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# ASSESSMENT OF INDUSTRIAL NOISE POLLUTION IN GHAZIABAD BY USING ARC GIS MAPPING AND PLOTTING OF GRAPH

**[1]Ayushi Jain, [2]A.K. Shukla, [3]Asit Singh**
[1]M.Tech Student, [2]Professor, [3]Assistant Professor
[1,2,3]Civil Engineering, Institute of Engineering and Technology Lucknow, 226021, India

***Abstract:*** One type of pollution that we practically always encounter is noise pollution. Noise pollution has a significant negative influence on our everyday health, much like other types of pollution such as soil, air, water, and others. Noise pollution poses a threat to our life in addition to the other types of pollution we encounter. Noise pollution is a serious hazard to health, according to findings from the World Health Organization. A person who is exposed to noise pollution on a regular basis may begin to have health problems, which might be disastrous in the long run. Numerous intolerable loud distractions might cause serious issues in later life.. It has been demonstrated that residents who live close to airports and busy streets experience stress as well as other issues including trouble paying attention, having trouble remembering things, and having trouble reading. The main piece of Esri's GIS software is Arc noise Map. It's how people utilize the program to make maps. They can identify trends and other kinds of changes in ArcMap by forecasting GIS data. With the aid of a sound level meter (SL-4010), noise numerical data is gathered. Measurements are made for both industries in the months of April, May, and June 2023, and are broken down into three time periods: 8 a.m. to 10 a.m., 12 p.m. to 2 p.m., and 4 p.m. to 6 p.m. Sound meters were used to measure the noise levels in terms of L10, L50, L90, LAeq, and LNP.

***IndexTerms-*** Noise pollution, GIS, Noise levels, sound meter

## I. INTRODUCTION

A worldwide problem with the environment, noise pollution is becoming more and more ubiquitous. Noise pollution has grown to be a major issue for both urban and rural regions equally in an age marked by humming metropolis, persistent technology breakthroughs, and the unceasing hum of human activity. This type of pollution disturbs the peace of our surroundings and poses a risk to our bodily and mental health in addition to being an annoyance to the ears. It can also result in a number of health issues. We will explore the sources, impacts, and potential solutions to this issue in this introduction, putting light on the sometimes disregarded negative effects of excessive noise in contemporary life.. A subset of noise pollution that results from different industrial, commercial, and manufacturing processes is known as industrial noise pollution. It is a significant source of the total noise pollution in populated and industrialized regions. Factories, building sites, power plants, the transit of products, and heavy machinery are only a few examples of the many causes of this kind of noise pollution.The intensity and persistence of industrial noise pollution are its defining traits. Continuous operation of industrial facilities results in continual noise levels that can have a significant negative impact on both the environment and human health. The main sources of industrial noise include large machinery, tools, and mechanical operations used in manufacturing, energy generation, and construction. Conveyor belts, pumps, compressors, engines, and manufacturing machinery are examples of common sources. To reduce industrial noise pollution, several nations have developed laws and guidelines that mandate businesses utilize quieter technologies and execute noise-reduction strategies. The use of soundproofing materials, scheduling noisy activities for off-peak hours, and sound barriers are some examples of these safety precautions..Conflicts between industries and surrounding people are frequently brought on by industrial noise pollution and neighborhood concerns. It's a constant struggle to strike a balance between the economic advantages of industry and community welfare(Coelho et al. 2005).The city of Nasik is now dealing with noise as one of the primary problems. Noise describes intolerable sounds in the

