  $\log_{10} P/P_r$ .



**Fig. 1.1:- Measurement of Equivalent Continuous Sound Pressure Level**

$L_{max}$ : The maximum Sound Pressure Level (SPL) value measured during the duration of monitoring

$L_{min}$ : The minimum Sound Pressure Level (SPL) value measured during the duration of monitoring.

$L_{10}$ : The level that were exceeded during 10% of the measuring time in dB(A)

$L_{50}$ : The level that were exceeded during 50% of the measuring time in dB(A)

$L_{90}$ : The level that were exceeded during 90% of the measuring time in dB(A).

Noise has been recognized as ambient air pollutant. Standards in this regard are laid down under The Environment (Protection) Act, 1986 (and rules made there under) and under the Model Rules of the Factories Act, 1948 for occupational health and safety purposes. The Central Pollution Control Board constituted a National Committee of Experts on Noise Pollution Control. The Committee recommended noise standards for ambient air and for automobiles, domestic appliances and constructions equipment, which were later notified under The Environment (Protection) Act, 1986 as given below in table 1.1:



**Table 1.1: Standards of Noise Levels under EPA (1986): Noise Pollution (Regulation & Control) Rules, 2000**

Area Code	Category of Area	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 Zone	50	40

**Note:**

1. Day time is reckoned in between 6 A.M and 10 P.M.
2. Night time is reckoned in between 10 P.M and 6 A.M.
3. Silence zone is referred as areas up to 100 meters around such premises as hospitals, courts, educational institutions and courts. The Silence zones are to be declared by the Competent Authority.
4. Use of vehicular horns, loudspeakers and bursting of crackers shall be banned in these zones.
5. Mixed categories of areas should be declared as one of the four above mentioned categories by the Competent Authority and the corresponding standards shall apply.

## **2. OBJECTIVES**

The main objectives of this study are:

- To determine the impact of various noise sources on an individual in two different scenarios (working and non working) i.e. 18<sup>th</sup> (Sunday) and 19<sup>th</sup> (Monday) of December, 2011.
- To compare the noise levels with Ambient Noise Standards for the area. Further, to create the awareness and educate the public.

## **3. METHODOLOGY**

The Noise Level Monitoring in six Metropolitan cities for 24 hours continuously (16 hrs day time & 8 hrs night time) was carried out on 18<sup>th</sup> (holiday) & 19<sup>th</sup> (working day) December 2011. The monitoring was carried at the same locations during both days and during the same period. Noise standards for ambient noise level during day and night are different (refer **Annexure I**); hence noise levels were measured accordingly as follows:

- Day shift from 06:00 Hrs. to 22:00 Hrs: 06:00 to 14:00 Hrs. & 14:00 to 22:00Hrs.
- Night shift from 22:00 Hrs. to 06:00 Hrs.

Precalibrated Sound Level Meters were used for the monitoring. All the measurements were made at 'Fast' response mode using 'A' filter, keeping in view the quickly changing nature of noise levels, as 'A' filter also corresponds to the human ear audible range of 20-20000Hz of frequencies.

The monitoring stations selected include residential areas, silence areas, industrial and commercial areas, adjacent to major roads (traffic) areas and also extended to air and rail traffic. The main purpose of this exercise is to determine the noise levels during both the days (Sunday and a working day) and to compare it with ambient noise standards for the area. Further, it may help in identifying

the significant sources of Noise and finding & implement of remedies to reduce the Noise levels. 25 locations were covered in six major cities of Maharashtra state as shown in the table 3.1.

**Table 3.1:- Noise Monitoring Locations in Maharashtra**

Sr. No.	City	Number of locations
1	Mumbai	10
2	Nashik	03
3	Nagpur	03
4	Aurangabad	03
5	Kolhapur	03
6	Pune	03
<b>TOTAL</b>		<b>25</b>

For detailed list of locations refer **Annexure II**

#### 4. RESULTS

The Global Positioning System (GPS) was used to determine the exact position of the locations of Metropolitan Cities. Also, the selected monitoring station's Latitude and Longitude along with the distance & height of sensor of the sound level meter for all the locations are summarized in the table 4.1:

**Table 4.1:- Exact position of monitoring station using Global Positioning System**

Location	Position	Distance of Monitoring Station in meters	Monitoring Height in meters
<b>MUMBAI</b>			
High Court	N 18° 55' 52.3" E 72° 49' 50.2"	2.43	1.23
Mumbadevi temple	N 18° 57' 03.1" E 72° 49' 53.4"	3.16	1.24
Borivali National Park	N 19° 01' 51.2" E 72° 51' 53.6"	2.70	1.26
Antop Hill	N 19° 01' 31.2" E 72° 50' 14.7"	1.87	1.26
Shivaji Park, Dadar	N 19° 05' 36.9" E 72° 51' 17.0"	1.66	1.23
Santacruz Airport	N 19° 10' 17.6" E 72° 51' 16.4"	2.30	1.20
Goregaon (E)	N 19° 05' 17.1" E 72° 54' 27.8"	1.80	1.21

Location	Position	Distance of Monitoring Station in meters	Monitoring Height in meters
Ghatkopar (W)	N 19 <sup>0</sup> 12' 34.4" E 72 <sup>0</sup> 49' 40.9"	1.93	1.27
Charkop, Kandivali (W)	N 19 <sup>0</sup> 01' 56.0" E 72 <sup>0</sup> 53' 48.7"	2.29	1.23
Vashi Naka, Chembur	N 19 <sup>0</sup> 13' 51.1" E 72 <sup>0</sup> 51' 53.3"	2.52	1.26
<b>PUNE</b>			
Pune University	N 18 <sup>0</sup> 32' 28.6" E 73 <sup>0</sup> 49' 38.4"	3.60	1.24
Nucleus Mall	N 18 <sup>0</sup> 31' 06.0" E 73 <sup>0</sup> 52' 30.8"	2.89	1.20
Kakade Angan	N 18 <sup>0</sup> 37' 27.9" E 73 <sup>0</sup> 47' 6.1"	3.10	1.25
<b>NASHIK</b>			
Dwarka Circle	N 19 <sup>0</sup> 59' 34.9" E 73 <sup>0</sup> 47' 53.5"	3.61	1.25
Pandit Colony Near NMC	N 20 <sup>0</sup> 00' 08.3" E 73 <sup>0</sup> 46' 34.6"	3.42	1.21
Pavan Nagar CIDCO	N 19 <sup>0</sup> 58' 27.1" E 73 <sup>0</sup> 45' 23.5"	2.56	1.22
<b>AURANGABAD</b>			
Ghati Hospital	N 19 <sup>0</sup> 53' 19.08" E 75 <sup>0</sup> 19' 07.4"	2.88	1.22
Nirala bazaar	N 19 <sup>0</sup> 52' 44.5" E 75 <sup>0</sup> 19' 28.5"	3.37	1.21
CIDCO N-4	N 19 <sup>0</sup> 52' 10.0" E 75 <sup>0</sup> 21' 44.7"	2.90	1.20
<b>NAGPUR</b>			
Government Medical College	N 21 <sup>0</sup> 08' 10.3" E 79 <sup>0</sup> 03' 38.9"	3.58	1.23

<b>Location</b>	<b>Position</b>	<b>Distance of Monitoring Station in meters</b>	<b>Monitoring Height in meters</b>
Sitabardi Police Station	N 21° 08' 34.6" E 79° 04' 54.8"	3.89	1.20
Shivaji Nagar	N 21° 07' 44.5" E 79° 05' 54.5"	4.50	1.22
<b>KOLHAPUR</b>			
Collector Office	N 16° 42' 29.9" E 74° 14' 08.6"	3.45	1.20
Dasara Chowk	N 16° 42' 04.7" E 74° 13' 36.1"	2.69	1.25
Shahupuri	N 16° 41' 59.5" E 74° 14' 25.6"	2.87	1.22

#### 4.1 Noise Levels at Various Locations in the City:

The noise levels at all locations were continuously monitored for a period of 24 hours during holiday and normal working day. The hourly equivalent noise recorded at each of the locations is shown in table below (From Table 4.1.1(a) to table 4.1.6(b)):

##### 1) Mumbai:

**Table 4.1.1(a): Ambient Noise levels in Mumbai as on 18<sup>th</sup> December, 2011**

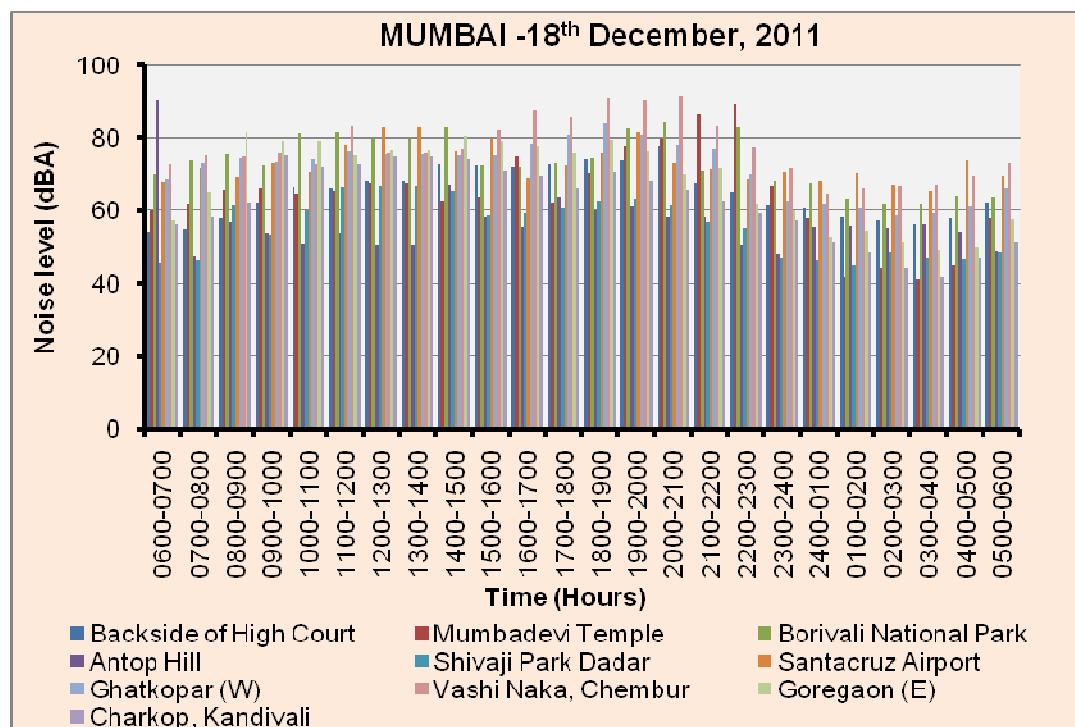
<b>Sr. No.</b>	<b>Monitoring Site</b>	<b>Date</b>	<b>Day Time (6AM-10PM) values in dB(A)</b>				<b>Date</b>	<b>Night Time (10PM-6AM) Values in dB(A)</b>			
			<b>L<sub>eq</sub></b>	<b>L<sub>10</sub></b>	<b>L<sub>50</sub></b>	<b>L<sub>90</sub></b>		<b>L<sub>eq</sub></b>	<b>L<sub>10</sub></b>	<b>L<sub>50</sub></b>	<b>L<sub>90</sub></b>
1	High Court	18.12.11	<b>53.4</b>	<b>51.8</b>	<b>54.0</b>	<b>65.9</b>	18.12.11 to 19.12.11	<b>47.2</b>	<b>43.7</b>	<b>46.5</b>	<b>50.9</b>
2	Mumbadevi	18.12.11	<b>71.7</b>	<b>69.5</b>	<b>71.0</b>	<b>75.2</b>	18.12.11 to 19.12.11	<b>71.6</b>	<b>70.4</b>	<b>71.3</b>	<b>73.6</b>
3	Borivali National Park	18.12.11	<b>68.6</b>	<b>59.2</b>	<b>67.0</b>	<b>79.1</b>	18.12.11 to 19.12.11	<b>68.1</b>	<b>63.3</b>	<b>68.9</b>	<b>73.2</b>

4	Antop Hill	18.12.11	<b>67.4</b>	<b>59.8</b>	<b>67.6</b>	<b>75.8</b>	18.12.11 to 19.12.11	<b>67.3</b>	<b>56.3</b>	<b>67.8</b>	<b>78.6</b>
5	Shivaji Park	18.12.11	<b>63.9</b>	<b>65.3</b>	<b>67.6</b>	<b>70.6</b>	18.12.11 to 19.12.11	<b>55.4</b>	<b>52.4</b>	<b>54.5</b>	<b>62.9</b>
6	Airport	18.12.11	<b>67.0</b>	<b>62.9</b>	<b>68.7</b>	<b>73.7</b>	18.12.11 to 19.12.11	<b>64.2</b>	<b>59.3</b>	<b>62.4</b>	<b>71.3</b>
7	Ghatkopar	18.12.11	<b>70.6</b>	<b>63.6</b>	<b>74.3</b>	<b>79.6</b>	18.12.11 to 19.12.11	<b>67.6</b>	<b>60.7</b>	<b>67.0</b>	<b>74.4</b>
8	Vashi Naka	18.12.11	<b>75.0</b>	<b>73.0</b>	<b>77.5</b>	<b>82.2</b>	18.12.11 to 19.12.11	<b>69.9</b>	<b>65.8</b>	<b>71.0</b>	<b>73.5</b>
9	Goregon	18.12.11	<b>59.5</b>	<b>63.3</b>	<b>70.1</b>	<b>73.6</b>	18.12.11 to 19.12.11	<b>40.1</b>	<b>30.9</b>	<b>35.9</b>	<b>54.1</b>
10	Charkop	18.12.11	<b>68.8</b>	<b>62.9</b>	<b>71.6</b>	<b>77.5</b>	18.12.11 to 19.12.11	<b>63.9</b>	<b>58.8</b>	<b>60.9</b>	<b>72.9</b>

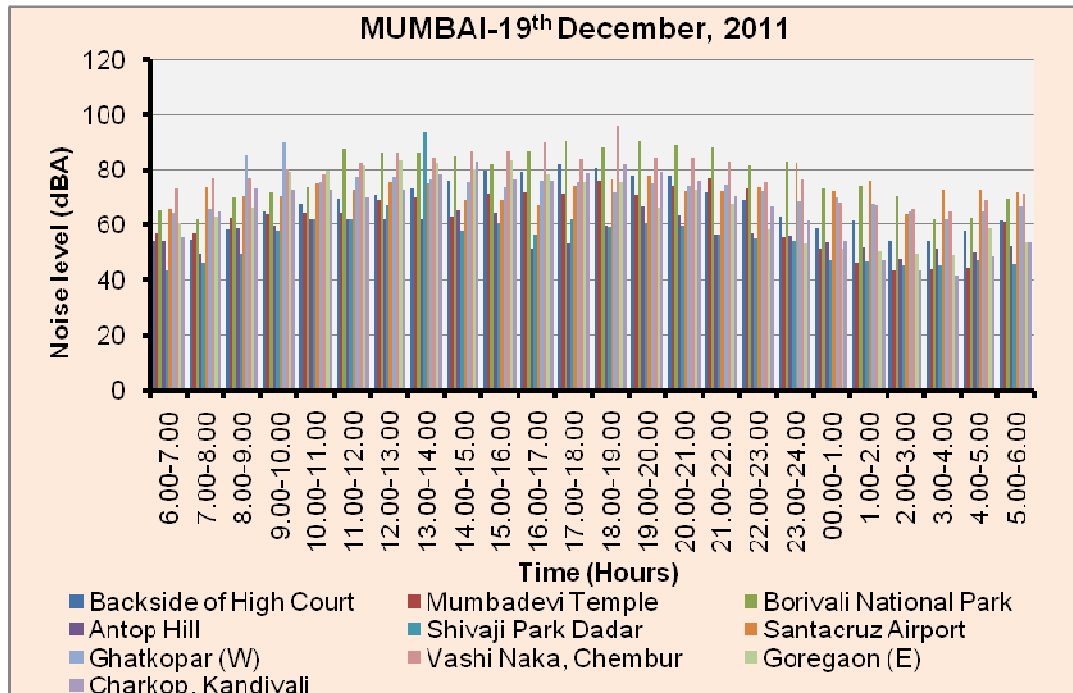
**Table 4.1.1(b): Ambient Noise levels in Mumbai as on 19<sup>th</sup> December, 2011:**

Sr. No	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	High Court	19.12.11	<b>69.0</b>	<b>67.6</b>	<b>69.7</b>	<b>72.5</b>	19.12.11 to 20.12.11	<b>67.2</b>	<b>61.7</b>	<b>67.2</b>	<b>72.9</b>
2	Mumbadevi	19.12.11	<b>70.6</b>	<b>65.3</b>	<b>70.0</b>	<b>74.7</b>	19.12.11 to 20.12.11	<b>72.4</b>	<b>69.0</b>	<b>72.3</b>	<b>75.5</b>
3	Borivali National Park	19.12.11	<b>65.2</b>	<b>57.4</b>	<b>64.8</b>	<b>73.2</b>	19.12.11 to 20.12.11	<b>67.1</b>	<b>58.5</b>	<b>68.1</b>	<b>73.8</b>
4	Antop Hill	19.12.11	<b>65.7</b>	<b>60.8</b>	<b>63.6</b>	<b>67.0</b>	19.12.11 to 20.12.11	<b>64.0</b>	<b>58.7</b>	<b>63.9</b>	<b>67.9</b>
5	Shivaji Park	19.12.11	<b>63.9</b>	<b>64.6</b>	<b>67.5</b>	<b>70.4</b>	19.12.11 to 20.12.11	<b>54.3</b>	<b>51.0</b>	<b>52.1</b>	<b>64.2</b>

6	Airport	19.12.11	<b>71.1</b>	<b>64.2</b>	<b>74.0</b>	<b>78.8</b>	19.12.11 to 20.12.11	<b>68.3</b>	<b>63.2</b>	<b>65.4</b>	<b>77.2</b>
7	Ghtkopar	19.12.11	<b>73.1</b>	<b>73.3</b>	<b>77.2</b>	<b>80.3</b>	19.12.11 to 20.12.11	<b>65.6</b>	<b>59.8</b>	<b>64.1</b>	<b>73.6</b>
8	Vashi Naka	19.12.11	<b>74.1</b>	<b>72.5</b>	<b>77.8</b>	<b>80.0</b>	19.12.11 to 20.12.11	<b>67.7</b>	<b>59.2</b>	<b>65.8</b>	<b>80.3</b>
9	Goregaon	19.12.11	<b>69.5</b>	<b>72.6</b>	<b>73.6</b>	<b>74.6</b>	19.12.11 to 20.12.11	<b>60.6</b>	<b>55.1</b>	<b>59.3</b>	<b>66.7</b>
10	Charkop	19.12.11	<b>69.1</b>	<b>63.4</b>	<b>71.3</b>	<b>76.1</b>	19.12.11 to 20.12.11	<b>66.2</b>	<b>61.1</b>	<b>64.5</b>	<b>73.5</b>



**Fig 4.1.1(a): Continuous Equivalent Noise Levels at Different Parts of Mumbai during 18<sup>th</sup> December, 2011**



**Fig 4.1.1(b): Continuous Equivalent Noise Levels at Different Parts of Mumbai during 19<sup>th</sup> December, 2011**

In **Mumbai**, a total of 10 locations were monitored continuously for two days from 18<sup>th</sup> to 19<sup>th</sup> December, 2011 for 24 hours (as shown in Table 4.1.1(a) and Table 4.1.1(b)). It was observed that, on 18<sup>th</sup> December, among all the 10 locations Borivali National Park was having the highest noise level at day time with 83.4dB(A) and Antop hill was having the highest noise level at night time with 78.9dB(A). On 19<sup>th</sup> December, Vashi Naka was found to be have highest noise level at day time with 81.7dB(A) followed by Ghatkoper (W) with 81.3dB(A) and at night time, Santacruz Airport with 82.9dB(A) followed by Antop hill with 82.1dB(A) found to have high noise level. The present study also shows that:

- At the silence areas the minimum sound level was 42.6dB(A) and the maximum sound level was 83.4dB(A).
- At the industrial areas the minimum sound level was 51.7dB(A) and maximum sound level was 82.9dB(A).
- At the commercial areas the minimum sound level was 48.0dB(A) and maximum sound level was 83.3dB(A).
- At the residential areas the minimum sound level was 30.8dB(A) and maximum sound level was 82.2dB(A).

