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International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** V **Month of publication:** May 2017

DOI:

www.ijraset.com

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Volume 5 Issue V, May 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Developing Noise Pollution Linear Regression Model of Una Town

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Abstract- Pollution is the main issue everywhere throughout the globe. Today's reality is finding a way to battle against air pollution, water pollution and land pollution; however fewer eyes are on noise pollution. It has the third dangerous risk to earth after air and water pollution as per World Health Organization (WHO). Noise pollution can neither be seen, touched nor noticed however it effect slightly individuals and on animals. Road transportation is one of the significant wellsprings of noise pollution in Una town. From this review, it was watched that vehicle noise pollution is more than 80dB and this is because of absence of legitimate activity framework, driver training, congestion, tire road interaction and vehicle engine noise. Direct relapse investigation was performed to create relationship of the average noise and most extreme noise with aggregate vehicles. Hoping to pattern of noise level, noise pollution legislation and observing is prescribed as a piece of control measures.
Keywords: Noise pollution, vehicular traffic, correlation, noise pollution legislation.

I. INTRODUCTION

This period of new advancements and improvement has welcomed numerous inconspicuous real issues. One of them is pollution. Expanding development rate of vehicles has contributed significantly towards noise pollution. The general population working and abiding close to the fringe of the highway are vanquished by the evil impacts of the noise pollution [2]. The noise levels of activity noise in urban territories surpasses as far as possible and influences the people and in addition creatures. The general population taking a shot at the outskirts of the street particularly national thruway or state expressway and are presented to noise levels more than 75 dB, for 8 hours are probably going to experience the ill effects of mental and additionally physical scatters [5]. The present review manages the noise pollution in Una town. It demonstrates the information of noise pollution review which was done at three distinct areas for 18 hours at every area. In view of the noise level information, the relationship between noise levels and the vehicular movement is discovered. The review additionally proposes a portion of the medicinal measures for decrease of the high noise levels in the Una Town.

Una town is situated on the outskirts of the National Highway 8 E, now known as NH 51. The population of the town is 58528 according to enumeration 2011.The noteworthy disadvantage of the town is that it does not have a bypass. So the greater part of the movement particularly the overwhelming business vehicles whose goal are business centre point like Veraval and so on needs to go through the CBD range of the Una town. This can be viewed as a noteworthy wellspring of movement noise pollution.

II. STUDY AREA PROFILE

The choice of UNA town NH8E as the study area (see Figure 1) was due to the fact that this road could serve as a typical traffic noise pollution source as it becomes the important operating route connecting Bhavnagar and Somnath. Noise level is unavoidably high and yet it is given little or no consideration on environmental policies, implementation and enforcement. Here limestone business is most prominent which grabs revenue of nearly 80-90 crores per month and has becoming the main transit access road, which qualifies it as a good sampling area to gather data to generate a representative model for traffic noise pollution. The study has been completed in Una Town (Figure 1) located at 20.8235°N, 71.0409°E Gujarat which is growing unevenly on the edges of NH 8E. The noise levels were measured at three different sites:

A. Site 1: Near Trikon baug.
B. Site 2: Vegetable Market Road.
C. Site 3: Near SBI bank, Tower Chowk.

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Volume 5 Issue V, May 2017
ISSN: 2321-9653
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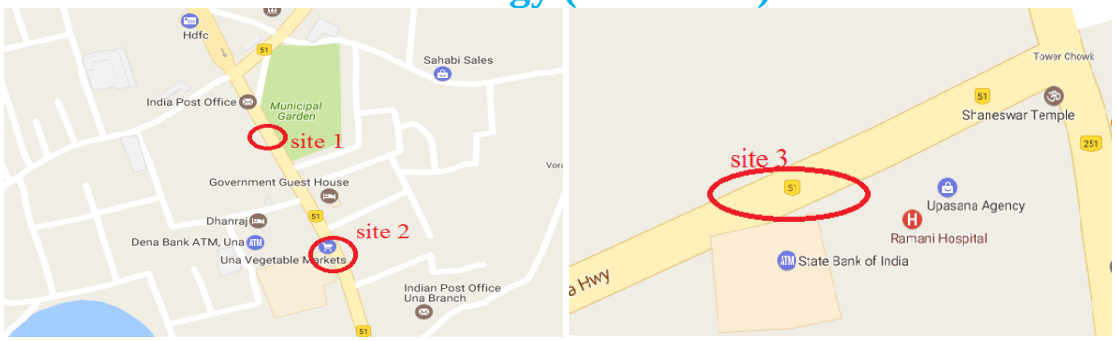