environment that endanger the health or wellbeing of people or animals living in various areas. Environmental noise pollution continues to be a serious threat to people's health and quality of life in many different parts of the world. The intention to investigate the effects of noise pollution on the environment serves as the general goal of the current investigation. Located in Maharashtra's northern region lies the city of Nasik. .The area has a significant historical past. It was acknowledged as one of Maharashtra's cities that was rapidly expanding. As a result, a large number of individuals are migrating to Nasik. The population density of the area is mostly caused by this. People are looking for better ways of living, thus they use a variety of different resources, which causes pollution(De Kluijver, H. et al. 2003) Based on research on a smaller scale, it has been shown that noise is dynamic, changing in various places at various times and in various regions. The accuracy of various forecasts depends on diverse geographical information data. As a result, based on the findings of this study, the authors sought to determine how well acceptable noisy data may be assessed after precisely identifying the data and time and space altering. The goal of this study is to determine optimal noise levels using a variety of geographical data types at various locations and intervals of time. The authors of this study discovered that data are important for appropriately evaluating noise. It was also discovered to be crucial how sudden and brief noise affected assessment(Dursun. et al. 2006) Various areas of mountains create a difficult and challenging surroundings to enable noise influenced analysis of development project worksIn order to enable a geographic evaluation distribution of noise owing to the widening and thickening of the national highway in the hilly terrain of East Sikkim, this study offers noise impact prediction methodologies utilizing the Traffic Noise Model (FHWA TNM 2.5) and Geographic Information Systems (GIS). Two noise indexes—Hourly Equivalent Sound Level (Leq(H)) and Day and Night Average Sound Level (Ldn)—were projected for the years 2005—the pre-project scenario—2015—the project's implementation year—and 2040—the project's post-project scenario. From the pre-project situation to the project execution job, the overall trend indicates that the area with extremely loud noise levels diminishes.( King, E.A. et al. 2009)Evaluation of noise is emerged to be the best suited method for evaluating cost-safety noise controls in industrial locations. One of the most important issues is the building of appropriate models for prediction of the tough relationships among acoustic features affecting noise level at locations. In this the numerical data were collected from 62 industrial embroidery rooms in the Khorasan area, at the East of Iran. The main acoustic and embroidery process features that significance of the noise were used to make prediction models using MATLAB software. Regression technique was also taken and its results were compared with those of few approaches, modern approaches were taken to develop relatively accurate models for evaluation of noise in noisy industrial rooms areas.

## II. MATERIALS AND METHOD

### 2.1. STUDY AREA

The findings of industrial noise level measurements conducted in April to June 2023 at two separate industrial sites—JAGAT MACHINERY MANUFACTURERS PVT LMT in Mangal Padey Marg, Ghaziabad, and K.S INDUSTRY in Patel Nagar, Ghaziabad—form the basis of this study. Therefore, this study is conducted at the city of GHAZIABAD, which is located at 77° 26' 59.2476" E longitude and 28° 40' 4.2816" N latitude. FIGURE 1 depicts a broad perspective of the city of Ghaziabad with regions designated as industrial cities for this research.

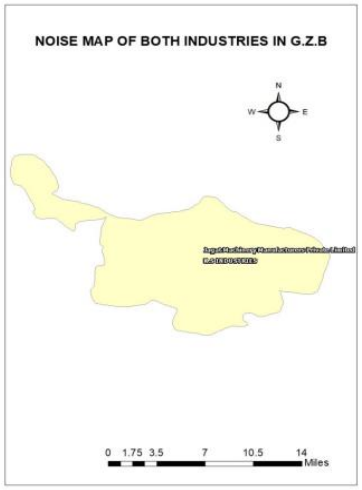



Figure-1 General view of Ghaziabad showing the locations of industrial sities

### 2.2. EXPERIMENTAL PROCEDURE

Instrumentation for the field measurements consisted of a precise grade sound level meter (SL 4010). Observations were made at a distance of 1 meter from the chest and a height of 1.5 meters during the course of an hour. The day, afternoon, and evening timetables were selected based on the following, which are several plans. for the

morning from 8:00 AM to 10:00 AM, the afternoon from 12:00 PM to 2:00 PM, and the evening from 4:00 PM to 6:00 PM. Every month from April through June 2023, there were five observation days.

### 2.3. MEASUEMENT CHARACTERISTICS

From the investigated data, the sound level measure features L10, L50, and L90 were processed.L50 is the degree of sound exceeding for half of the entire season of estimation or Mean Sound Level, L90 is the degree of sound exceeding for 90% of the entire season of estimation or Background or Residual Noise Level. L10 is the degree of sound exceeding for 10% of the absolute season of estimation or Peak Noise Level.In Microsoft Office Excel, L10 and L90 were calculated. These boundaries were utilized for the assessment of Equivalent Continuous Noise Level (Leq) and Noise Pollution Level (LNP). The clamor pollution records were calculated using the following criteria:
Leq= L50 plus [(L10-L90)2 /60](1) LNP = LEQ plus (L10 -L90)…..... (2)