## 2) Pune:

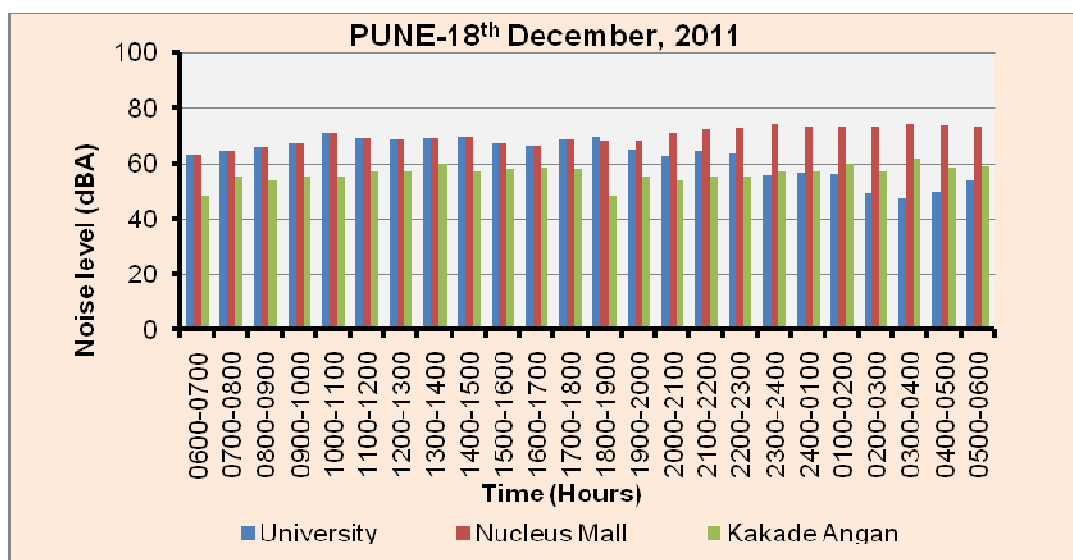
**Table 4.1.2(a): Ambient Noise Levels in Pune as on 18<sup>th</sup> December, 2011:**

Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	Pune University	18.12.11	54.2	62.0	58.2	55.2	18.12.11 to 19.12.11	46.3	51.6	62.8	55.4
2	Nucleus Mall	18.12.11	63.3	70.7	67.8	58.5	18.12.11 to 19.12.11	57.8	68.7	71.3	57.7
3	Kakade Angan	18.12.11	53.8	60.0	57.6	54.1	18.12.11 to 19.12.11	47.1	53.5	71.0	58.0

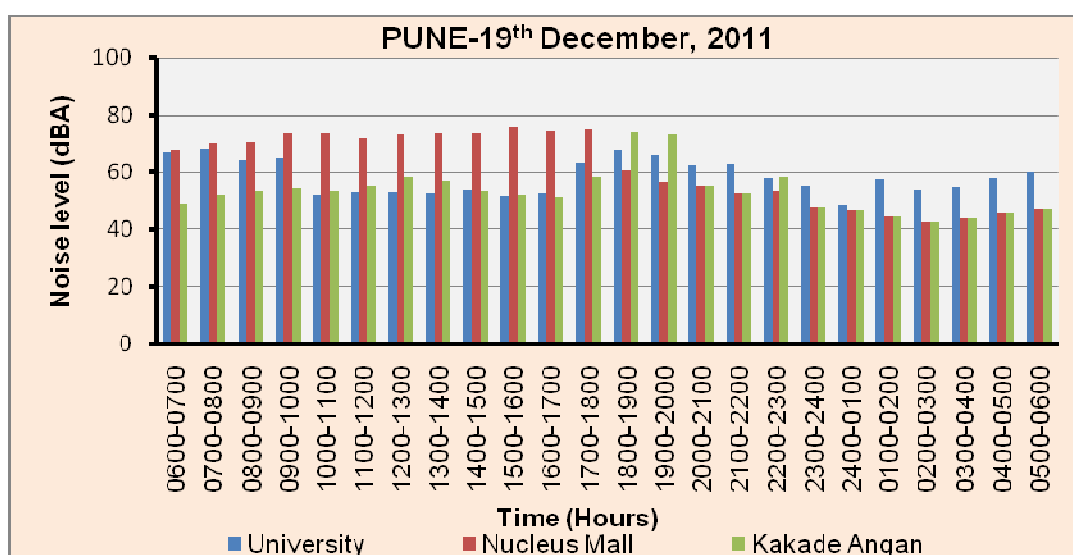
**Table 4.1.2(b) Ambient Noise Level in Pune as on 19<sup>th</sup> December 2011:**

Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	Pune University	19.12.11	57.5	65.0	62.7	56.5	19.12.11 to 20.12.11	50.1	54.9	48.9	46.1
2	Nucleus Mall	19.12.11	61.4	70.0	66.0	60.8	19.12.11 to 20.12.11	52.0	62.8	49.9	43.0
3	Kakade Angan	19.12.11	56.3	65.3	60.4	56.2	19.12.11 to 20.12.11	46.9	52.5	46.2	42.0





**Fig 4.1.2(a): Continuous Equivalent Noise Levels at Different Parts of Pune during 18<sup>th</sup> December, 2011**



**Fig 4.1.2(b): Continuous Equivalent Noise Levels at Different Parts of Pune during 19<sup>th</sup> December, 2011**

In **Pune**, a total of 3 locations were monitored continuously for two days from 18<sup>th</sup> to 19<sup>th</sup> December, 2011 for 24 hours (As shown in Table 4.1.2(a) and 4.1.2(b)). Among the entire locations Nucleus mall was observed to have the highest noise level on 18<sup>th</sup> December, at day as well as at night time with 72.2dB(A) and 69.3dB(A) respectively. Similarly, on 19<sup>th</sup> December also, Nucleus mall at day time and Pune University at night time were found to have highest noise levels with 71.3dB(A) and 88.9dB(A) respectively. In Pune, it was also observed that:

- At the silence areas the minimum sound level was 41.0dB(A) and the maximum sound level was 63.7dB(A).
- At the commercial areas the minimum sound level was 48.9dB(A) and maximum sound level was 72.2dB(A).

- At the residential areas the minimum sound level was 42.5dB(A) and maximum sound level was 61.0dB(A).

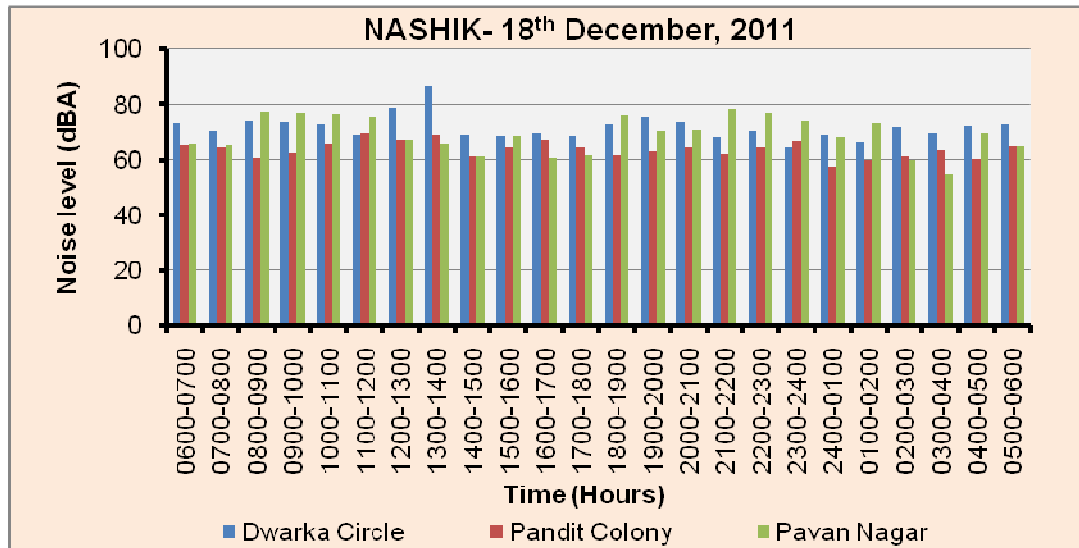
### 3) Nashik:

**Table 4.1.3(a): Ambient Noise Levels in Nashik as on 18<sup>th</sup> December, 2011:**

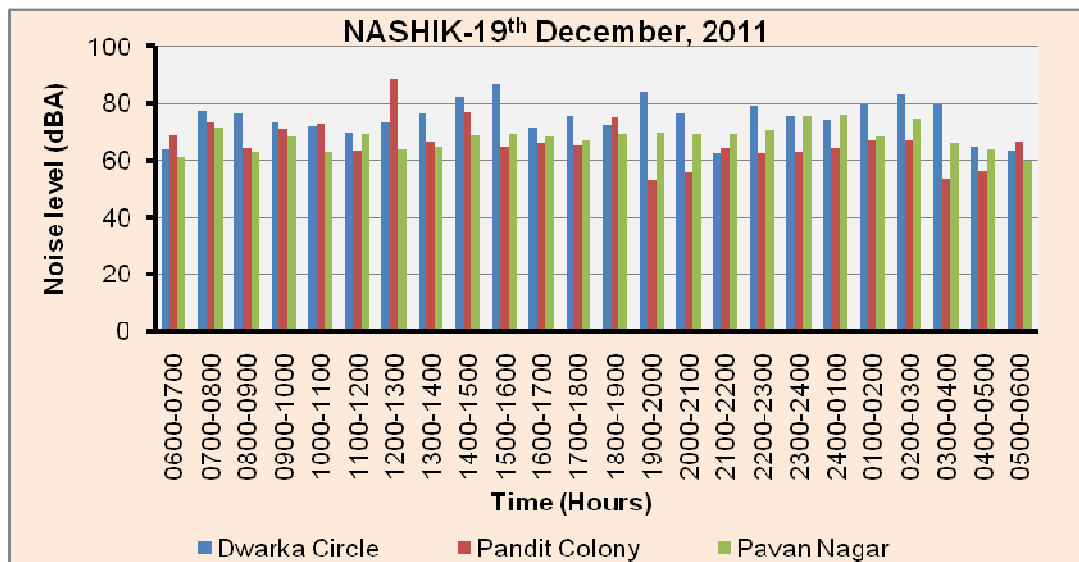
Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	Dwarka Circle	18.12.11	72.2	76.6	73.2	69.7	18.12.11 to 19.12.11	70.3	72.5	70.0	68.4
2	Pandit Colony	18.12.11	67.6	73.2	66.9	65.0	18.12.11 to 19.12.11	66.2	69.5	66.6	62.7
3	Pavan Nagar	18.12.11	71.8	77.7	73.7	69.3	18.12.11 to 19.12.11	69.0	75.1	68.6	64.5

**Table 4.1.3(b) Ambient Noise Level in Nashik as on 19<sup>th</sup> December, 2011:**

Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	Dwarka Circle	19.12.11	72.3	76.3	73.5	71.3	19.12.11 to 20.12.11	69.8	72.5	69.9	67.1
2	Pandit Colony	19.12.11	69.2	76.4	70.8	63.7	19.12.11 to 20.12.11	66.5	70.8	68.0	60.3
3	Pavan Nagar	19.12.11	67.4	73.7	68.6	63.1	19.12.11 to 20.12.11	66.1	70.8	67.8	59.2



**Fig 4.1.3(a): Continuous Equivalent Noise Levels at Different Parts of Nashik during 18<sup>th</sup> December, 2011**



**Fig 4.1.3(b): Continuous Equivalent Noise Levels at Different Parts of Nashik during 19<sup>th</sup> December, 2011**

In **Nashik**, a total of 3 locations were monitored continuously for two days from 18<sup>th</sup> to 19<sup>th</sup> December, 2011 for 24 hours (As shown in Table 4.1.3(a) & 4.1.3(b)). It was observed that, on 18<sup>th</sup> December, among all the locations Pavan nagar was having the highest noise level both at day time and at night time with 78.6dB(A) and 75.9dB(A) respectively. On 19<sup>th</sup> December, Dwarka Circle was found to be have highest noise level at day time and at night time with 79.0dB(A) and 72.8dB(A) respectively. The present study also shows that:

- At the commercial area, the minimum sound level was 67.3dB(A) and maximum sound level was 77.5dB(A).
- At the residential areas, the minimum sound level was 61.4dB(A) and maximum sound level was 78.6dB(A).

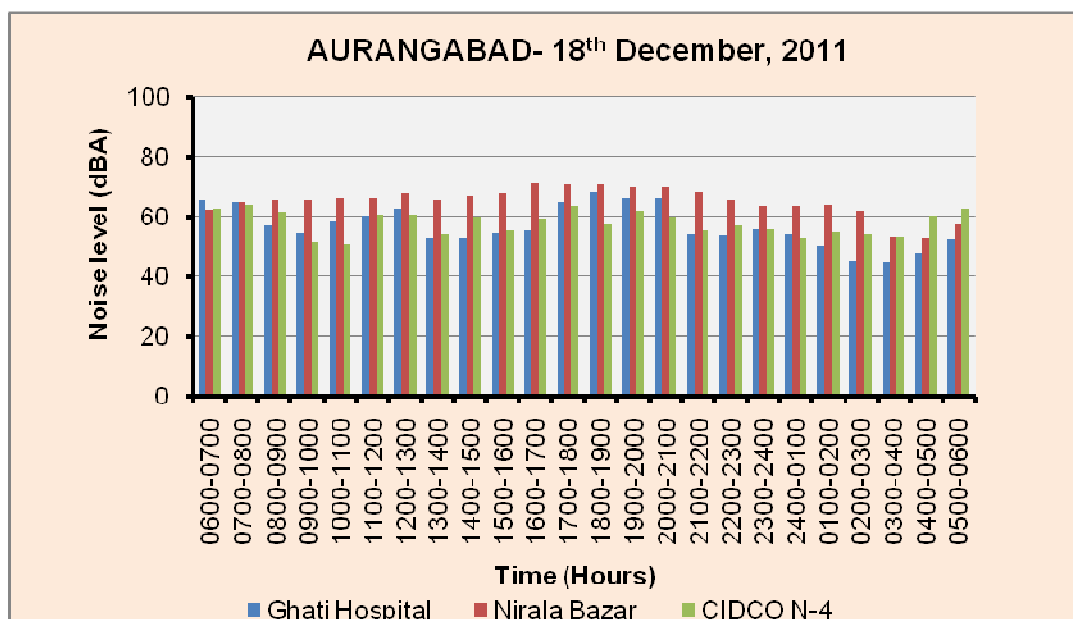
#### 4) Aurangabad:

**Table 4.1.4(a): Ambient Noise Levels in Aurangabad as on 18<sup>th</sup> December, 2011**

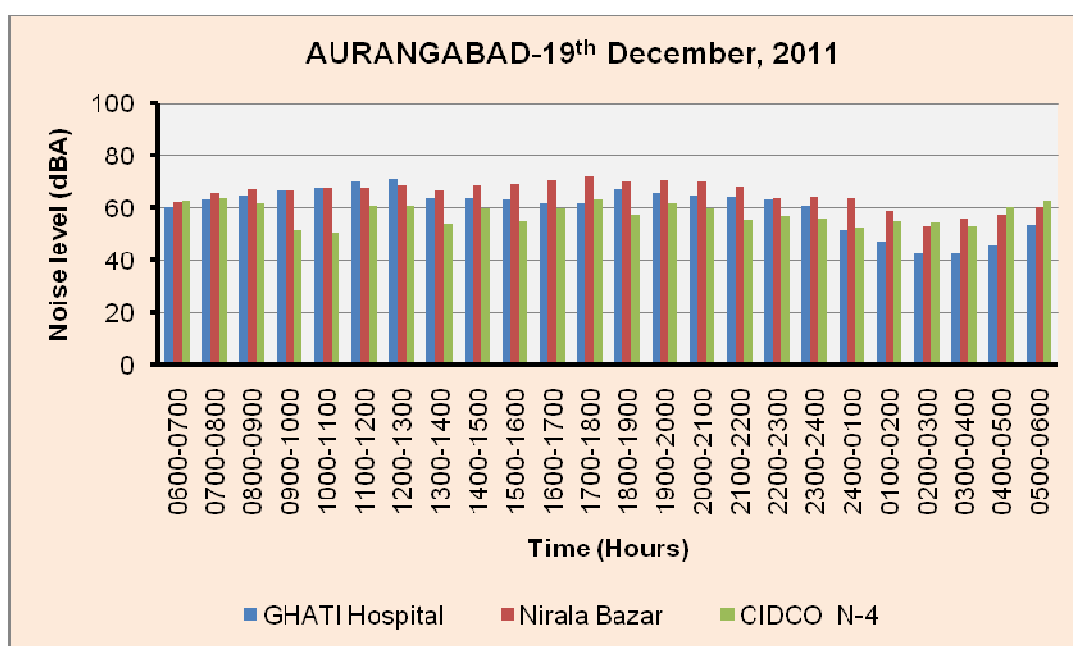
Sr. No	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	Ghati Hospital	18.12.11	59.0	66.0	64.2	59.2	18.12.11 to 19.12.11	50.5	55.4	49.9	46.7
2	Nirala Bazaar, Samarth Nagar	18.12.11	62.5	70.6	68.6	64.3	18.12.11 to 19.12.11	60.9	63.6	60.7	58.7
3	CIDCO N-4	18.12.11	61.0	65.1	62.6	60.2	18.12.11 to 19.12.11	57.3	60.2	57.8	53.8

**Table 4.1.4(b): Ambient Noise Levels in Aurangabad as on 19<sup>th</sup> December, 2011:**

Sr. No	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	Ghati Hospital	19.12.11	63.0	71.3	68.0	63.8	19.12.11 to 20.12.11	53.7	59.8	52.6	47.8
2	Nirala Bazaar, Samarth Nagar	19.12.11	67.1	71.9	70.2	68.8	19.12.11 to 20.12.11	61.0	64.1	61.3	57.3
3	CIDCO N-4	19.12.11	63.3	68.2	65.4	62.4	19.12.11 to 20.12.11	58.9	61.8	59.3	55.5



**Fig 4.1.4(a): Continuous Equivalent Noise Levels at Different Parts of Aurangabad during 18<sup>th</sup> December, 2011**



**Fig 4.1.4(b): Continuous Equivalent Noise Levels at Different Parts of Aurangabad during 19<sup>th</sup> December, 2011**

In **Aurangabad** also, 3 locations were monitored continuously for two days from 18<sup>th</sup> to 19<sup>th</sup> December, 2011 for 24 hours (As shown in Table 4.1.4(a) & 4.1.4(b)). It was observed that on both days, Nirala Bazaar was noisiest at day as well as at night time. It was also observed that:

- At the silence areas the minimum sound level was 46.2dB(A) and the maximum sound level was 72.6dB(A).