Figure 1: Location of Study Area

III. METHODOLOGY

The measurement instrument used in this study was sound level meter of Class 2, Model SL-1352, manufactured by HTC. Sound level meter SL-1352. All readings were made by SL-1352 sound level meter with calibrated condenser microphone. The microphone of the sound level meter was guarded by polyurethane windscreen, in order to eliminate wind effects on measurements as recommended by ISO-1996/1:2003 standard. Measurements were made at for 18 hours, between 06:00 am to 12:00 mid night at each site. The data was collected for both direction of traffic at each sites. Sound level meter was placed at a uniform height of 1.2 meter from the ground and was placed at a distance of 3 meters away from the edge of the road pavement, as recommended by ISO-1996/1:2003 standard. Classified Volume Count Study was carried out simultaneously at the time of survey, to get the data related to total number of vehicles passing at each sites. The data obtained were analysed and the correlation between total number of vehicles and noise levels was obtained using excel software.

IV. RESULTS AND DISCUSSION

From the data collected at three different sites, following results were drawn. The tables below shows the total vehicles passed and prevailing noise levels at a particular site within a given interval of time.

Table 1: Data of Site 1 (Flow of Traffic: Upstream On Una-Veraval Road)

Time	Total Vehicles	Average Noise Levels	Max. Noise Levels
06:00 Am To 08:00 Am	1601	78.1125	80.6
08:00 Am To 10:00 Am	1742	82.775	88.6
10:00 Am To 12:00 Pm	1745	84.4375	88.1
12:00 Pm To 02:00 Pm	1726	82	88.7
02:00 Pm To 04:00 Pm	1733	82.6875	88.7
04:00 Pm To 06:00 Pm	1765	82.9125	87.3
06:00 Pm To 08:00 Pm	1721	81.25	88.6
08:00 Pm To 10:00 Pm	1728	79.6125	87.4
10:00 Pm To 12:00 Am	1369	76.525	81.2

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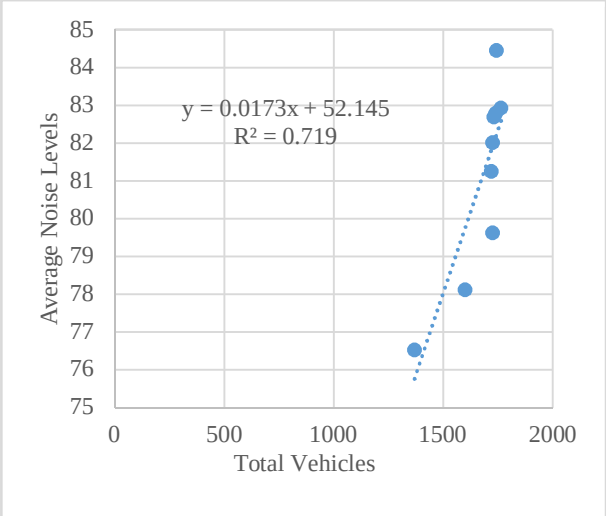