Leq is Equivalent consistent uproar level;
LNP is the Noise Pollution Level;

## III. RESULT AND DISCUSSIONS

### 3.1. ASSESSMENT OF NOISE PARAMETERS :

Different sites each produced an average noise parameter.For the research region, Table 1 displays the daily average noise parameter values. In the time periods (8AM to 10AM), (12PM to 2PM), and (4PM to 6PM), respectively, LEQ and LNP values at two sites exceeded the allowable limits in the month of APRIL 2023.The different noise level parameter such as L10, L50,L90, LNP and LEQare shown for different locations from 8am to 10am in figure 2 and figure 5 .The L10 values of noise level varies between 79 to 81.50 dB, L 50 values varied between 69.34 to 72.95,L90 values varied between 62.53 to 64.00 dB, LAeq values varied between 75.75 to 77.89 dB and LNP was in the range of 87.96 to 100.69 dB .Then the different noise level parameter were showed at different locations for 12pm-2pmThe L10 values range from 78 to 82.59 decibels, while the L50 values are between 70.11 and 72.56 decibels, the L90 values are between 61 and 66 decibels, the LAeq values are between 73 and 81.20 decibels, and the LNP values are between 90 and 101.45 decibels. Also, between the hours of 4 and 6 p.m., various noise level metrics were displayed at various places.The L10 values range between 81.27 and 82.48 dB, the L 50 values range between 72.16 and 73.21 dB, the L 90 values range between 68.00 and 69.59 dB, the LAeq values range between 76.29 and 79.77 dB, and the LNP values range between 101.37 and 102.45 dB.The daily average noise parameter values for the research region are shown in Table 2. In the MAY 2023 time periods (8AM to 10AM), (12PM to 2PM), and (4PM to 6PM), respectively, levels of LEQ and LNP were found at two locations to be higher than the permitted limits. Figures 3 and 6 illustrate various noise level parameters from 8am to 10am for various locations, including L10, L50, L90, LNP, and LEQ.The noise level L10 ranges from 76.50 to 82.00 dB, the noise level L50 ranges from 68.97 to 76.73 dB, the noise level L90 ranges from 62.98 to 69.00 dB, the noise level LAeq ranges from 67.89 to 78.75 dB, and the noise level LNP ranges from 83.97 to 103.79 dB. .Following that, for the hours of 12 to 2, various noise level parameters were displayed at various places.LNP values range from 92.67 to 100.45 dB, whereas L10 values range from 79.00 to 82.59 dB, L50 values from 70.67 to 75.98 dB, L90 values from 61.02 to 66.54 dB, LAeq values from 73.90 to 81.20 dB, and LNP values from 92.67 to 66.54 dB. Also, between the hours of 4 and 6 p.m., various noise level metrics were displayed at various places.L50 values ranged from 72.87 to 73.97 dB, L10 values ranged from 81.27 to 81.48 dB, and L90 values varied between69.07 TO 69.59 dB, LAeq values varied between 76.9 to 79.77 dB, and LNP values varied between 93.07 to 94.96 dB.

The research area's daily average noise parameter values are shown in Table 3. During the time periods (8AM to 10AM), (12PM to 2PM), and (4PM to 6PM), respectively, at two sites, the values of LEQ and LNP were higher than the permitted limits. Figures 4 and 7 depict several noise level parameters from 8am to 10am for various locations, including L10, L50, L90, LNP, and LEQ.The noise level's L10 values vary from 77.5 to 82.56 dB, while L50 values are between 70.62 and 74.13 dB, L90 values are between 63.54 and 70.31 dB, LAeq values are between 71.70 and 72.47 dB, and LNP is between 86.37 and 102.81 dB. Following that, for the hours of 12 to 2, various noise level parameters were displayed at various places.The L10 values range from 78 to 83 decibels, the L50 values from 71 to 73 decibels, the L90 values from 62 to 65 decibels, the LAeq values from 74 to 79 decibels, and the LNP values from 95 to 104 decibelsAlso, between the hours of 4 and 6 p.m., various noise level metrics were displayed at various places.LNP values range from 91.06 to 93.87 dB, LAeq values from 72.65 to 73.17 dB, L10 values from 78.21 to 79.33 dB, L50 values from 69.08 to 70.11 dB, L90 values from 67.98 to 69.21 dB, and L90 values from 67.98 to 69.21 dB.