- At the commercial areas the minimum sound level was 55.2dB(A) and maximum sound level was 73.6dB(A).
- At the residential areas the minimum sound level was 53.2dB(A) and maximum sound level was 68.8dB(A).

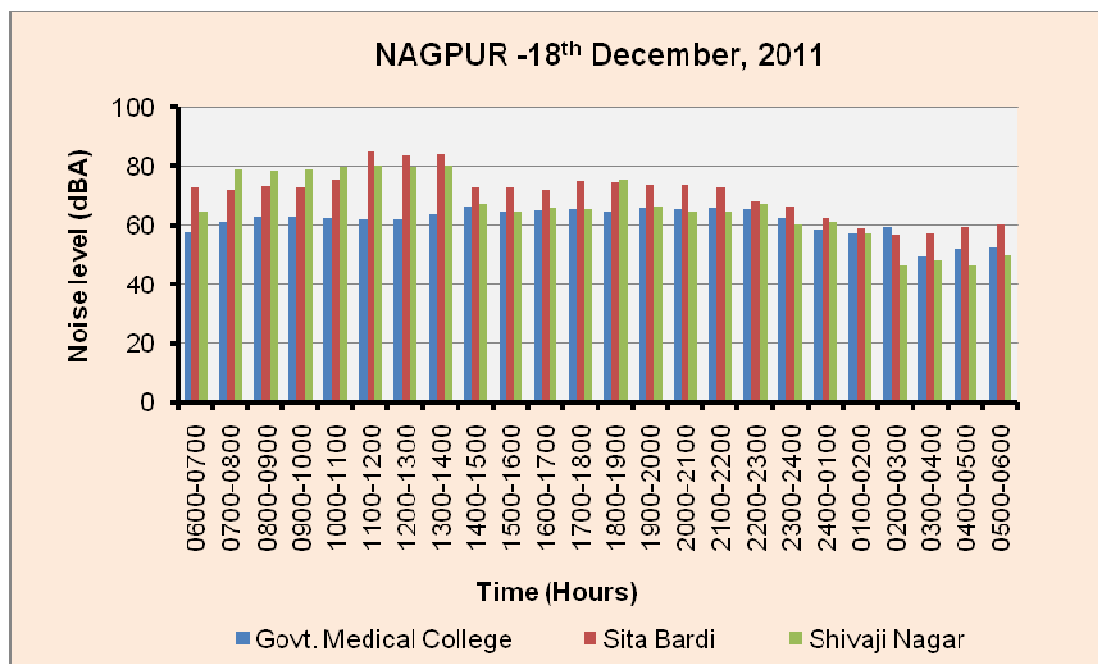
## 5) Nagpur

**Table 4.1.5(a): Ambient Noise Levels in Nagpur as on 18<sup>th</sup> December, 2011:**

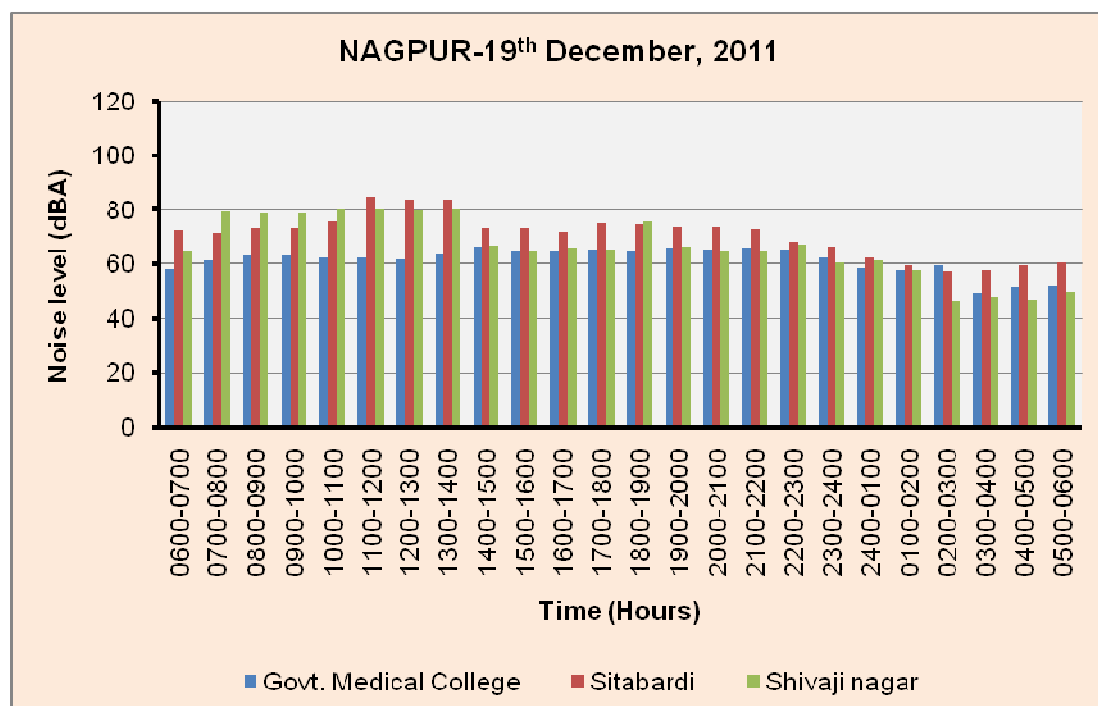
Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	Govt. Medical College	18.12.11	61.4	64.8	60.7	58.6	18.12.11 to 19.12.11	54.0	57.9	60.7	50.2
2	Sitabardi Police Station	18.12.11	73.8	76.9	74.6	69.6	18.12.11 to 19.12.11	63.6	67.5	64.6	58.6
3	Shivaji Nagar	18.12.11	65.7	69.1	66.7	63.5	18.12.11 to 19.12.11	52.1	62.1	48.8	44.2

**Table 4.1.5(b) Ambient Noise Level in Nagpur as on 19<sup>th</sup> December, 2011:**

Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	Govt. Medical College	19.12.11	61.9	67.2	62.5	60.5	19.12.11 to 20.12.11	59.3	60.0	59.4	58.4
2	Sitabardi Police Station	19.12.11	71.8	78.4	75.0	73.1	19.12.11 to 20.12.11	65.2	73.9	64.2	58.6
3	Shivaji Nagar	19.12.11	63.6	69.3	67.1	64.0	19.12.11 to 20.12.11	57.3	65.0	55.5	52.5



**Fig 4.1.5(a): Continuous Equivalent Noise Levels at Different Parts of Nagpur during 18<sup>th</sup> December, 2011**



**Fig 4.1.5(b): Continuous Equivalent Noise Levels at Different Parts of Nagpur during 19<sup>th</sup> December, 2011**

In **Nagpur** also, a total of 3 locations were monitored continuously for two days from 18<sup>th</sup> to 19<sup>th</sup> December, 2011 for 24 hours (As shown in Table 4.1.5(a) & 4.1.5(b)). It was observed that on both

days, Sitabardi was having maximum noise level at day as well as at night time. It was also observed that:

- At the silence areas the minimum sound level was 48.5dB(A) and the maximum sound level was 70.9dB(A).
- At the commercial areas the minimum sound level was 42.9dB(A) and maximum sound level was 70.2dB(A).
- At the residential areas the minimum sound level was 47.0dB(A) and maximum sound level was 70.2dB(A).

## 6) Kolhapur

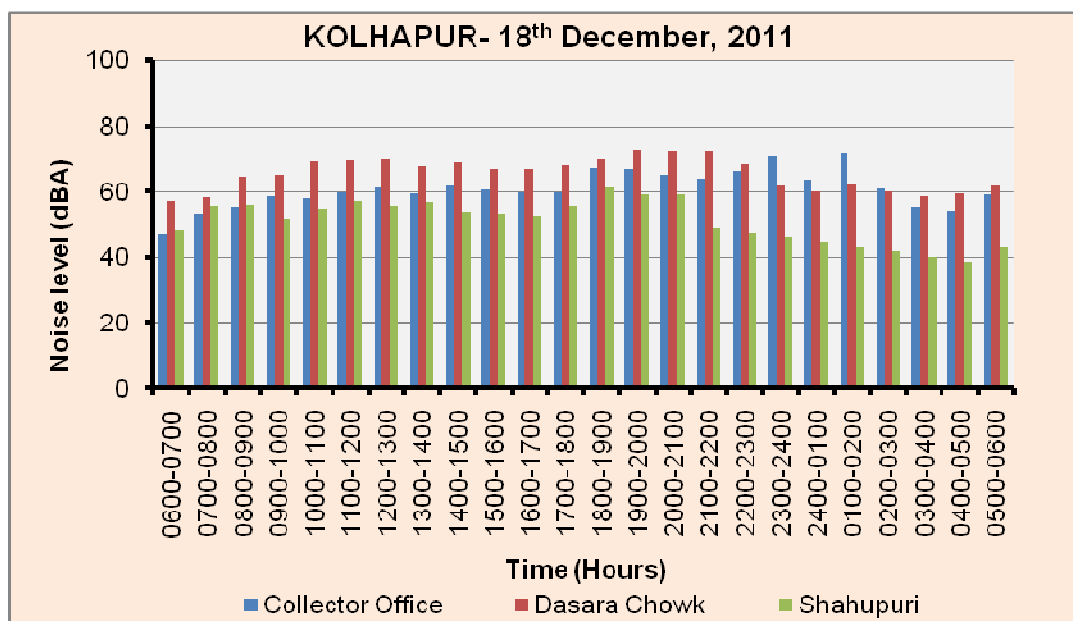
**Table 4.1.6(a) Ambient Noise Level in Kolhapur as on 18<sup>th</sup> December, 2011:**

Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	Collector Office	18.12.11	60.3	69.0	62.8	55.4	18.12.11 to 19.12.11	55.6	58.0	55.4	53.6
2	Dasara Chowk	18.12.11	64.8	74.8	71.3	55.1	18.12.11 to 19.12.11	55.6	61.2	54.5	51.7
3	Shahupuri	18.12.11	64.6	73.7	71.0	58.0	18.12.11 to 19.12.11	57.1	65.0	54.9	50.8

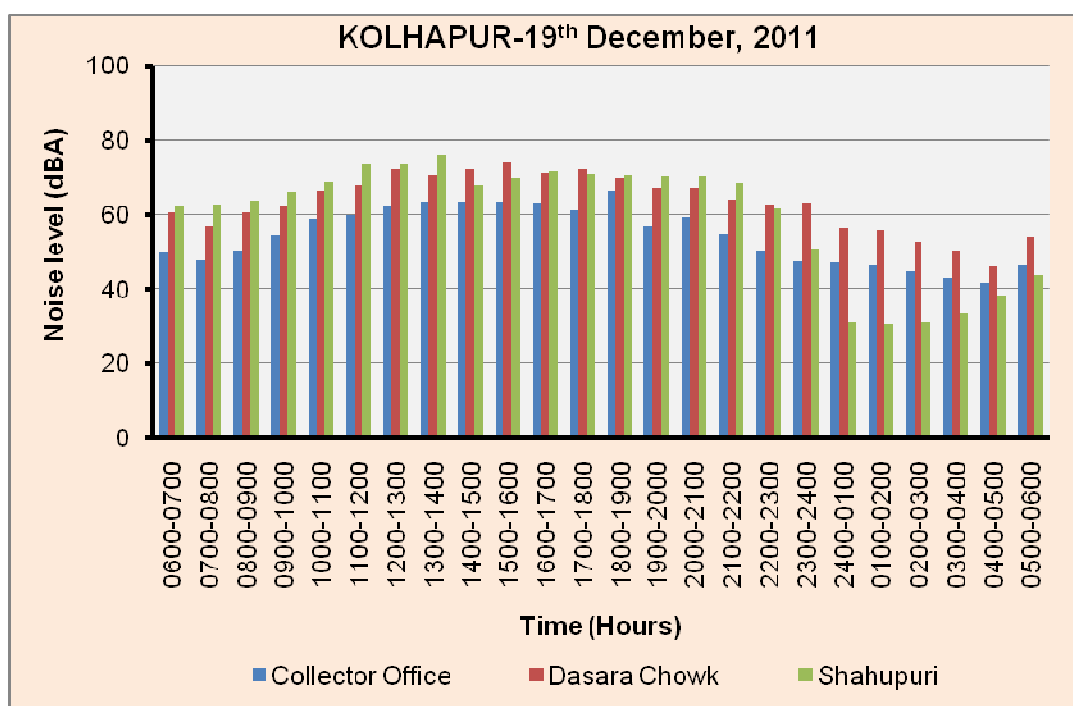
**Table 4.1.6(b) Ambient Noise Level in Kolhapur as on 19<sup>th</sup> December, 2011:**

Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>		L <sub>eq</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>
1	Collector Office	19.12.11	63.1	76.9	64.8	56.8	19.12.11 to 20.12.11	55.1	58.5	54.3	52.4
2	Dasara Chowk	19.12.11	69.0	80.3	78.0	62.1	19.12.11 to 20.12.11	54.4	59.8	52.7	51.0
3	Shahupuri	19.12.11	69.7	82.1	80.1	62.3	19.12.11 to 20.12.11	55.9	66.5	52.2	51.2





**Fig 4.1.6(a): Continuous Equivalent Noise Levels at Different Parts of Kolhapur during 18<sup>th</sup> December, 2011**



**Fig 4.1.6(b): Continuous Equivalent Noise Levels at Different Parts of Kolhapur during 19<sup>th</sup> December, 2011**

In **Kolhapur** also 3 locations were monitored continuously for two days from 18<sup>th</sup> to 19<sup>th</sup> December, 2011 for 24 hours (As shown in Table 4.1.6(a) and 4.1.6(b)). It was observed that, among all the locations Dasara Chowk was found to be having highest noise level on the 18<sup>th</sup> December day & night

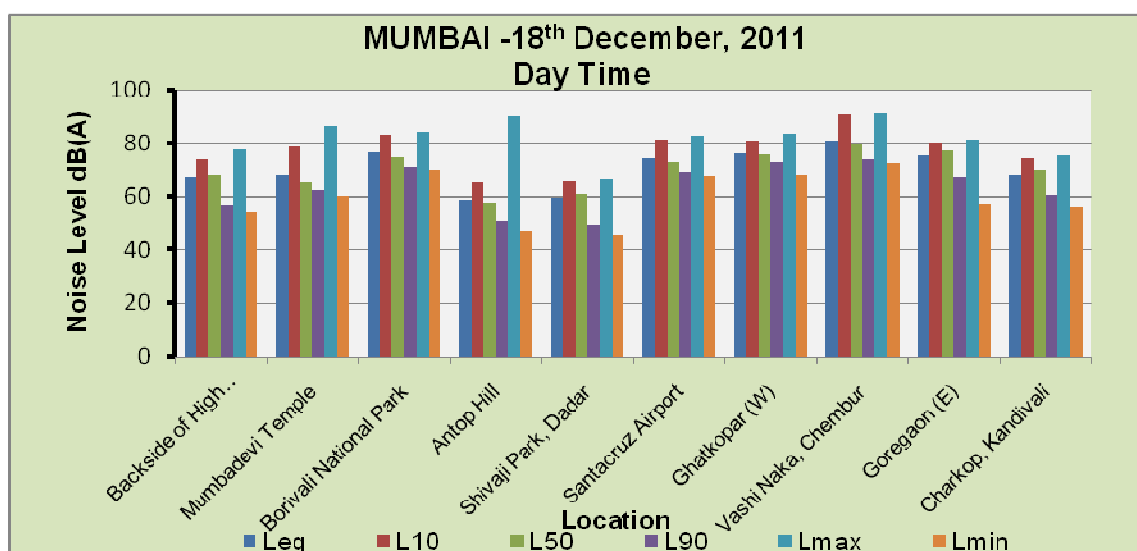
time & 19<sup>th</sup> December night time. Collector office was observed with highest noise level of on 19<sup>th</sup> December, 2011. It was also observed that:

- At the silence areas the minimum sound level was 50.3dB(A) and the maximum sound level was 88.9dB(A).
- At the commercial areas the minimum sound level was 51.0dB(A) and maximum sound level was 80.5dB(A).
- At the residential areas the minimum sound level was 50.3dB(A) and maximum sound level was 82.6dB(A).