Figure 2: Graph 1

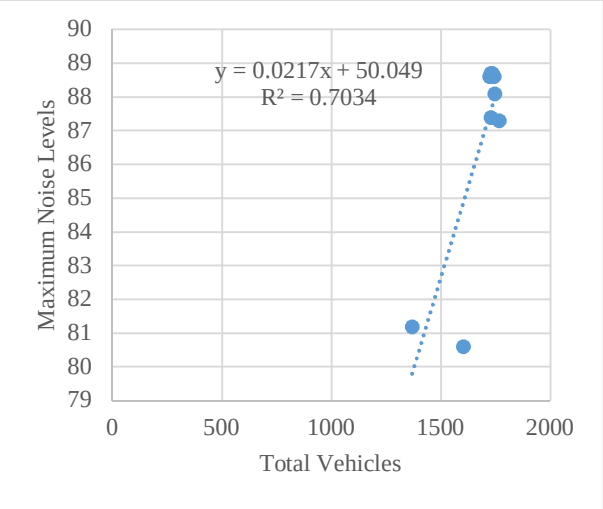


Figure 3: Graph 2

Table 1 shows the total number of vehicles passed and average and maximum noise levels at the interval of 2 hours. The Graph 1and Graph 2 shows the equation and correlation of the data of total number of vehicles with average noise levels and maximum noise levels respectively. The equation obtained is helpful to find out average noise levels or maximum recorded noise levels at Site 1 if the number of vehicles of the upstream traffic flow is known.

Similarly the data of different sites with different direction of traffic flow are shown in tables below. Also the graphs of correlation and equation of the linear relationship between total vehicles passed and average noise levels and maximum recorded noise levels, prevailing at different sites with different direction of traffic flow, are shown below.

Table 2: Data of Site 1 (Flow of Traffic: Downstream On Una-Veraval Road)

Time	Total Vehicles	Average Noise Levels	Maximum Noise Levels
06:00 Am To 08:00 Am	1662	80.1625	87.1
08:00 Am To 10:00 Am	1793	82.8857	88.3
10:00 Am To 12:00 Pm	1749	79.8375	83.5
12:00 Pm To 02:00 Pm	1746	83.6125	88.7
02:00 Pm To 04:00 Pm	1784	81.5	88.5
04:00 Pm To 06:00 Pm	1786	82.3125	88.4
06:00 Pm To 08:00 Pm	1728	81.0125	87.5
08:00 Pm To 10:00 Pm	1727	83.9375	88.1
10:00 Pm To 12:00 Am	1706	80.3125	88.9

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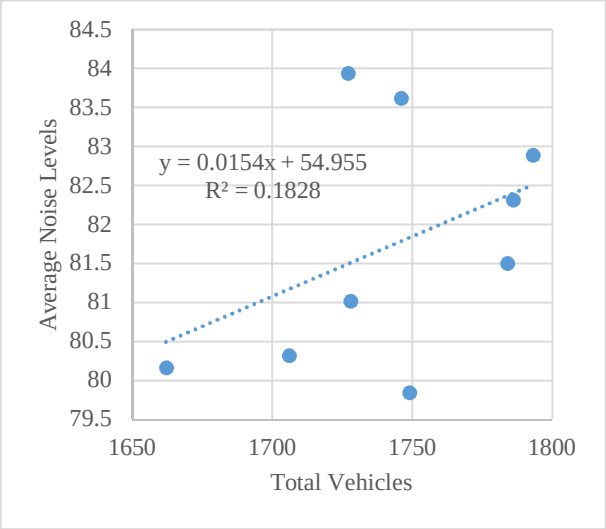


Figure 4: Graph 3

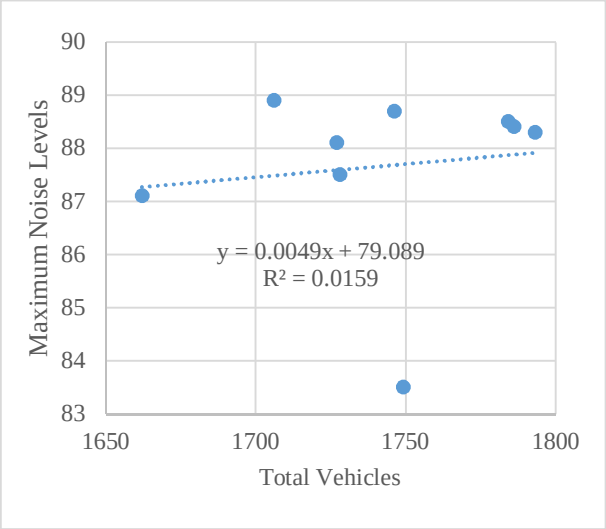


Figure 5: Graph 4

Table 3: Data of Site 2 (Flow of Traffic: Upstream on Una-Veraval Road)