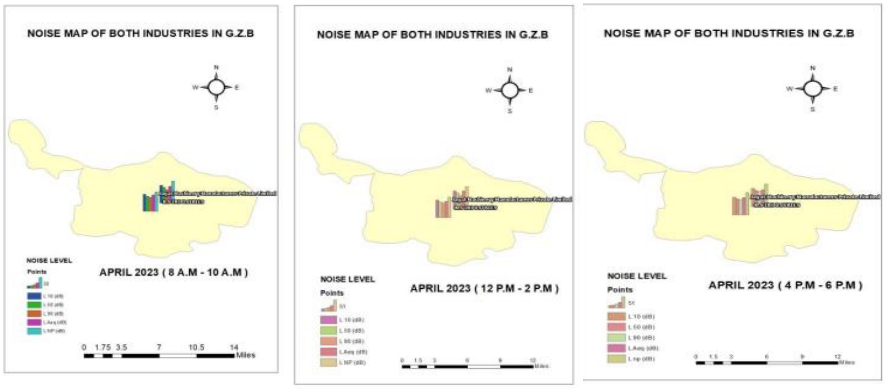



Figure 2. Noise map for Ghaziabad city for the month of APRIL 2023

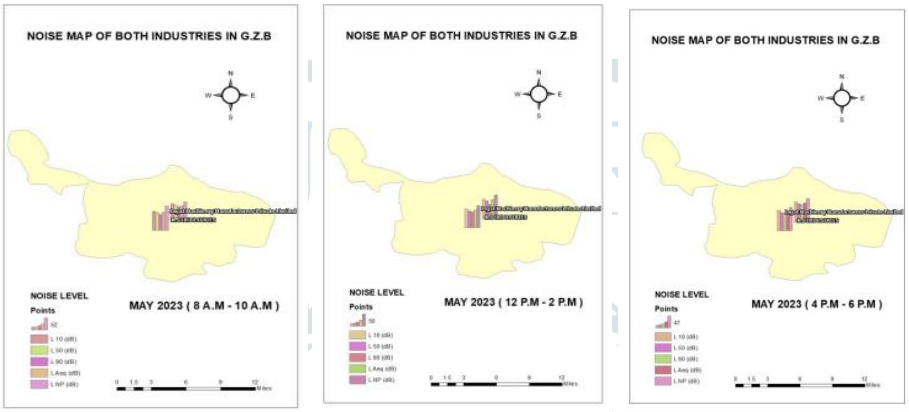



Figure 3. Noise map for Ghaziabad city for the month of MAY 2023

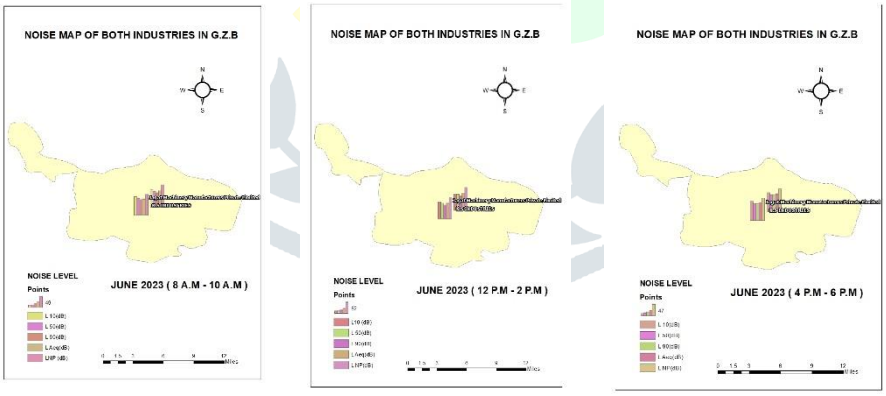
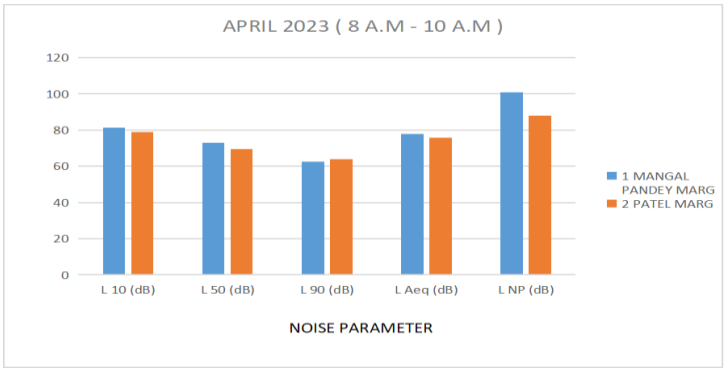
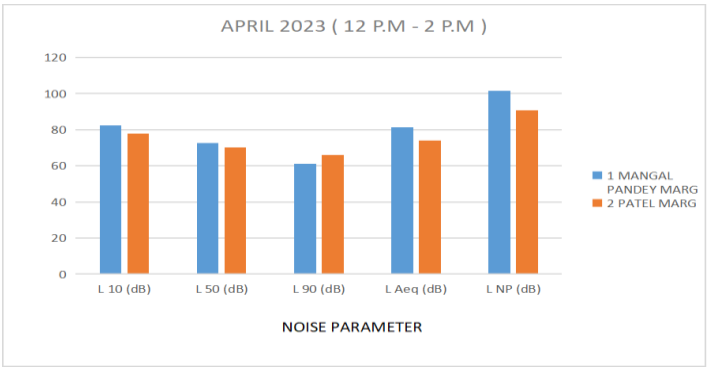