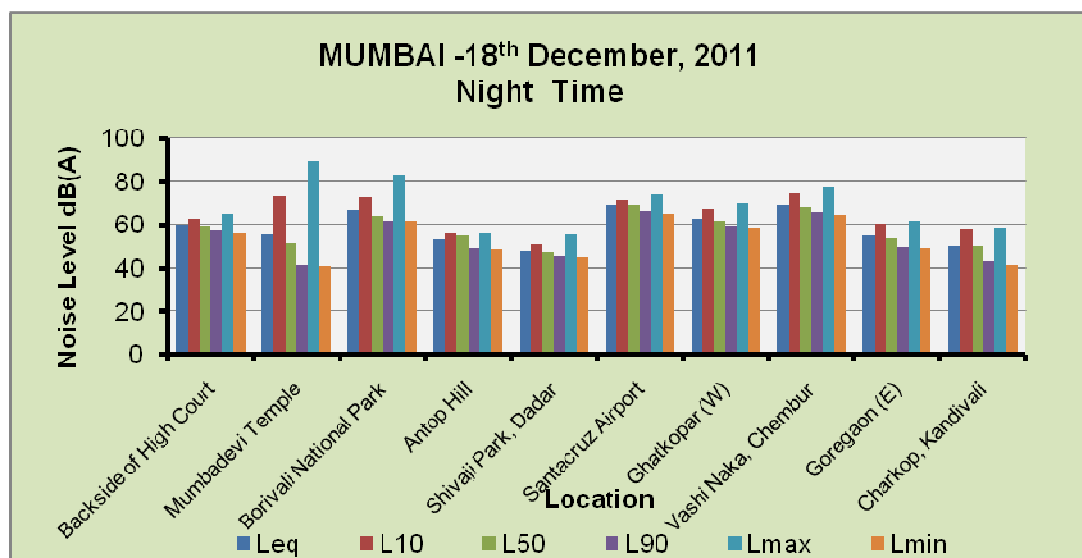
#### 4.2 Graphical representation of $L_{eq}$ , $L_{10}$ , $L_{50}$ , $L_{90}$ :

The following are the graphs of each metropolitan city which shows the noise levels at day time and night time.

##### 1) Mumbai

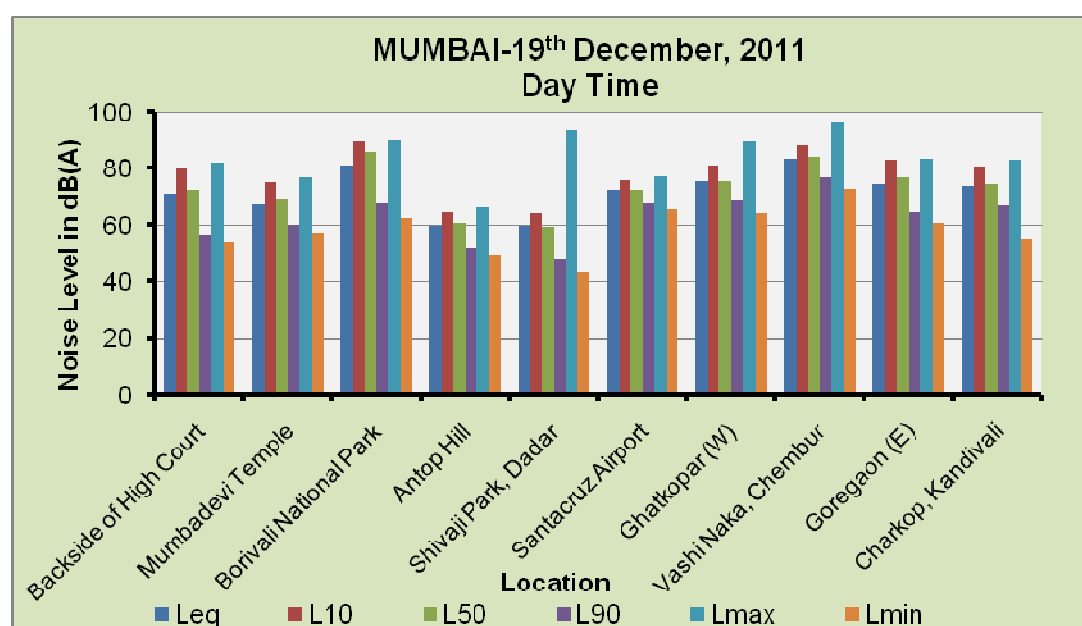


**Fig 4.2.1(a): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Mumbai on 18<sup>th</sup> December, 2011 at Day Time**

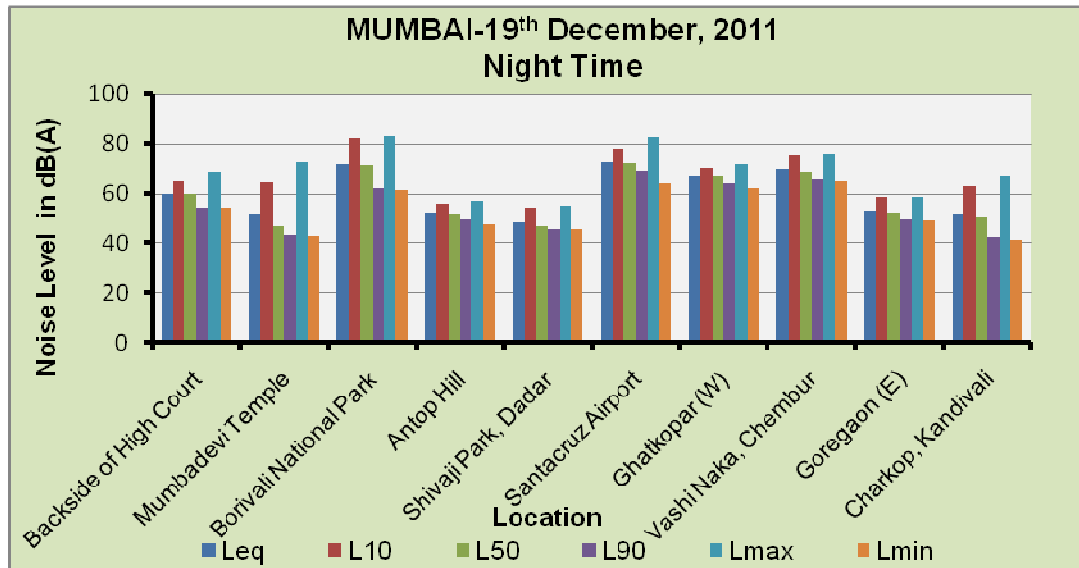


**Fig 4.2.1(b): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Mumbai on 18<sup>th</sup> December, 2011 at Night Time**

Figure 4.2.1(a) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 18<sup>th</sup> December ranged between 53.4dB(A) at Backside of High Court to 75.0dB(A) at Vashi naka, Chembur during day time. However at night time (fig 4.2.1(b)), noise levels ( $L_{eq}$ ) ranged between 40.1dB(A) at Goregaon (E) to 71.6dB(A) at Mumbadevi Temple.



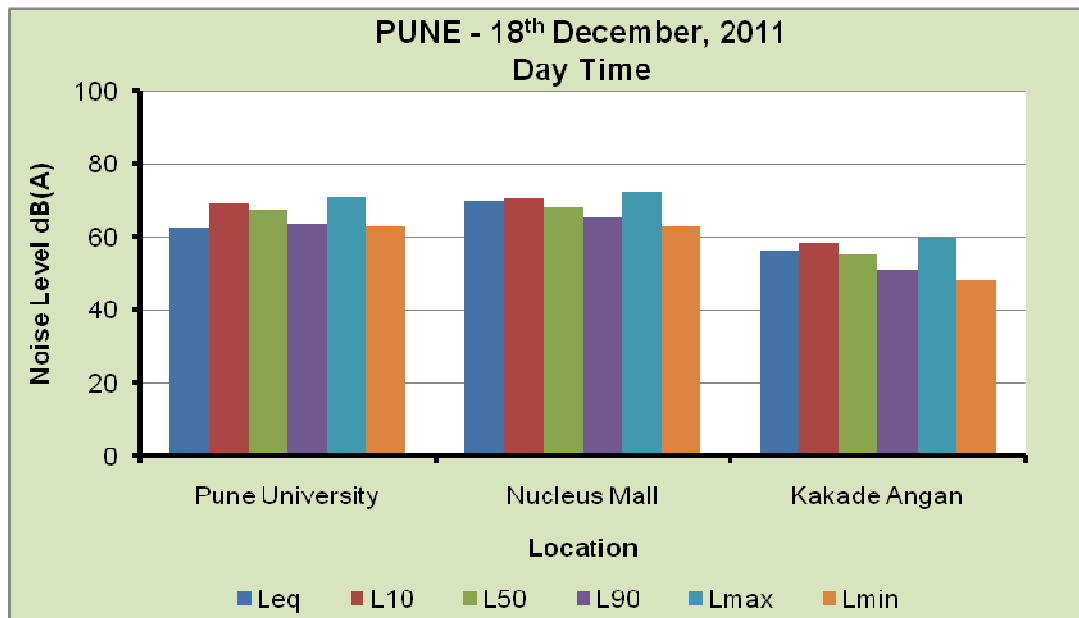
**Fig 4.2.1(c): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Mumbai on 19<sup>th</sup> December, 2011 at Day Time**



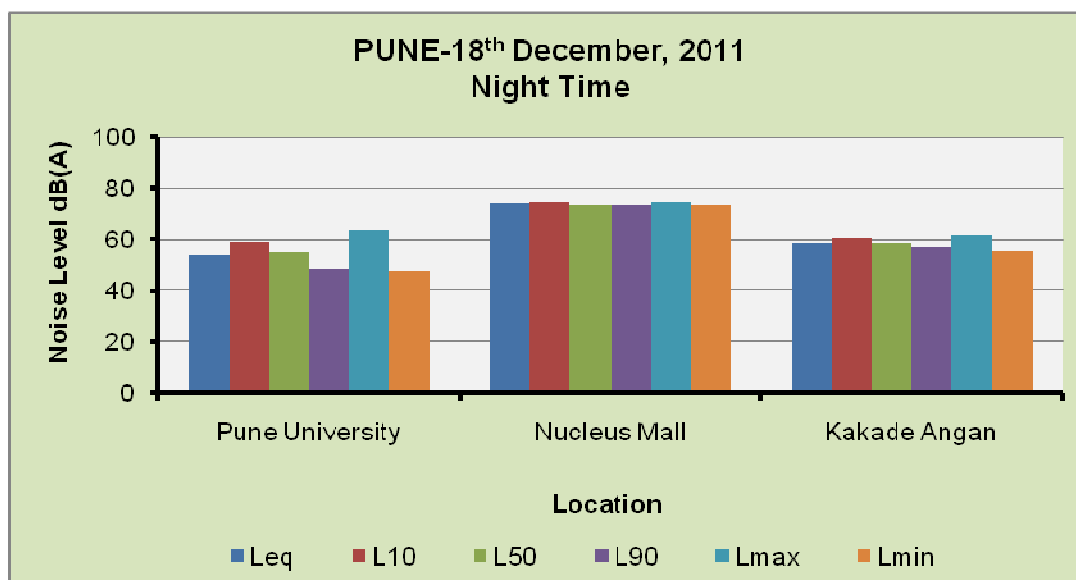
**Fig 4.2.1(d): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Mumbai on 19<sup>th</sup> December, 2011 at Night Time**

Figure 4.2.1(c) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 19th December ranged between 63.9dB(A) at Shivaji Park to 74.1dB(A) at Vashi Naka, Chembur during day time. However at night time (Fig. 4.2.1(d), noise levels ( $L_{eq}$ ) ranged between 54.3dB(A) at Shivaji Park to 74.2dB(A) at Mumbadevi temple.

## 2) Pune:

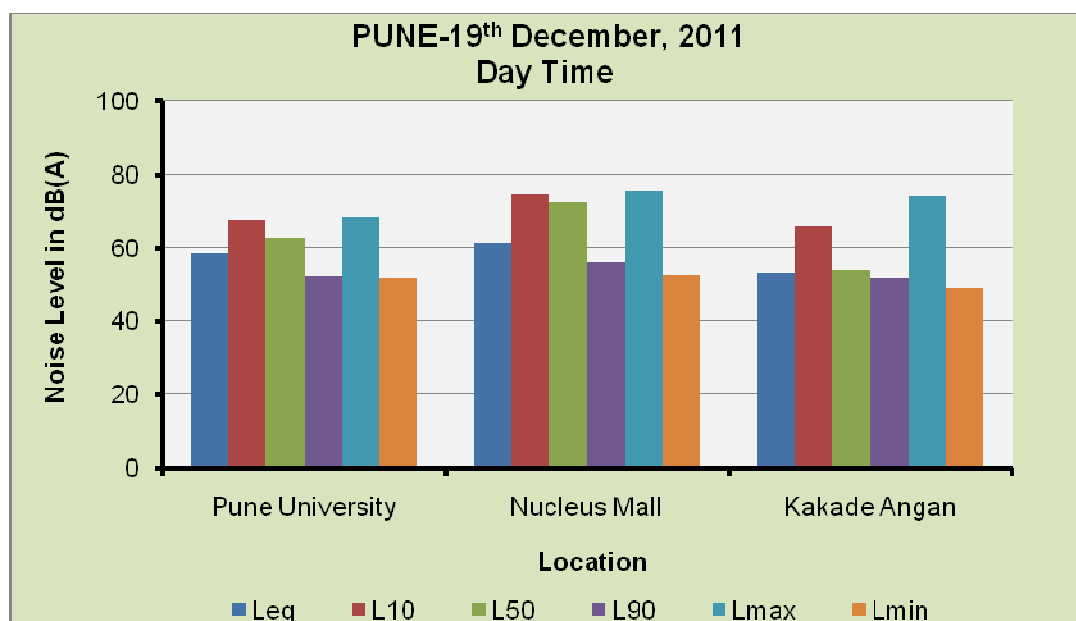


**Fig 4.2.2(a): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Pune on 18<sup>th</sup> December, 2011 at Day Time**

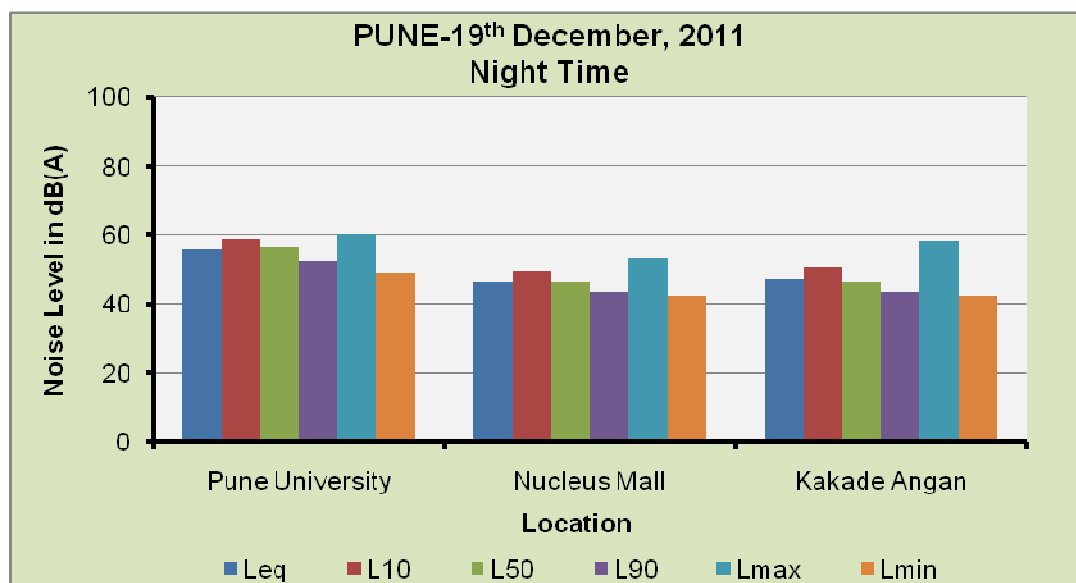


**Fig 4.2.2(b): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Pune on 18<sup>th</sup> December, 2011 at Night Time**

Figure 4.2.2(a) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 18<sup>th</sup> December ranged between 53.8dB(A) at Kakade Angan to 63.3dB(A) at Nucleus mall during day time. However at night time (fig 4.2.2(b), noise levels ( $L_{eq}$ ) ranged between 46.3dB(A) at Pune University to 57.8dB(A) at Nucleus mall.



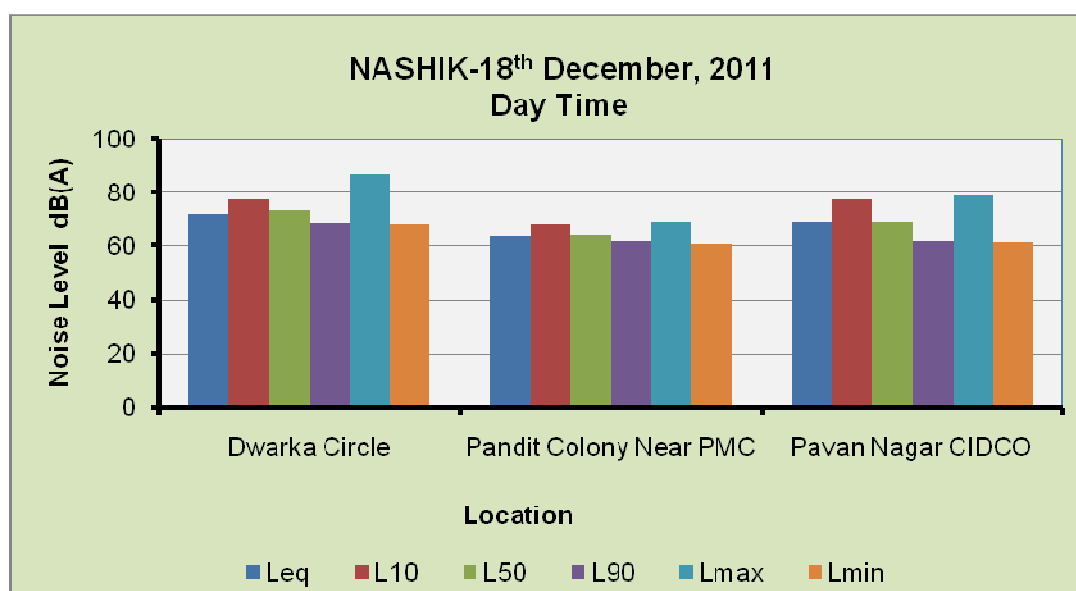
**Fig 4.2.2(c): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Pune on 19<sup>th</sup> December, 2011 at Day Time**



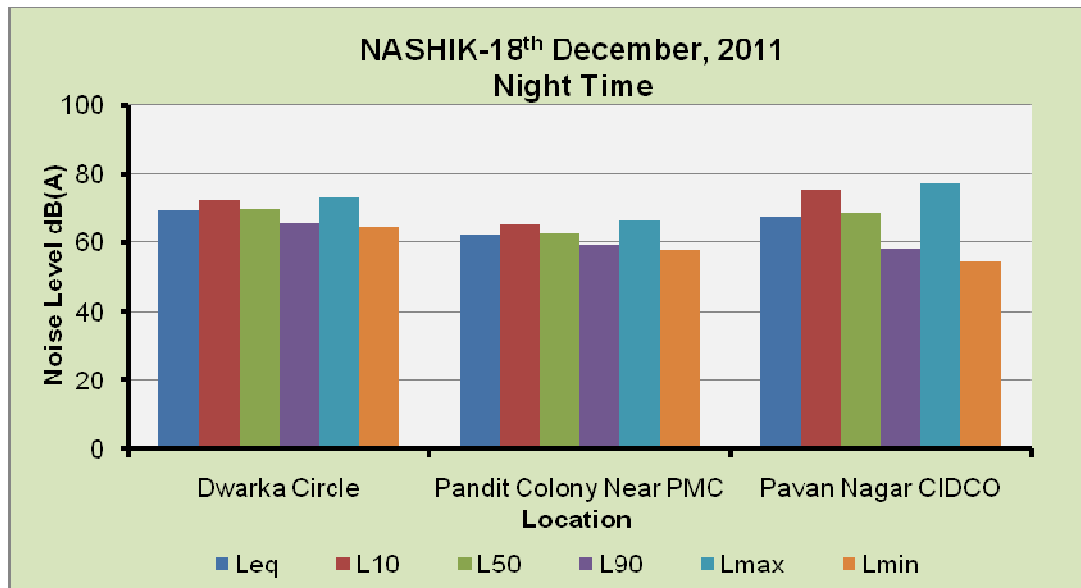
**Fig 4.2.2(d): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Pune on 19<sup>th</sup> December, 2011 at Night Time**

Figure 4.2.2(c) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 19<sup>th</sup> December ranged between 56.3dB(A) at kakade Angan to 61.4dB(A) at Nucleus mall during day time. However at night time (fig 4.2.2(d), noise levels ( $L_{eq}$ ) ranged between 46.9dB(A) at kakade Angan to 52.0dB(A) at Nucleus mall.