Time	Total Vehicles	Average Noise Levels	Maximum Noise Levels
06:00 Am To 08:00 Am	1687	79.3	84.2
08:00 Am To 10:00 Am	1662	79.5125	84.7
10:00 Am To 12:00 Pm	1792	82.5	87.7
12:00 Pm To 02:00 Pm	1717	79.8875	83.6
02:00 Pm To 04:00 Pm	1730	81.5285714	87.9
04:00 Pm To 06:00 Pm	1802	84.22857	87.8
06:00 Pm To 08:00 Pm	1670	80.9428571	88.1
08:00 Pm To 10:00 Pm	1736	80.8285714	85.3
10:00 Pm To 12:00 Am	1470	75.3125	80.3

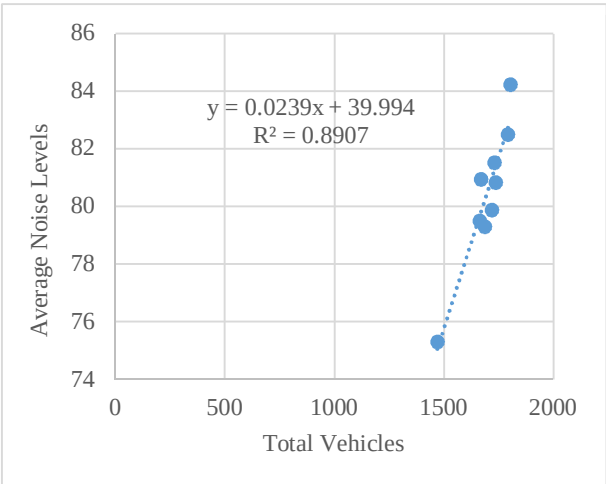


Figure 6: Graph 5

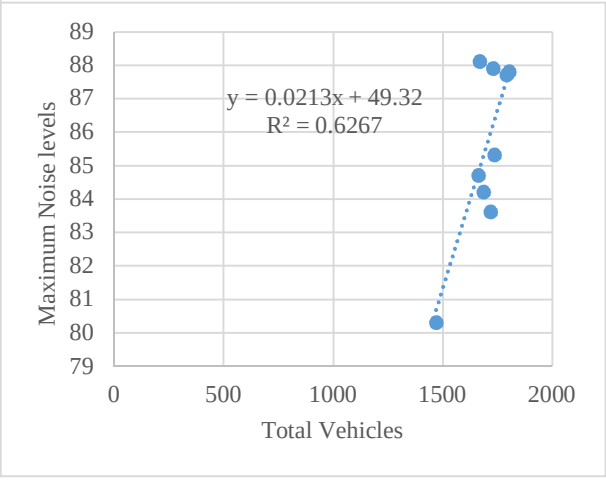


Figure 7: Graph 6

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Table 4: Data of Site 2(Flow of Traffic: Downstream on Una-Veraval Road)

Time	Total Vehicles	Average Noise Levels	Maximum Noise Levels
06:00 Am To 08:00 Am	1608	80.375	87.3
08:00 Am To 10:00 Am	1710	80.9625	87.9
10:00 Am To 12:00 Pm	1748	84.0375	88.2
12:00 Pm To 02:00 Pm	1713	80.8625	87.9
02:00 Pm To 04:00 Pm	1664	82.5875	88.3
04:00 Pm To 06:00 Pm	1741	84.6625	88.1
06:00 Pm To 08:00 Pm	1725	82.2625	87.2
08:00 Pm To 10:00 Pm	1669	80.625	87.5
10:00 Pm To 12:00 Am	1471	78.4625	87.2