Figure 4. Noise map for Ghaziabad city for the month of JUNE 2023



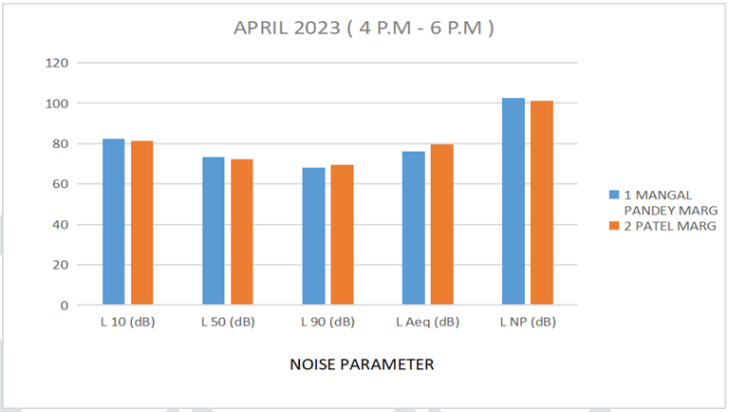
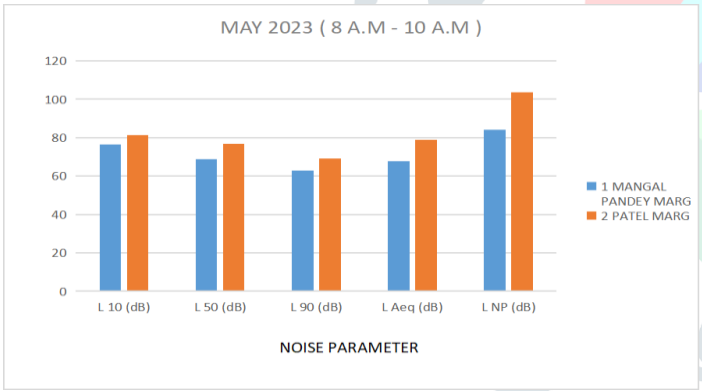
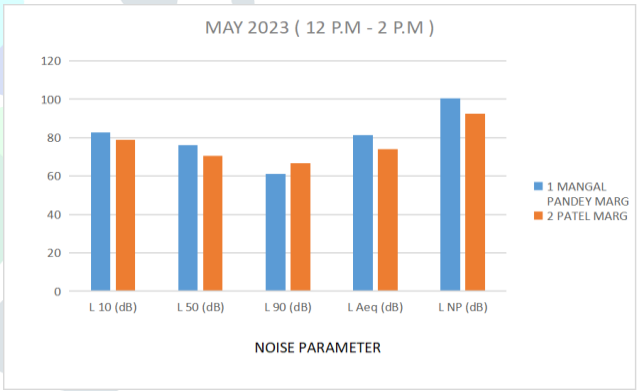