### 3) Nashik:

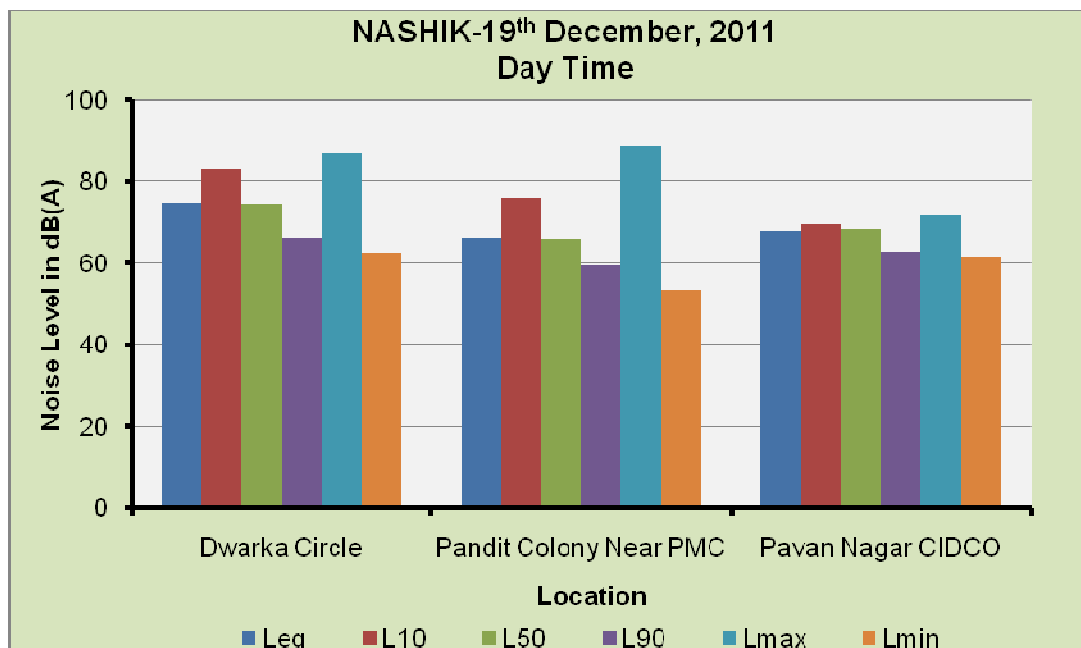


**Fig 4.2.3(a): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Nasik on 18<sup>th</sup> December, 2011 at Day Time**

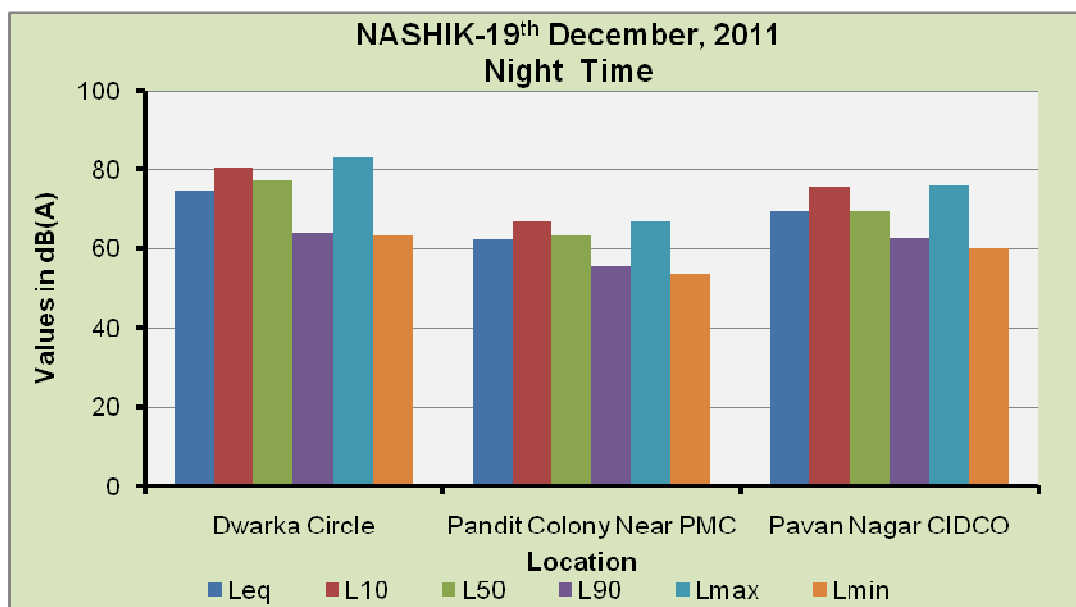


**Fig 4.2.3(b): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Nasik on 18<sup>th</sup> December, 2011 at Night Time**

Figure 4.2.3(a) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 18<sup>th</sup> December ranged between 67.6dB(A) at Pandit colony to 72.2dB(A) at Dwarka circle during day time. However at night time (fig 4.2.3(b)), noise levels ( $L_{eq}$ ) ranged between 66.2dB(A) at Pandit colony to 70.3dB(A) at Dwarka Circle.



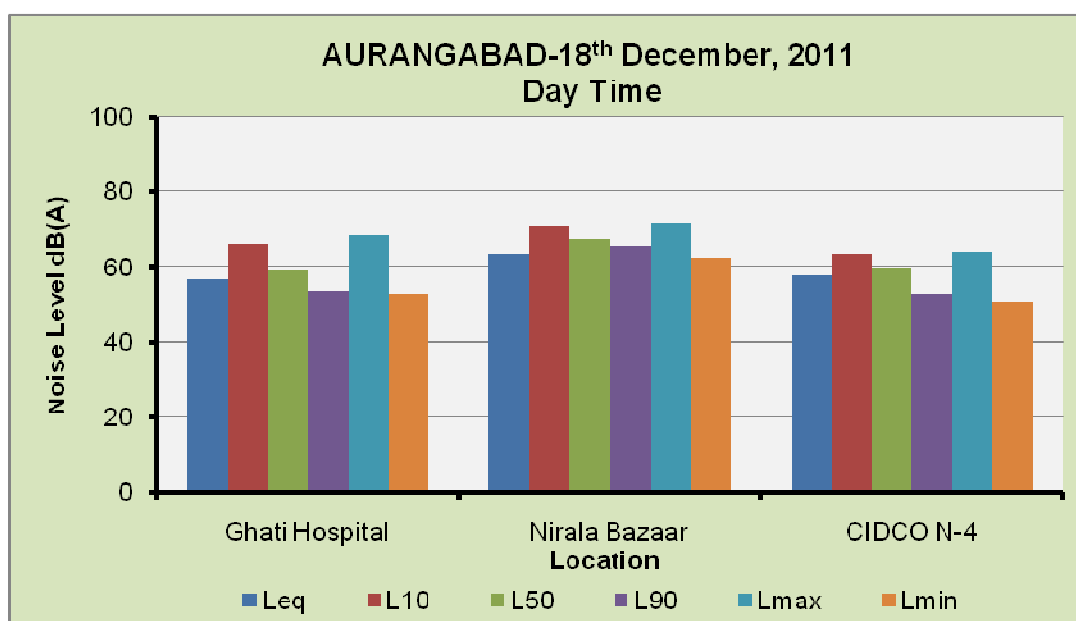
**Fig 4.2.3(c): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Nasik on 19<sup>th</sup> December, 2011 at Day Time**



**Fig 4.2.3(d): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Nasik on 19<sup>th</sup> December, 2011 at Night Time**

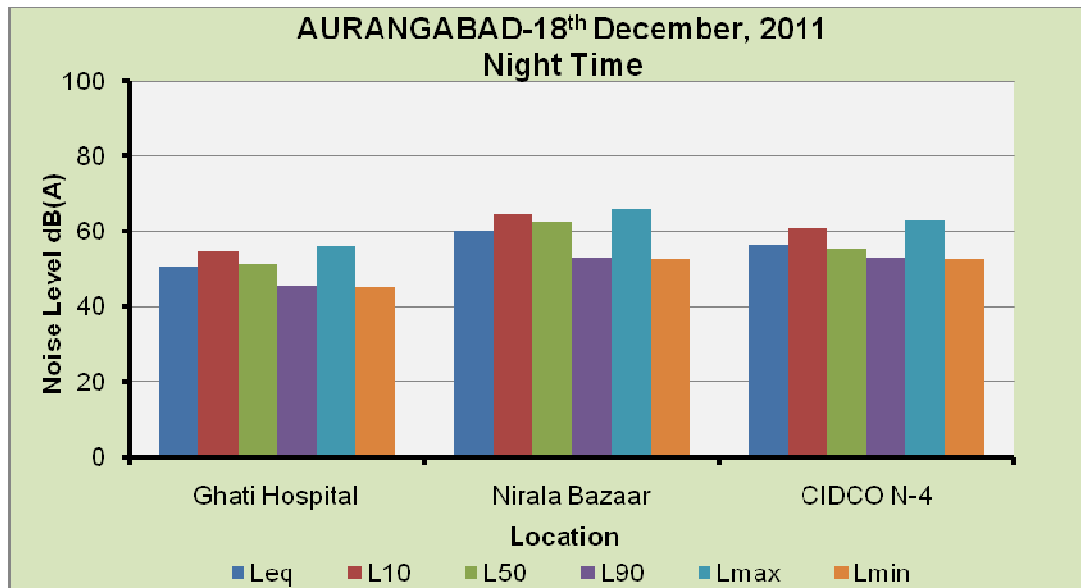
Figure 4.2.3(c) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 19<sup>th</sup> December ranged between 67.4dB(A) at Pavan Nagar to 72.3dB(A) at Dwarka circle during day time. However at night time (fig 4.2.3(d)), noise levels ( $L_{eq}$ ) ranged between 66.1dB(A) at Pavan Nagar to 69.8dB(A) at Dwarka Circle.

#### 4) Aurangabad:



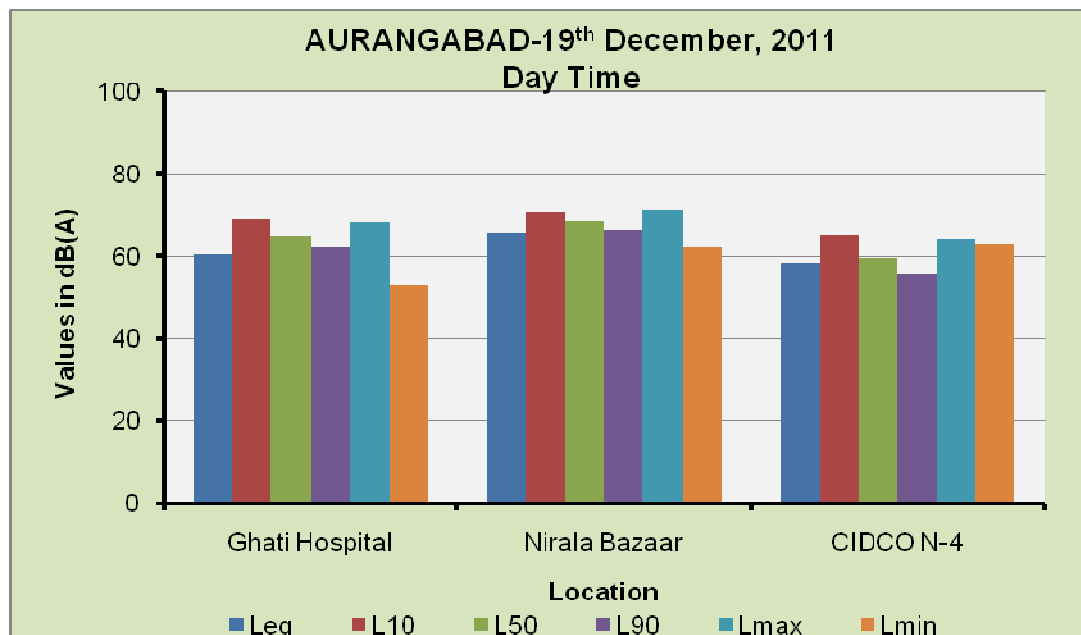
**Fig 4.2.4(a): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Aurangabad on 18<sup>th</sup> December, 2011 at Day Time**



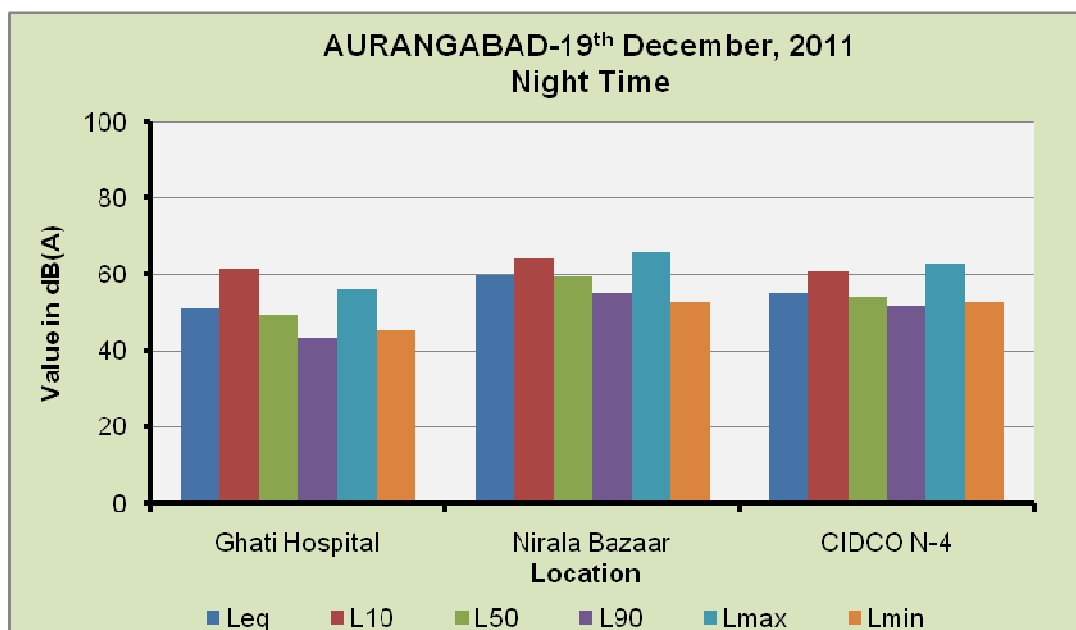


**Fig 4.2.4(b): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Aurangabad on 18<sup>th</sup> December, 2011 at Night Time**

Figure 4.2.4(a) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 18<sup>th</sup> December ranged between 59.0dB(A) at Ghati Hospital to 62.5dB(A) at Nirala Bazar during day time. However at night time (fig 4.2.4(b)) also, noise levels ( $L_{eq}$ ) ranged between 50.5dB(A) at Ghati Hospital to 60.9dB(A) at Nirala Bazar.



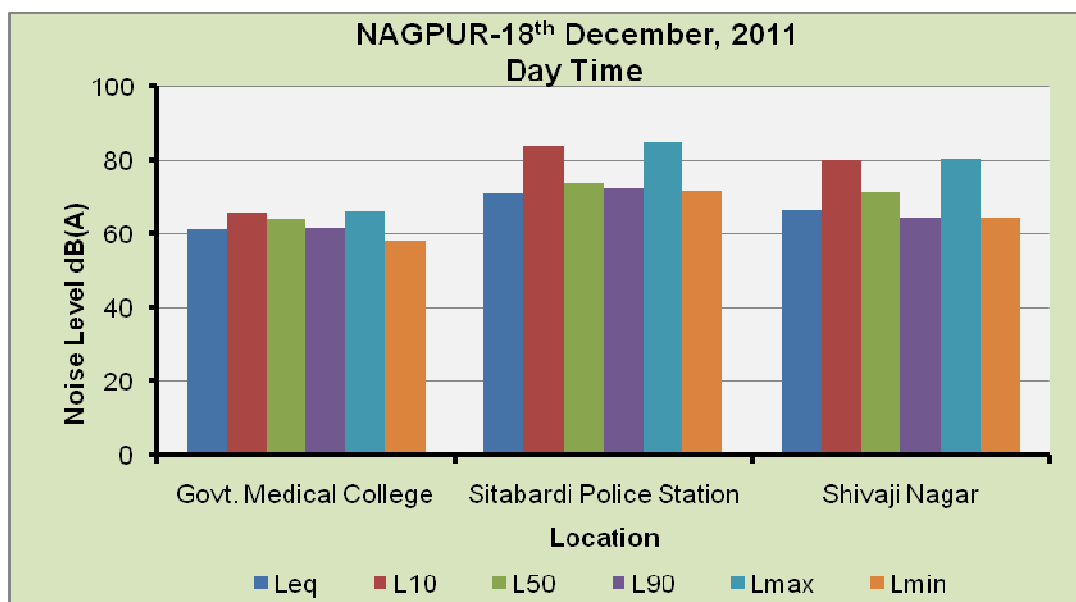
**Fig 4.2.4(c): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Aurangabad on 19<sup>th</sup> December, 2011 at Day Time**



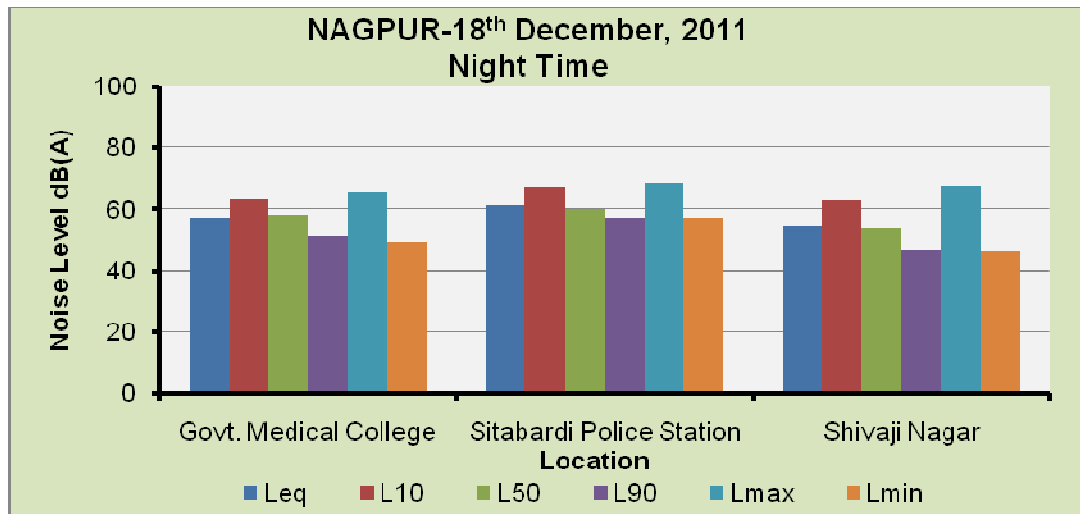
**Fig 4.2.4(d): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Aurangabad on 19<sup>th</sup> December, 2011 at Night**

Figure 4.2.4(C) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 19<sup>th</sup> December ranged between 63.0dB(A) at Ghati Hospital to 67.1dB(A) at Nirala Bazar during day time. However at night time (fig 4.2.4(d)) also, noise levels ( $L_{eq}$ ) ranged between 53.1dB(A) at Ghati Hospital to 61.0dB(A) at Nirala Bazar.

## 5) Nagpur

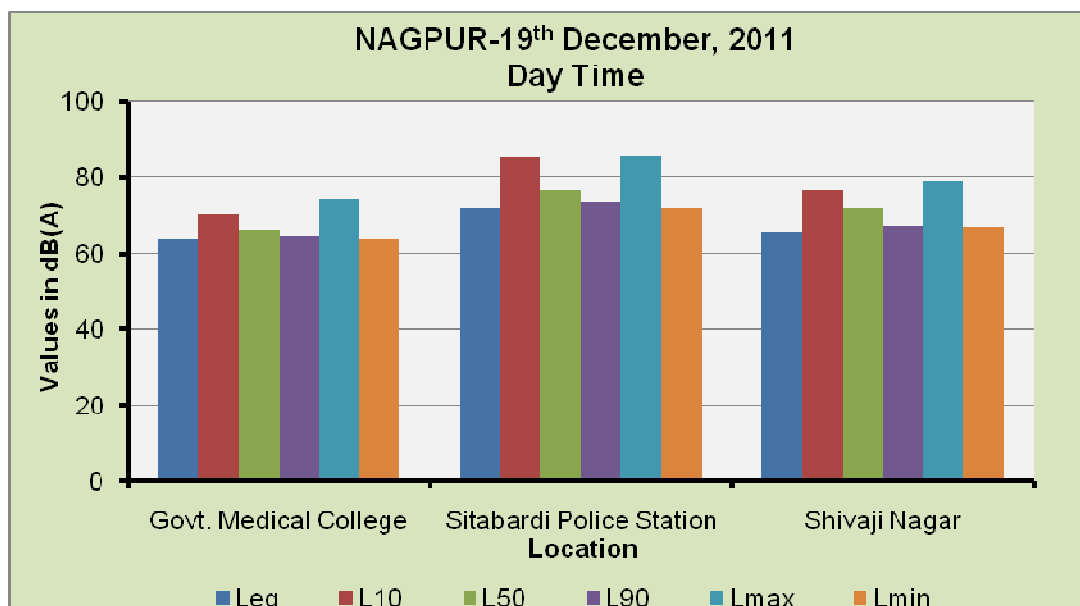


**Fig 4.2.5(a): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Nagpur on 18<sup>th</sup> December, 2011 at Day Time**

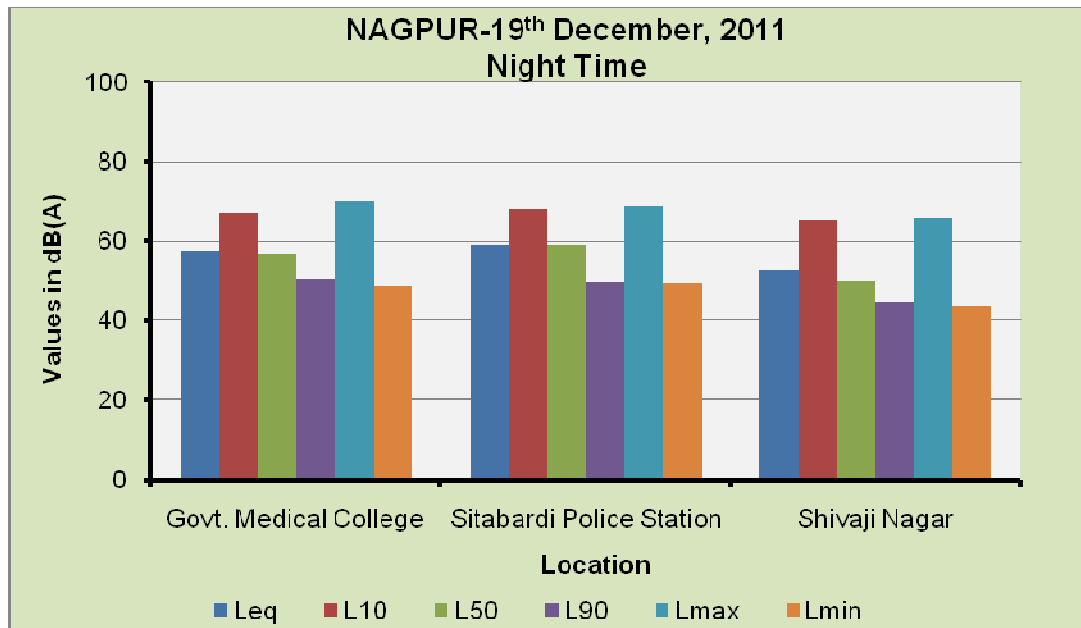


**Fig 4.2.5(b): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Nagpur on 18<sup>th</sup> December, 2011 at Night Time**

Figure 4.2.5(a) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 18<sup>th</sup> December ranged between 61.4dB(A) at Govt. medical college to 73.8dB(A) at Sitabardi police Station during day time. However at night time (fig 4.2.5(b)), noise levels ( $L_{eq}$ ) ranged between 52.1dB(A) at Shivaji Nagar to 63.6dB(A) at Sitabardi.



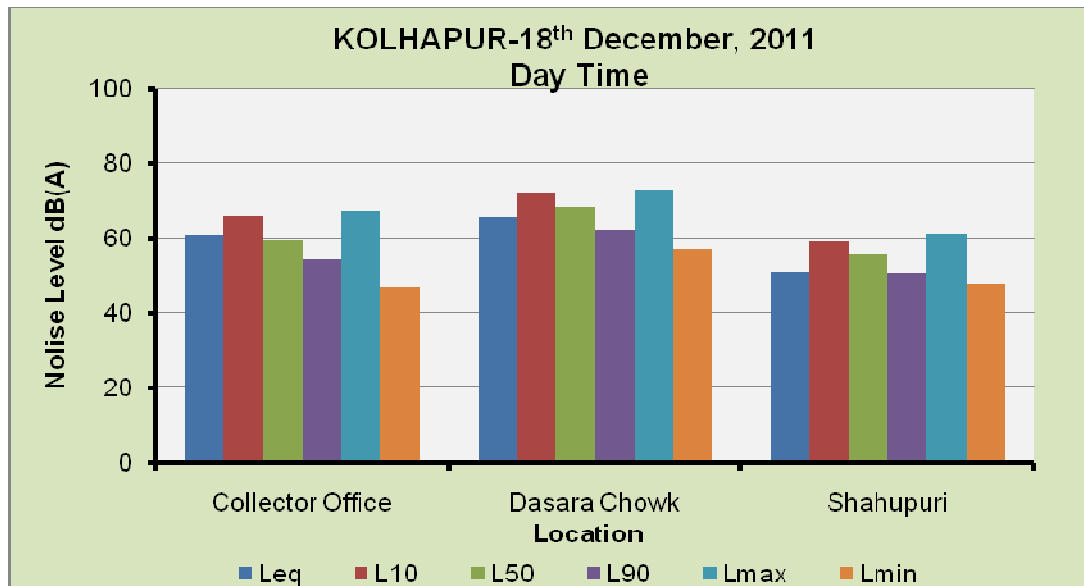
**Fig 4.2.5(c): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Nagpur on 19<sup>th</sup> December, 2011 at Day Time**



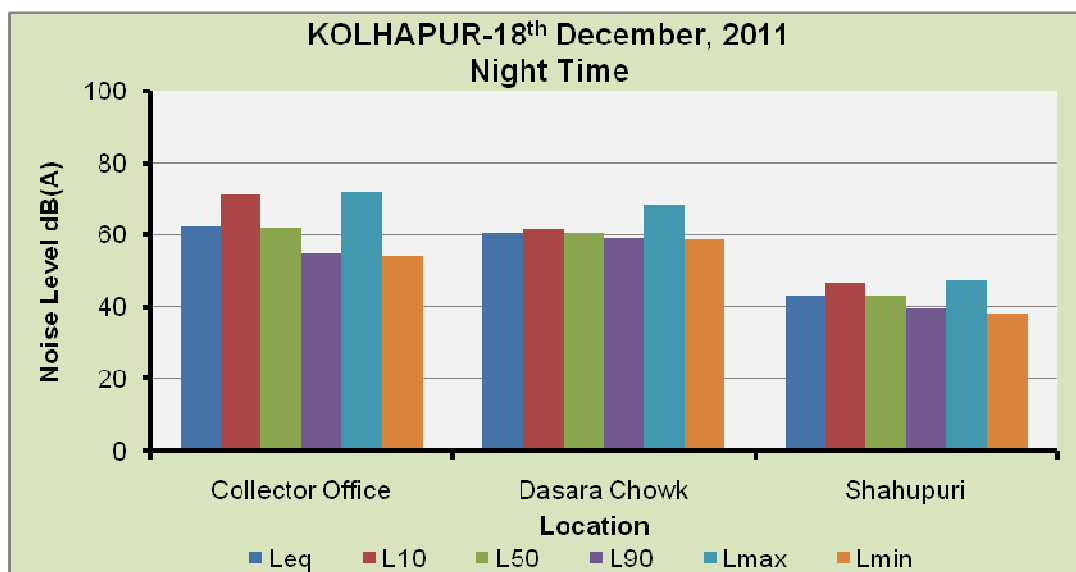
**Fig 4.2.5(d): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Nagpur on 19<sup>th</sup> December, 2011 at Night Time**

Figure 4.2.5(c) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 19<sup>th</sup> December ranged between 61.9dB(A) at Govt. medical college to 71.8dB(A) at Sitabardi Police Station during day time. However at night time (fig 4.2.5(d)), noise levels ( $L_{eq}$ ) ranged between 59.3dB(A) at Govt. medical college to 65.2dB(A) at Sitabardi.

## 6) Kolhapur

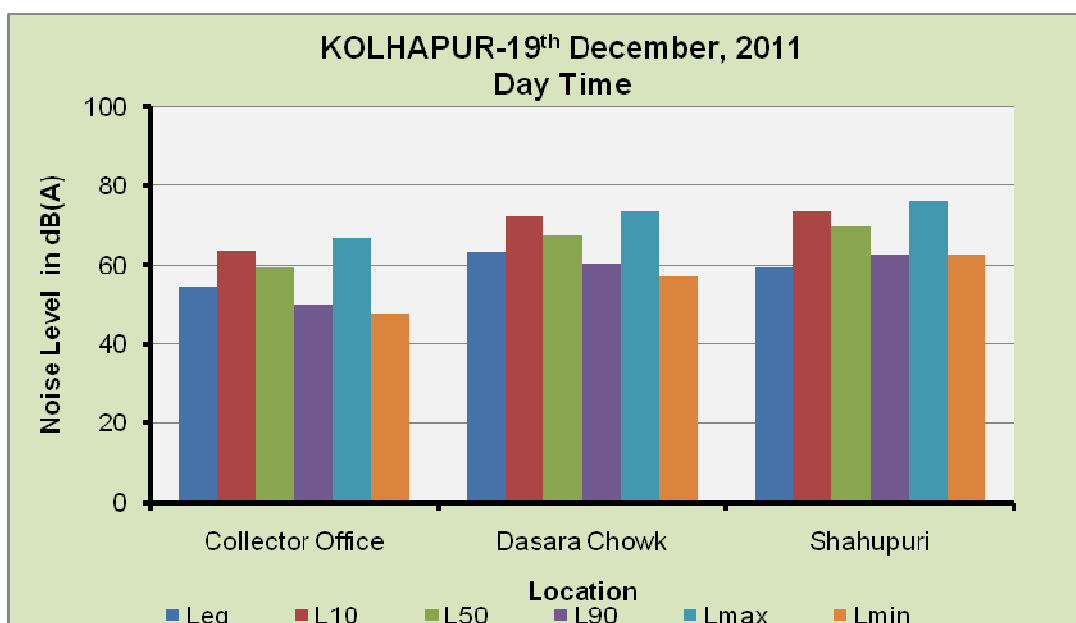


**Fig 4.2.6(a): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Kolhapur on 18<sup>th</sup> December, 2011 at Day Time**

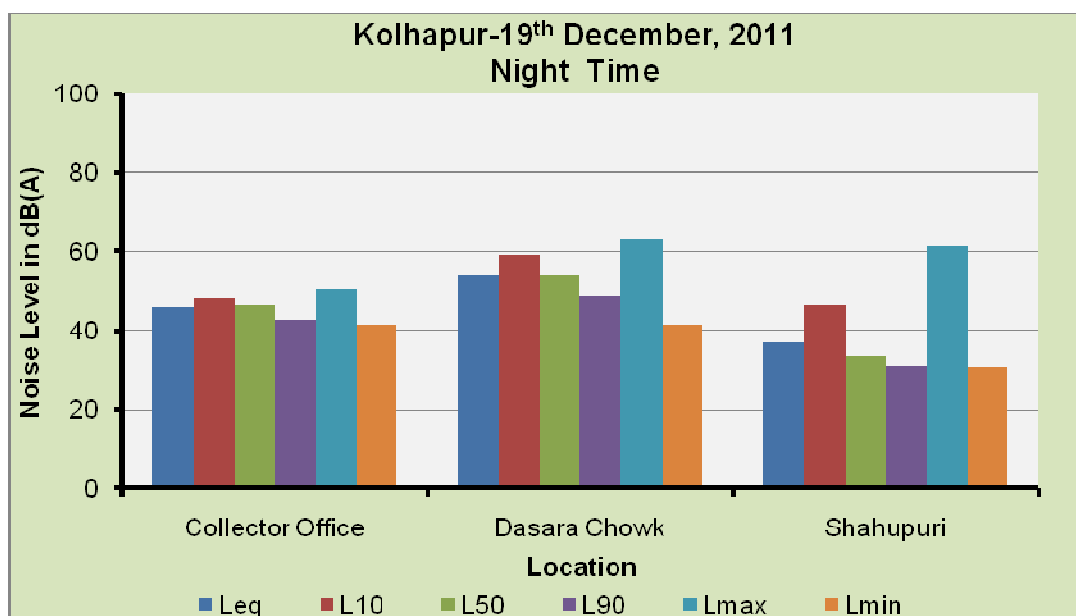


**Fig 4.2.6(b): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Kolhapur on 18<sup>th</sup> December 2011 at Night**

Figure 4.2.6(b) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 18<sup>th</sup> December ranged between 60.3dB(A) at Collector Office to 64.8dB(A) at Dasara Chowk during day time. However at night time (fig 4.2.6(b)), noise levels ( $L_{eq}$ ) ranged between 55.6dB(A) at Collector Office & Dasara Chowk to 57.1dB(A) at Shahupuri.



**Fig 4.2.6(c): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in kolhapur on 19<sup>th</sup> December, 2011 at Day Time**



**Fig 4.2.6(d): Graphical Representation of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$ ,  $L_{max}$  &  $L_{min}$  in Kolhapur on 19<sup>th</sup> December, 2011 at Night**

Figure 4.2.6(c) shows that the ambient noise levels ( $L_{eq}$ ) during day time of 19<sup>th</sup> December ranged between 63.1dB(A) at Collector Office to 69.7dB(A) at Shahupuri during day time. However at night time (fig 4.2.6(d)), noise levels ( $L_{eq}$ ) ranged between 54.4dB(A) at Dasara Chowk to 55.9dB(A) at Shahupuri.