Figure5. GRAPH for Ghaziabad city for the month of APRIL 2023



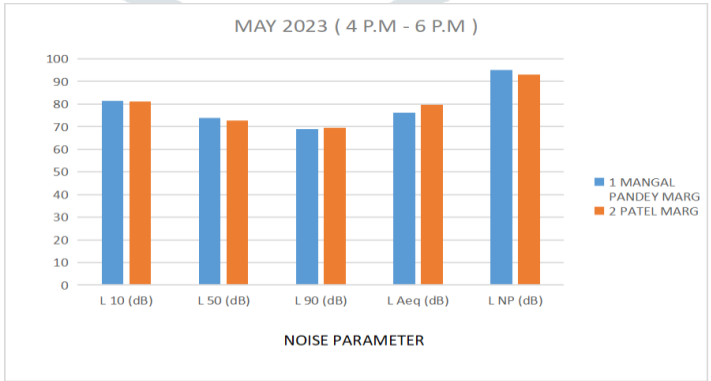
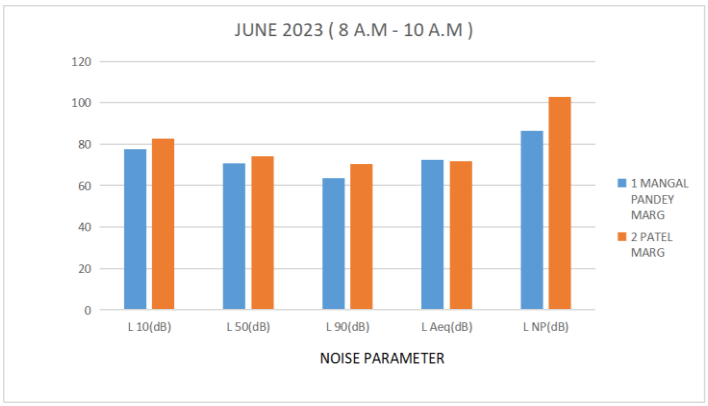
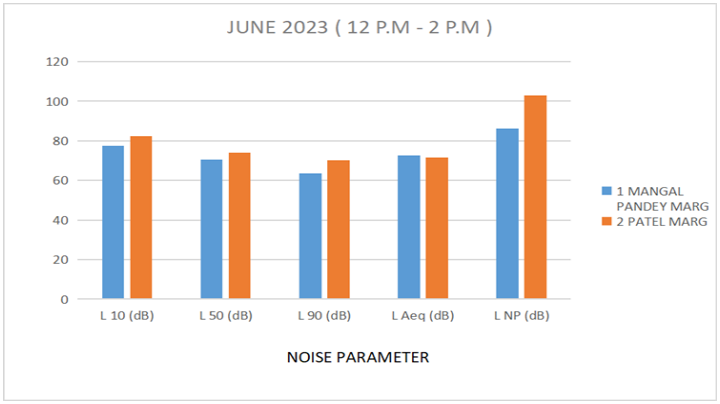