### 4.3 Day-Night Noise Levels according to area:

The day night equivalent ( $L_{dn}$ ) noise levels were calculated and are compared with  $L_{max}$ ,  $L_{min}$  and the maximum permissible limit of the area as shown in table 4.3(a) and 4.3(b)

**Table 4.3(a): Noise Levels as on 18<sup>th</sup> December, 2011:**

Area	Location	$L_{dn}$ dB(A)	$L_{max}$ dB(A)	$L_{min}$ dB(A)	Maximum Permissible Limit in dB(A)
<b>MUMBAI</b>					
Silence	High Court	63.7	74.1	42.6	50
	Mumbadevi	61.9	77.7	68.7	50
	National Park	71.8	83.4	56.9	50
Residential	Antop Hill	55.9	78.9	52.7	55
	Shivaji Park	53.8	72.9	51.7	55
Commercial	Airport	71.9	75.8	58.7	65
	Vashi Naka	69.4	80.3	56.1	65
	Ghatkopar	75.2	82.8	62.0	65
Industrial	Goregaon	64.9	76.1	30.8	75
	Charkop	59.1	81.5	58.3	75

PUNE					
Silence	University	58.3	63.7	41.0	50
Residential	Kakade Angan	71.9	72.2	48.9	55
Commercial	Nucleus Mall	57.3	61.0	42.5	65
NASHIK					
Residential	Pandit Colony	70.6	77.5	67.3	55
Residential	Pavan Nagar	63.1	77.3	61.4	55
Commercial	Dwarka Circle	68.3	78.6	62.2	65
AURANGABAD					
Silence	Ghati Hospital	53.6	67.8	46.2	50
Residential	CIDCO N-4	61.8	71.4	57.6	55
Commercial	Nirala Bazaar	57.1	67.5	53.2	65
NAGPUR					
Silence	Medical College	59.3	70.9	48.5	50
Residential	Shivaji Nagar	66.1	77.3	56.7	55
Commercial	Sitabardi	60.5	69.8	42.9	65
KOLHAPUR					
Silence	Dasara Chowk	61.7	71.6	50.3	50
Residential	Collector Office	63.0	75.8	51.0	55
Commercial	Shahupuri	47.1	74.0	50.3	65

**Table 4.3(b): Noise Levels as on 19<sup>th</sup> December, 2011:**

Area	Location	L <sub>dn</sub> dB(A)	L <sub>max</sub> dB(A)	L <sub>min</sub> dB(A)	Maximum Permissible Limit in dB(A)
MUMBAI					
Silence	High Court	65.5	74.5	59.5	50
	Mumbadevi	59.7	77.7	62.9	50
	National Park	76.6	78.8	47.6	50
Residential	Antop Hill	55.9	82.1	58.6	55
	Shivaji Park	54.0	71.7	50.5	55
Commercial	Airport	72.7	82.9	62.4	65
	Vashi Naka	71.2	81.3	57.6	65
	Ghatkopar	76.5	81.7	58.3	65
Industrial	Goregaon	63.8	76.9	54.7	75
	Charkop	62.9	79.0	60.6	75

PUNE					
Silence	University	57.2	88.9	50.1	50
Residential	Kakade Angan	53.9	80.5	55.1	55
Commercial	Nucleus Mall	50.3	82.6	51.3	65
NASHIK					
Residential	Pandit Colony	74.8	79.0	66.7	55
Residential	Pavan Nagar	64.3	78.0	59.1	55
Commercial	Dwarka Circle	68.6	75.4	55.5	65
AURANGABAD					
Silence	Ghati Hospital	55.8	72.6	47.3	50
Residential	CIDCO No.-4	62.6	73.6	55.2	55
Commercial	Nirala Bazaar	56.7	68.8	53.3	65
NAGPUR					
Silence	Medical College	60.5	69.8	58.3	50
Residential	Shivaji Nagar	65.5	79.9	57.1	55
Commercial	Sitabardi	58.9	70.2	47.0	65
KOLHAPUR					
Silence	Dasara Chowk	50.1	88.9	52.0	50
Residential	Collector Office	58.6	80.5	50.5	55
Commercial	Shahupuri	48.2	82.6	50.8	65

#### 4.4 Comparative Study

It is observed from the results that, the noise levels mostly were exceeding the permissible limit during the both days on 18<sup>th</sup> (holiday) & 19<sup>th</sup> (working day) December, 2011 in all the six Metropolitan Cities of Maharashtra as shown in the table 4.4.1 given below:

The detailed comparison of Noise level results during last year result are as follows

**Table 4.4.1: Noise Levels as on 13<sup>th</sup> December 2009, 12<sup>th</sup> December 2010 & 18<sup>th</sup> December 2011 during Day Time**

Area	Location	Sunday, 13 <sup>th</sup> December, 2009 (Holiday) L <sub>eq</sub> dB(A)	Sunday, 12 <sup>th</sup> December, 2010 (Holiday) L <sub>eq</sub> dB(A)	Sunday, 18 <sup>th</sup> December, 2011 (Holiday) L <sub>eq</sub> dB(A)	Maximum Permissible Limit in dB(A)
MUMBAI					
Silence	High Court	73.9	67.6	53.4	50
	Mumbadevi	74.1	68.3	71.7	50
	National Park	71.3	76.9	68.6	50
Residential	Antop Hill	72.6	58.6	67.4	55



	Shivaji Park	69.2	59.6	63.9	55
Commercial	Airport	73.3	74.6	67.0	65
	Vashi Naka	71.2	81.0	70.6	65
	Ghatkopar	71.7	76.3	75.0	65
Industrial	Goregaon	76.2	75.2	59.5	75
	Charkop	77.7	68.1	68.8	75
<b>PUNE</b>					
Silence	University	74.5	62.7	54.2	50
Residential	Kakade Angan	72.0	70.0	63.3	55
Commercial	Nucleus Mall	74.9	56.4	53.8	65
<b>NASHIK</b>					
Residential	Pandit Colony	63.2	71.7	72.2	55
Residential	Pavan Nagar	70.0	63.8	67.6	55
Commercial	Dwarka Circle	69.1	69.1	71.8	65
<b>AURANGABAD</b>					
Silence	Ghati Hospital.	67.9	56.8	59.0	50
Residential	CIDCO N-4	57.5	63.5	62.5	55
Commercial	Nirala Bazaar	68.0	57.9	61.0	65
<b>NAGPUR</b>					
Silence	Medical College	66.7	61.5	61.4	50
Residential	Shivaji Nagar	68.6	70.8	73.8	55
Commercial	Sitabardi	74.1	66.4	65.7	65
<b>KOLHAPUR</b>					
Silence	Dasara Chowk	64.9	60.8	60.3	50
Residential	Collector Office	55.8	65.5	64.8	55
Commercial	Shahupuri	71.9	51.0	64.6	65

**Table 4.4.2: Noise Levels as on 13<sup>th</sup> December 2009, 12<sup>th</sup> December 2010 & 18<sup>th</sup> December 2011 during Night Time**

Area	Location	Sunday, 13 <sup>th</sup> December, 2009 (Holiday) L <sub>eq</sub> dB(A)	Sunday, 12 <sup>th</sup> December, 2010 (Holiday) L <sub>eq</sub> dB(A)	Sunday, 18 <sup>th</sup> December, 2011 (Holiday) L <sub>eq</sub> dB(A)	Maximum Permissible Limit in dB(A)
<b>MUMBAI</b>					
Silence	High Court	72.5	59.9	47.2	40
	Mumbadevi	70.2	51.8	71.6	40
	National Park	72.4	71.9	68.1	40

Residential	Antop Hill	70.5	52.4	67.3	45
	Shivaji Park	55.3	48.5	55.4	45
Commercial	Airport	71.1	73.2	64.2	55
	Vashi Naka	70.4	69.8	67.6	55
	Ghatkopar	70.4	67.1	69.9	55
Industrial	Goregaon	72.7	53.0	40.1	70
	Charkop	68.3	52.0	63.9	70
<b>PUNE</b>					
Silence	University	72.3	54.0	46.3	40
Residential	Kakade Angan	65.7	73.8	57.8	45
Commercial	Nucleus Mall	72.2	58.3	47.1	55
<b>NASHIK</b>					
Residential	Pandit Colony	64.7	69.5	70.3	45
Residential	Pavan Nagar	68.6	62.3	66.2	45
Commercial	Dwarka Circle	64.9	67.6	69.0	55
<b>AURANGABAD</b>					
Silence	Ghati Hospital.	57.5	50.5	50.5	40
Residential	CIDCO N-4	54.1	60.2	60.9	45
Commercial	Nirala Bazaar	61.2	56.4	57.3	55
<b>NAGPUR</b>					
Silence	Medical College	62.0	57.1	54.0	40
Residential	Shivaji Nagar	58.8	61.3	63.6	45
Commercial	Sitabardi	69.1	54.6	52.1	55
<b>KOLHAPUR</b>					
Silence	Dasara Chowk	51.6	62.6	55.6	40
Residential	Collector Office	47.8	60.5	55.6	45
Commercial	Shahupuri	53.3	43.1	57.1	55

**Table 4.4.3 Noise Levels as on 14<sup>th</sup> December 2009, 13<sup>th</sup> December 2010 & 19<sup>th</sup> December 2011 during Day Time**

Area	Location	Monday, 14 <sup>th</sup> December, 2009 (Working Day) L <sub>eq</sub> dB(A)	Monday, 13 <sup>th</sup> December, 2010 (Working Day) L <sub>eq</sub> dB(A)	Monday, 19 <sup>th</sup> December, 2011 (Working Day) L <sub>eq</sub> dB(A)	Maximum Permissible Limit in dB(A)
<b>MUMBAI</b>					
Silence	High Court	64.5	71.1	69.0	50
	Mumbadevi	70.3	67.7	70.6	50
	National Park	71.1	81.3	65.2	50
Residential	Antop Hill	68.1	59.4	65.7	55
	Shivaji Park	65.3	59.5	63.9	55
Commercial	Airport	64.2	72.2	71.1	65
	Vashi Naka	68.2	83.3	73.1	65
	Ghatkopar	80.4	75.4	74.1	65
Industrial	Goregaon	73.7	74.7	69.5	75
	Charkop	77.6	73.8	69.1	75
<b>PUNE</b>					
Silence	University	74.9	58.5	57.5	50
Residential	Kakade Angan	71.5	61.2	61.4	55
Commercial	Nucleus Mall	72.8	53.4	56.3	65
<b>NASHIK</b>					
Residential	Pandit Colony	66.8	74.7	72.3	55
Residential	Pavan Nagar	69.5	66.2	69.2	55
Commercial	Dwarka Circle	68.5	67.9	67.4	65
<b>AURANGABAD</b>					
Silence	Ghati Hospital.	66.0	60.5	63.0	50
Residential	CIDCO N-4	57.3	65.5	67.1	55
Commercial	Nirala Bazaar	69.1	58.4	63.3	65
<b>NAGPUR</b>					
Silence	Medical College	68.7	61.5	61.9	50
Residential	Shivaji Nagar	69.8	70.8	71.8	55
Commercial	Sitabardi	75.1	66.4	63.6	65
<b>KOLHAPUR</b>					
Silence	Dasara Chowk	68.8	60.8	63.1	50
Residential	Collector Office	56.3	65.5	69.0	55
Commercial	Shahupuri	70.8	51.0	69.7	65

**Table 4.4.4: Noise Levels as on 14<sup>th</sup> December 2009, 13<sup>th</sup> December 2010 & 19<sup>th</sup> December 2011 during Night Time**

Area	Location	Monday, 14 <sup>th</sup> December, 2009 (Working Day) L <sub>eq</sub> dB(A)	Monday, 13 <sup>th</sup> December, 2010 (Working Day) L <sub>eq</sub> dB(A)	Monday, 19 <sup>th</sup> December, 2011 (Working Day) L <sub>eq</sub> dB(A)	Maximum Permissible Limit in dB(A)
<b>MUMBAI</b>					
Silence	High Court	62.7	59.9	67.2	40
	Mumbadevi	62.9	51.8	72.4	40
	National Park	67.2	71.9	67.1	40
Residential	Antop Hill	57.0	52.4	64.0	45
	Shivaji Park	52.3	48.5	54.3	45
Commercial	Airport	56.9	73.2	68.3	55
	Vashi Naka	65.3	69.8	65.6	55
	Ghatkopar	75.8	67.1	67.7	55
Industrial	Goregaon	67.9	53.0	60.6	70
	Charkop	68.7	52.0	66.2	70
<b>PUNE</b>					
Silence	University	71.5	55.9	50.1	40
Residential	Kakade Angan	70.0	46.6	52.0	45
Commercial	Nucleus Mall	73.6	47.2	46.9	55
<b>NASHIK</b>					
Residential	Pandit Colony	65.9	74.9	69.8	45
Residential	Pavan Nagar	62.4	62.4	66.5	45
Commercial	Dwarka Circle	65.1	69.4	66.1	55
<b>AURANGABAD</b>					
Silence	Ghati Hospital.	52.1	51.1	53.7	40
Residential	CIDCO N-4	48.9	59.7	61.0	45s
Commercial	Nirala Bazaar	59.0	55.0	58.9	55
<b>NAGPUR</b>					
Silence	Medical College	64.3	57.4	59.3	40
Residential	Shivaji Nagar	70.1	59.0	65.2	45
Commercial	Sitabardi	66.7	52.5	57.3	55
<b>KOLHAPUR</b>					
Silence	Dasara Chowk	50.3	62.6	55.1	40
Residential	Collector Office	49.3	60.5	54.4	45
Commercial	Shahupuri	52.7	43.1	55.9	55

Comparison study of last year's noise levels and this year's noise levels shows that there is significant decrease in noise levels at many locations this year.

Study shows that noise levels decreased at day as well as at night time at High court, Mumbadevi, Shivaji Park, Goregaon, Vashi Naka and Charkop locations of Mumbai, all the three locations of Pune, Pavan nagar and Dwarka Circle of Nashik, Ghati Hospital and CIDCO N-4 of Aurangabad, Govt. medical college and Shivaji Nagar of Nagpur, Collector Office and Shahupuri of Kolhapur.

## 5. CONCLUSION

The study reveals that although, the laid down noise norms for respective zones (Industrial, Commercial, Residential or Silence) are exceeded at many locations. However, decreasing trends in noise levels are observed at most of the locations this year as compared to last year. This indicates that ambient noise levels may be reduced or controlled closer to standards with more awareness among public, especially in sensitive areas like national parks and other silence zone areas.

**Table 5.1: Detailed list of Locations**

S.No.	City	Location	Area
1.	Mumbai	High Court	Silence
		Mumbadevi temple	
		Borivali National Park	
		Antop Hill	Residential
		Shivaji Park, Dadar	
		Santacruz Airport	Commercial
		Vashi Naka, Chembur	
		Ghatkopar (W)	
		Charkop, Kandivali (W)	Industrial
		Goregaon (E)	
2.	Pune	Pune University	Silence
		Nucleus Mall	Commercial
		Kakade Angan	Industrial
3.	Nashik	Dwarka Circle	Commercial
		Pandit Colony Near NMC	Residential
		Pavan Nagar CIDCO	
4.	Aurangabad	Ghati Hospital	Silence
		Nirala bazaar	Commercial
		CIDCO N-4	Residential
5.	Nagpur	Government Medical College	Silence
		Sitabardi Police Station	Commercial
		Shivaji Nagar	Residential
6.	Kolhapur	Collector Office	Residential
		Dasara Chowk	Silence
		Shahupuri	Commercial

## **6. DEFINITIONS**

### **A-Weighting**

"A-weighting" is the frequency weighting characteristic as specified in IEC 123 or IEC 179 and intended to approximate the relative sensitivity of the normal human ear to different frequencies (pitches) of sound.

### **A-weighted Sound Pressure Level**

The "A-weighted sound pressure level" is the sound pressure level modified by application of the A-weighting. It is measured in dBA, A-weighted, and denoted as dBA.

### **Decibel**

The "decibel" is a dimensionless measure of the sound level or sound pressure level; see sound pressure level.

### **Equivalent Sound Level**

The "equivalent sound level" sometimes denoted  $L_{eq}$  is the value of the constant sound level which would result in exposure to the same total A-weighted energy as would the specified time-varying sound, if the constant sound level persisted over an equal time interval. It is measured in dBA.

### **Fast Response**

"Fast response" is a dynamic characteristic setting of sound level meter meeting the applicable specifications.

#### **$L_{max}$**

The maximum Sound Pressure Level (SPL) value measured during the duration of monitoring

#### **$L_{min}$**

The minimum Sound Pressure Level (SPL) value measured during the duration of monitoring.

#### **$L_{10}$**

The level that were exceeded during 10% of the measuring time in dB (A)

#### **$L_{50}$**

The level that were exceeded during 50% of the measuring time in dB (A)

#### **$L_{90}$**

The level that were exceeded during 90% of the measuring time in dB (A).

### **Percentile Sound Level**

The "X percentile sound level", designated  $L_x$ , is the sound level exceeded x percent of a specified time period, It is measured in dBA.

## **Sound**

"Sound" is an oscillation in pressure, stress, particle displacement or particle velocity, in a medium with internal force (e.g. elastic viscous), or the superposition of such propagated oscillations, which may cause an auditory sensation.

### **Sound Level Meter**

A "sound level meter" is an instrument which is sensitive to and calibrated for the measurement of sound.

### **Sound Pressure Level**

The "Sound Pressure level" is twenty times the logarithm to the base 10 of the ratio of the effective pressure (P) of a sound to the reference pressure ( $P_r$ ) of 20  $\mu\text{Pa}$ . Thus the sound pressure level in dB  
 $= 20 \log_{10} P/P_r$ .

# **ANNEXURE I**



ध्वनी प्रदूषण (नियंत्रण व नियमन) नियम, २०००  
ची प्रभावीपणे अंमलबजावणी करण्यासाठी  
प्राधिकरणाची नियुक्ती करण्याबाबत

महाराष्ट्र शासन

पर्यावरण विभाग, मंत्रालय,

शासन निर्णय क्रमांक : ध्वनीप्र-२००९/प्र.क्र.९५/तांक-१

नविन प्रशासन भवन, १५ वा मजला, मादाम कामा रोड, मुंबई - ४०० ०३२

दिनांक: २१ एप्रिल, २००९

- वाचा - १) शासन निर्णय क्रमांक : ध्वनीप्र-२०००/प्र.क्र.२४/तांक ३, दिनांक १६ ऑगस्ट, २००० आणि दिनांक १५ जून, २००१  
२) मे. उच्च न्यायालयाच्या मुंबई खंडपीठामध्ये दाखल करण्यात आलेल्या सार्वजनिक हिताच्या याचिका क्र. (१) २०५३/२००३, (२) ७४/२००७, (३) ८५/२००७ आणि (४) १/२००९ मधील दिनांक २६/२/२००९ चे आदेश

प्रस्तावना :-

पर्यावरण विभाग, शासन निर्णय क्र. एन.पी./२०००/२४/क्र.३, दिनांक १६/८/२००० व दिनांक १५/०६/२००१ रोजी ध्वनी प्रदूषण (नियंत्रण व नियमन) नियम, २००० च्या २ (क) नुसार, राज्यातील पोलीस आयुक्त असलेल्या शहरामध्ये पोलीस उप आयुक्त व इतर ठिकाणी जिल्हा पोलीस अधिक्षक यांना एक सदस्य प्राधिकरण म्हणून ध्वनी प्रदूषण नियमाची अंमलबजावणी करण्यासाठी नियुक्ती करण्यात आली आहे.

मा. उच्च न्यायालय, मुंबई खंडपीठाने वरील याचिकांमध्ये महाराष्ट्र शासन व इतर विभागांनी ध्वनी प्रदूषण (नियंत्रण व नियमन) नियम, २००० ची प्रभावी अंमलबजावणी करण्याकरीत दिनांक २६/२/२००९ रोजी ठराविक निर्देश दिलेले आहेत. त्यानुसार स्थानिक स्वराज्य संस्थांनी शहरी भागात शांतता झोन जाहीर करणे आवश्यक आहे.