Figure6. GRAPH for Ghaziabad city for the month of MAY 2023



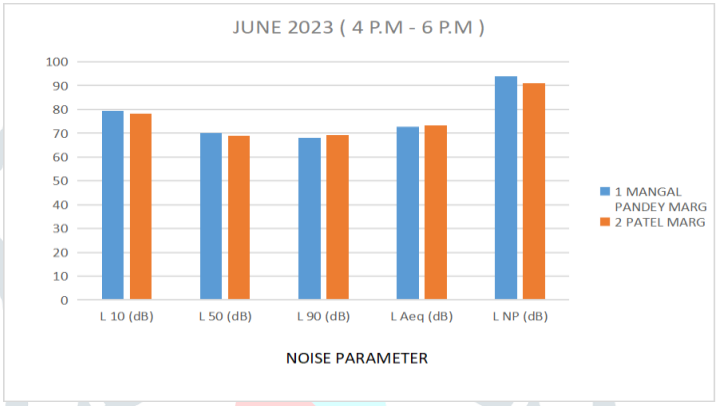




Figure6. GRAPH for Ghaziabad city for the month of JUNE 2023

| TIME | 8 A.M. - 10 A.M. | | | | | 12 P.M. - 2 P.M. | | | | | 4 P.M - 6 P.M. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | L10 (dB) | L 50 (dB) | L90 (dB) | LAeq (dB) | LNP | L10 (dB) | L 50 (dB) | L90 (dB) | LAeq (dB) | LNP | L10 (dB) | L 50 (dB) | L90 (dB) | LAeq (dB) | LNP |
| MANGAL PANDEY MARG | 81.50 | 72.95 | 62.53 | 77.89 | 100.69 | 82.59 | 72.56 | 61.02 | 81.20 | 101.45 | 82.48 | 73.21 | 68.00 | 76.29 | 102.45 |
| PATEL MARG | 79.00 | 69.34 | 64.00 | 75.75 | 87.96 | 78.00 | 70.11 | 66.00 | 73.90 | 90.88 | 81.27 | 72.16 | 69.59 | 79.77 | 101.37 |

TABLE 1 : DATA OF NOISE POLLUTION MEASUREMENT AT STUDY AREARS IN GZB IN APRIL MONTH 2023

| TIME | 8 A.M. - 10 A.M. | | | | | 12 P.M. - 2 P.M. | | | | | 4 P.M - 6 P.M. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | L10 (dB) | L50 (dB) | L90 (dB) | LAeq (dB) | LNP | L10 (dB) | L50 (dB) | L90 (dB) | LAeq (dB) | LNP | L10 (dB) | L50 (dB) | L90 (dB) | LAeq (dB) | LNP |
| MANGAL PANDEY MARG | 76.50 | 68.97 | 62.98 | 67.89 | 83.97 | 82.59 | 75.98 | 61.02 | 81.20 | 100.45 | 81.48 | 73.97 | 69.07 | 76.29 | 94.96 |
| PATEL MARG | 82.00 | 76.73 | 69.00 | 78.75 | 103.79 | 79.00 | 70.67 | 66.54 | 73.90 | 92.67 | 81.27 | 72.87 | 69.59 | 79.77 | 93.07 |

TABLE 2 : DATA OF NOISE POLLUTION MEASUREMENT AT STUDY AREARS IN GZB IN MAY MONTH 2023

| TIME | 8 A.M. - 10 A.M. | | | | | 12 P.M. - 2 P.M. | | | | | 4 P.M - 6 P.M. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | L10 (dB) | L50 (dB) | L90 (dB) | LAeq (dB) | LNP | L10 (dB) | L50 (dB) | L90 (dB) | LAeq (dB) | LNP | L10 (dB) | L50 (dB) | L90 (dB) | LAeq (dB) | LNP |
| MANGAL PANDEY MARG | 77.58 | 70.62 | 63.54 | 72.47 | 86.37 | 83.05 | 73.67 | 65.65 | 79.98 | 104.85 | 79.33 | 70.11 | 67.98 | 72.65 | 93.87 |
| PATEL MARG | 82.56 | 74.13 | 70.31 | 71.70 | 102.81 | 78.00 | 71.66 | 62.74 | 74.51 | 95.78 | 78.21 | 69.08 | 69.21 | 73.17 | 91.06 |

TABLE 3 : DATA OF NOISE POLLUTION MEASUREMENT AT STUDY AREARS IN GZB IN JUNE MONTH 2023

## CONCLUSION

A noise map and noise graph of the city of Ghaziabad have been created as part of this evaluation research based on the noise parameters L10, L50, L90, L Aeq (Equicalent noise level), and LNP (Noise pollution level). The noise map reveals that industrial areas with greater levels of noise pollution are located close to markets and residential areas. This forecast demonstrates that noise levels surpassed the CPCB-recommended limit. Thus, the citizens of Ghaziabad are at serious danger for health problems due to the noise pollution.Even the discomfort and irritation caused by pollution may significantly lower productivity, in both the public and private sectors. Creating a noise map is the single most essential action that can be taken to reduce noise pollution in the city of Ghaziabad. Town planners, engineers, and others can use the noise map itself, together with the noise parameter values, to plan and carry out their projects using baseline data. The noise maps of specific locations have not been published in the majority of Uttar Pradesh's cities. Noise pollution levels in industrial areas can be reduced by using noise barriers or dampening techniques..For the sake of noise regulation, it is advised that noise maps be created for each city in Uttar Pradesh.

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