शासन निर्णय :-

१) मा. उच्च न्यायालयाच्या आदेशानुसार तसेच ध्वनी प्रदूषण (नियंत्रण व नियमन) नियम, २००० च्या कलम ३ (५) नुसार स्थानिक स्वराज्य संस्थांनी शहरी भागात शांतता झोन त्वरीत जाहीर करून योग्य ते आदेश काढावेत. तसेच शहरात शांतता झोनचे फलक लावून आदेशाची प्रभावी अंमलबजावणी करण्यासाठी योग्य ती प्रसिध्दी करावी.

- १) शैक्षणिक संस्थांच्या सभोवताली १०० मीटर क्षेत्र
- २) सर्व न्यायालयाच्या सभोवताली १०० मीटर क्षेत्र
- ३) रुग्णालयाच्या सभोवताली १०० मीटर क्षेत्र

२) ध्वनी प्रदूषणाची वाढती पातळी व निरनिराळे प्रदूषण स्रोत विचारात घेता, शासनाच्या निरनिराळ्या विभागांनी सद्यःस्थितीत ते राबवीत असलेल्या नियमाद्वारे ध्वनी प्रदूषण नियंत्रण व नियमनाची अंमलबजावणी करावी. त्याकरिता परिशिष्ट १ मध्ये नमूद केल्याप्रमाणे, शासनाच्या संबंधित विभागांच्या अधिपत्याखालील संस्थांच्या अधिकाऱ्यांना पदनास प्राधिकरण म्हणून जाहीर करण्यात येत आहे. याबाबत संबंधित

रोट्टा/इच-०१००[५००-५-२००९]-१

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विभागांनी स्वतंत्र आदेश निर्गमित करावेत. सदर प्राधिकरण, ते राबवित असलेल्या नियमाच्या तरतुदीनुसार तसेच ध्वनी प्रदूषण (नियंत्रण व नियमन) नियम, २००० च्या तरतुदीनुसार ध्वनी प्रदूषण नियंत्रण व नियमनाच्या कार्यवाही करण्यास सक्षम असेल.

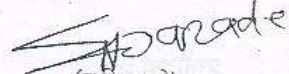
A.

३) ध्वनी प्रदूषण करणारे उपकरणे / स्रोत जसे D.G. Sets (15-500 KVA); Coal Washeries ; Fire Crackers Generator Sets with Diesel (upto 1000 KVA) manufactured on or after 1st July, 2003 ; Vehicles at manufacturing stage from the year, 2003 and 1st April, 2005 respectively as well as Noise Limits for Automobiles and Domestic appliances and construction equipments at the manufacturing stage laid down under the provisions of the Environment (Protection) Act, 1986 and Rules made there under इत्यादींची, सभोवतालच्या हवेतील ध्वनी प्रदूषण गुणवत्तेच्या विहित मर्यादा परिशिष्ट २ मध्ये नमूद केल्याप्रमाणे असेल.

४) या शासन निर्णयान्वये, पर्यावरण विभागाने यापूर्वी दिनांक १६ ऑगस्ट, २००० आणि दिनांक १५ जून, २००१ रोजी या विषयाबाबत निर्गमित केलेला शासन निर्णय खारीज करण्यात येत आहे. हा शासन निर्णय निर्गमित झाल्याच्या दिनांकापासून लागू राहील.

महाराष्ट्राचे राज्यपाल यांच्या आदेशानुसार व नावाने.

B.

  
(ग.नि.वराडे)

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सर्व जिल्हाधिकारी

सर्व पोलीस आयुक्त / उप आयुक्त

सर्व जिल्हा पोलीस अधिक्षक / उप अधिक्षक

पर्यावरण विभाग सर्व अधिकारी / कार्यासन / निवडनस्ती - तांक १

परिशिष्ट - १

एच-०१०० -१५



ध्वनी प्रदूषण व नियमन व नियंत्रणाची अंमलबजावणी करण्यासाठी शासनाच्या अधिपत्याखाली असलेल्या संस्थांमधील संबंधित अधिका-याची पदनाम प्राधिकरण म्हणून नियुक्ती

Sr. No	Officer /Agency	Concerned Department	Duties
1.	District Magistrate, Sub-Divisional Magistrate,	Revenue	Corresponding Rules for the enforcement of the Noise Pollution Control measures within their respective jurisdiction.
2.	Police Commissioner or any other officer not below the rank of the Deputy Superintendent of Police designated for the maintenance of Ambient Air Quality Standards, as mentioned in the Rule 2(c) of Noise Pollution( Regulation and Control) Rules, 2000.	Home	The Police Authorities will be responsible for initiating further legal actions in respect of the violations..
3.	Municipal Commissioner, Additional/Deputy Municipal Commissioner/ Chief Officer of Municipal Council/Committee Govt. of Maharashtra not below the rank of the Deputy Superintendent of Police.	Urban Development	<p>Corresponding Rules for the enforcement of noise standards laid down under the Environment (Protection) Rules, 1986 at source for construction projects, utilities for buildings (ACs, DG sets etc.), domestic appliances, development and other activities in their jurisdiction.</p> <p>The urban local bodies shall be responsible for demarcation of the silent zones as per the Noise Rules, 2000 and displaying the same adequately.</p> <p>The urban local bodies shall include an Action Plan for noise control in the Environmental Status Report submitted by them annually, including noise monitoring and noise mapping studies.</p> <p>The Local Body and Urban Development Deptt., Govt. of Maharashtra will not grant any permissions for development activities in consistent with or in conflict with the categorization of zone. In case of overlapping zones, stringent standards will prevail over in that particular area.</p>
4.	Registrar /Head Master of the Educational Institutions duly approved by the concerned Government not below the rank of the Deputy Superintendent of Police	Higher & Technical Education/ School Education	Corresponding Rules for the enforcement and maintenance of the Ambient Noise Standards laid down for domestic appliances, automobiles etc. in respect of any activity in its jurisdiction.
5.	Dean/Superintendent of the Government Hospitals not below the rank of the Deputy Superintendent of Police	Public Health	Corresponding Rules for the enforcement and maintenance of the Ambient Noise Standards laid down for domestic appliances, automobiles etc. in respect of any activity in its

एच-०१०० -२



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6.	Head of M.M.R.D.A., M.S.R.D.C., C.I.D.C.O., having local jurisdiction constituted under various Laws and Public Works Department.	Urban Development	<p>jurisdiction.</p> <p>Corresponding Rules for the enforcement and maintenance of Noise Standards laid down under the Environment (Protection) Rules, 1986 at source for construction projects, utilities for buildings (ACs, DG sets etc.), domestic appliances, development and other activities in their jurisdiction</p> <p>These Developmental Authorities should include adequate noise abatement measures in their project activities such as noise barriers to the bridges and flyovers, tree plantation for roads etc.</p>
7.	Member Secretary and any officer Maharashtra Pollution Control Board not below the rank of the Deputy Superintendent of Police	Environment Department	<p>(i) Monitoring of Ambient Noise Levels in case of specific requests from other authorities referred in the table and communicating the results to the respective Authorities for further necessary action at their end.</p> <p>(ii) For the enforcement of Noise Pollution Control Measures and Standards in industrial areas.</p>
8.	<p>(i) Any officer from the State Transport Department / Deputy Regional Transport Officer in their respective jurisdiction not below the rank of the Deputy Superintendent of Police</p> <p>(ii) Head of Maharashtra State Road Transport Corporation or any officer/ Depot Manager not below the rank of the Deputy Superintendent of Police.</p> <p>(iii) Traffic Police Authorities not below the rank of the Deputy Superintendent of Police</p>	Home Department (Transport)	<p>Enforcement and maintenance of the Noise Standards laid down under Environment (Protection) Rules, 1986 and Motor Vehicles Act, 1939 for the new and operating vehicles within their respective jurisdiction.</p> <p>The noise levels generated by the in-use vehicles should be monitored while grant of Pollution Under Control Certificate.</p>



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Schedule  
(Under rule 3(1) and 4(1)) of Noise Pollution (Control and Regulation) Rules, 1999

Ambient Air Quality Standards in respect of Noise

Area Code	Category of Area/Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(C)	Residential Area	55	45
(D)	Silence Zone	50	40

- i. Day time shall mean from 6.00 a.m. to 10.00 p.m.
- ii. Night time shall mean from 10.00 p.m. to 6.00 a.m.
- iii. Silence Zone is defined as an area comprising not less than 100 meters around hospitals, educational institutions and courts. The silence zones are zones which are declared as such by the competent authority.
- iv. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

\*dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq : it is an energy mean of the noise level, over a specified period.

**2. Standards / Guidelines for control of Noise Pollution from Stationary Diesel Generator (DG) Sets.**

**(A) Noise Standards for DG sets (15-500 KVA)**

The total sound power level,  $L_w$  of a DG set should be less than,  $94 + 10 \log_{10} (KVA)$ , dB(A), at the manufacturing stage, where, KVA is the nominal power rating of a DG set. This level should fall by 5 dB(A) every five years, till 2007, i.e. in 2002 and then in 2007

**(B) Mandatory acoustic enclosure/acoustic treatment of room for stationary DG sets (5KVA and above).**

Noise from the D.G. Set should be controlled by providing an acoustic enclosure or by treating the room acoustically.

The acoustic enclosure / acoustic treatment of the room should be designed for minimum 25 dB (A) Insertion Loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under such circumstances, the performance may be checked for noise reduction upto actual ambient noise level, preferably in the night time). The measurement for Insertion Loss may be done at different points at 0.5 m from the acoustic enclosure/room, and then averaged.

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The DG set should also be provided with proper exhaust muffler with insertion loss of minimum 25dB (A).

A. (C) **Guidelines for the manufacturers/users of DG sets (5 KVA and above).**

01. The manufacturer should offer to the user a standard acoustic enclosure of 25 dB(A) insertion Loss and also a suitable exhaust muffler, with Insertion Loss of 25 dB(A).
02. The user should make efforts to bring down the noise levels due to the D.G. set, outside his premises, within the ambient noise requirements by proper siting and control measures.
03. The manufacturer should furnish noise power levels of the unsilenced DG sets as per standards prescribed under (A).
04. The total sound power level of a D.G. set, at the user's end, shall be within 2 dB(A) of the total sound power level of the DG set, at the manufacturing stage as prescribed under (A).
05. Installation of a DG set must be strictly in compliance with the recommendations of the DG set manufacturer.
06. A proper routine and preventive maintenance procedure for the DG set should be set and followed in consultation with the DG set manufacturer, which would help to prevent noise levels of the DG set from deteriorating with use.

3. **Noise Level Standards for Coal Washeries**

Operational / Working Zone -- not to exceed 85 dB(A) Leq for 8 hours exposure.

The Ambient Air Quality Standards in respect of noise as notified under Environment (Protection) Rules, 1986 shall be followed at the boundary line of the coal washery.

**Code of Practice of Coal Washery**

Water or Water mixed chemical shall be sprayed at all strategic coal transfer points such as conveyors, loading/unloading points etc. As far as practically possible conveyors, transfer points etc. shall be provided with enclosures.

- \* The crushers/pulverizers of the coal washeries shall be provided with enclosures, fitted with suitable air pollution control measures and finally emitted through a stack of minimum height of 30m, conforming particulate matter emission standards of 150 mg/Nm<sup>3</sup> or provided with adequate water sprinkling arrangement.
- \* Water sprinkling by using fine atomizer nozzles arrangement shall be provided on the coal heaps and on land around the crushers/pulverisers.
- \* Area, in and around the coal washery shall be pucca either asphalted or concreted.
- \* Water consumption in the coal washery shall not exceed 1.5 cubic meter per tonne of coal.
- \* The efficiency of the settling ponds of the waste water treatment system of the coal washery shall not be less than 90%.
- \* Green belt shall be developed along the road side, coal handling plants, residential complex, office building and all around the boundary line of the coal washery.
- \* Storage bunkers, hoppers, rubber decks in chutes and centrifugal chutes shall be provided with proper rubber linings.

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- \* Vehicles movement in the coal washery area shall be regulated effectively to avoid traffic congestion. High pressure horn shall be prohibited. Smoke emission from heavy duty vehicle operating in the coal washeries should conform the standards prescribed under Motor Vehicle Rules, 1989.

**4. Noise Standards for fire-crackers**

- A.(i) The manufacturer, sale or use of fire-crackers generating noise level exceeding 125 dB(A) or 145 dB(C)<sub>pk</sub> at 4 meters distance from the point of bursting shall be prohibited.
- (ii) For individual fire-cracker constituting the series (joined fire crackers), the above mentioned limit be reduced by  $5 \log_{10} (N)$  dB, where N=Number of crackers joined together.
- B. The broad requirements for measurement of noise from fire-crackers shall be-
- (i) The measurements shall be made on a hard concrete surface of minimum 5 meter diameter or equivalent.
- (ii) The measurement shall be made in free field conditions i.e., there shall not be any reflecting surface upto 15 meter distance from the point of bursting.
- (iii) The measurement shall be made with an approved sound level meter.

C. The Department of Explosives shall ensure implementation of these standards.

**5. Noise Limits for Generator Sets run with diesel**

**Noise limit for diesel generator sets (upto 1000 KVA) manufactured on or after 1<sup>st</sup> July, 2003**

The maximum permissible sound pressure level for new diesel generator (DG) sets with rated capacity upto 1000 KVA, manufactured on or after the 1<sup>st</sup> July, 2003 shall be 75 dB(A) at 1 meter from the enclosure surface.

The diesel generator sets should be provided with integral acoustic enclosure at the manufacturing stage itself.

The Implementation of noise limit for these diesel generator sets shall be regulated as given in below mentioned paragraph.

**Requirement of certification**

Every manufacturer of engine or every importer of engine or product must have valid certificates of Type Approval and certificates of Conformity of Production for each year, for all engine models being manufactured or for all engines or product models being imported, after the effective date with the emission limit as specified in earlier paragraph.

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6. (1) Noise limits for vehicles applicable at manufacturing stage  
from the year, 2003.

Sr.No.	Type of Vehicle	Noise Limits dB(A)	Date of Implementation
(1)	(2)	(3)	(4)
1.	Two Wheeler		1 <sup>st</sup> January, 2003
	Displacement upto 80 cm <sup>3</sup>	75	
	Displacement more than 80 cm <sup>3</sup> but upto 175 cm <sup>3</sup>	77	
	Displacement more than 175 cm <sup>3</sup>	89	
2.	Three Wheeler		1 <sup>st</sup> January, 2003
	Displacement upto 175 cm <sup>3</sup>	77	
	Displacement more than 175 cm <sup>3</sup>	80	
3.	Passenger Car	75	1 <sup>st</sup> January, 2003
4.	Passenger or Commercial Vehicles		1 <sup>st</sup> July, 2003
	Gross vehicle weight upto 4 tonnes	80	
	Gross vehicle weight more than 4 tonnes but upto 12 tonnes	83	
	Gross vehicle weight more than 12 tonnes	85	



(2) Noise Limits for vehicles at manufacturing stage applicable on and from 1<sup>st</sup> April, 2005

Sr.No.	Type of vehicles	Noise Limits
1.0	<b>Two Wheelers</b>	
1.1	Displacement upto 80 cc	75
1.2	Displacement more than 80 cc but upto 175 cc	77
1.3	Displacement more than 175 cc	80
2.1	<b>Three Wheelers</b>	
2.1	Displacement upto 175 cc	77
2.2	Displacement more than 175 cc	80
3.0	Vehicles used for the carriage of passengers and capable of having not more than nine seats, including the driver's seat	74
4.0	Vehicles used for the carriage of passengers having more than nine seats including the driver's seat and a maximum Gross Vehicle Weight (GVW) of more than tonnes	
4.1	With an engine power less than 150KW	78
4.2	With an engine power of 150 KW or above	80
5.0	Vehicles used for the carriage of passengers having more than nine seats including the driver's seat: Vehicle used for the carriage of goods.	
5.1	With a maximum GVW not exceeding 2 tonnes	76
5.2	With a maximum GVW greater than 3 tonnes but not exceeding 3.5 tonnes	77
6.0	Vehicles used for the transport of goods with a maximum GVW exceeding 3.5 tonnes	
6.1	With an engine power less than 75 KW	77
6.2	With an engine power of 75 KW or above but less than 150KW	78
6.3	With an engine power of 150 KW or above	80

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7. Noise Standards Part E:-

A. Noise limits for Automobiles (Free Field Distance at 7.5 meter in dB(A) at the manufacturing stage.

(a)	Motorcycle, Scooters and Three Wheelers	80
(b)	Passenger Cars	82
(c)	Passenger or Commercial vehicles upto 4 MT	85
(d)	Passenger or Commercial vehicles above 4 MT and Upto 12 MT	89
(e)	Passenger or Commercial vehicles exceeding 12 MT	91

B. Domestic appliances and construction equipments at the manufacturing stage to be achieved by 31<sup>st</sup> December, 1993.

(a)	Window Air Conditioners of 1 ton to 1.5 ton	68
(b)	Air Coolers	60
(c)	Refrigerators	46
(d)	Diesel generator of domestic purposes	85-90
(e)	Compactors (rollers), Front Loaders, Concrete Mixers, Cranes (moveable), Vibrators and Saws	75

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# **ANNEXURE II**

### Detailed list of locations

Total 25 locations were covered during Diwali festival in all over Maharashtra state. The detailed list of locations is given below:-

S.No.	City	Location	Area
1.	Mumbai	High Court	Silence
		Mumbadevi temple	
		Borivali National Park	
		Antop Hill	Residential
		Shivaji Park, Dadar	
		Santacruz Airport	Commercial
		Vashi Naka, Chembur	
		Ghatkopar (W)	
		Charkop, Kandivali (W)	Industrial
		Goregaon (E)	
2.	Pune	Pune University	Silence
		Nucleus Mall	Commercial
		Kakade Angan	Industrial

<b>3.</b>	<b>Nashik</b>	Dwarka Circle	Commercial
		Pandit Colony Near NMC	Residential
		Pavan Nagar CIDCO	
<b>4.</b>	<b>Aurangabad</b>	Ghati Hospital	Silence
		Nirala bazaar	Commercial
		CIDCO N-4	Residential
<b>5.</b>	<b>Nagpur</b>	Government Medical College	Silence
		Sitabardi Police Station	Commercial
		Shivaji Nagar	Residential
<b>6.</b>	<b>Kolhapur</b>	Collector Office	Residential
		Dasara Chowk	Silence
		Shahupuri	Commercial

# **ANNEXURE III**

## SOUND LEVEL METER