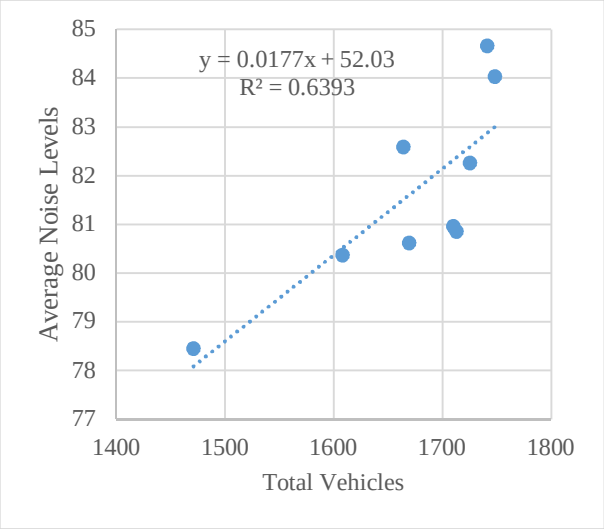


Figure 8: Graph 7

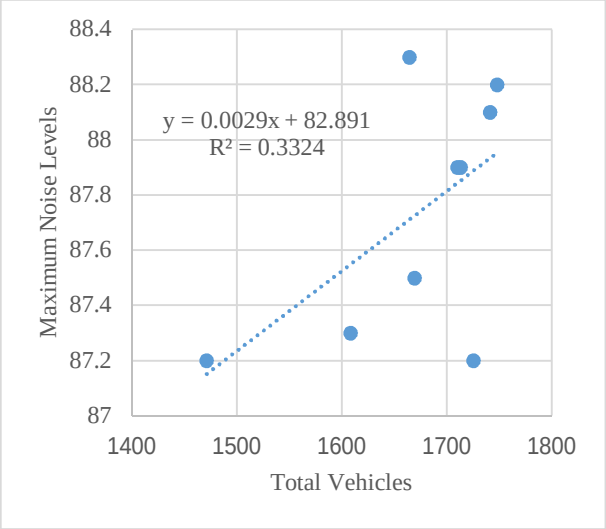


Figure 9: Graph 8

Table 5: Data of Site 3 (Flow of Traffic: Upstream on Una-Veraval Road)

Time	Total Vehicles	Average Noise Levels	Maximum Noise Levels
06:00 Am To 08:00 Am	1617	75.4	79.3
08:00 Am To 10:00 Am	1700	79.9125	85.2
10:00 Am To 12:00 Pm	1698	81.8	88.4
12:00 Pm To 02:00 Pm	1700	78.7428571	80.5
02:00 Pm To 04:00 Pm	1693	77.85	81.5
04:00 Pm To 06:00 Pm	1720	83.7625	87.9
06:00 Pm To 08:00 Pm	1702	83.6375	88
08:00 Pm To 10:00 Pm	1707	81.9625	87.1
10:00 Pm To 12:00 Am	1543	77.8375	85.4

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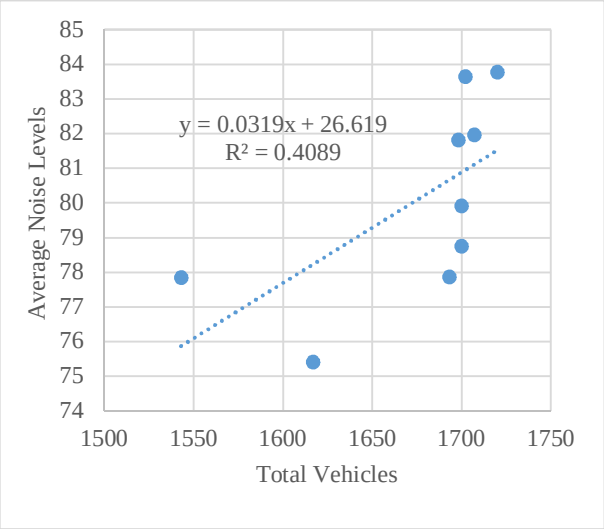


Figure 10: Graph 9

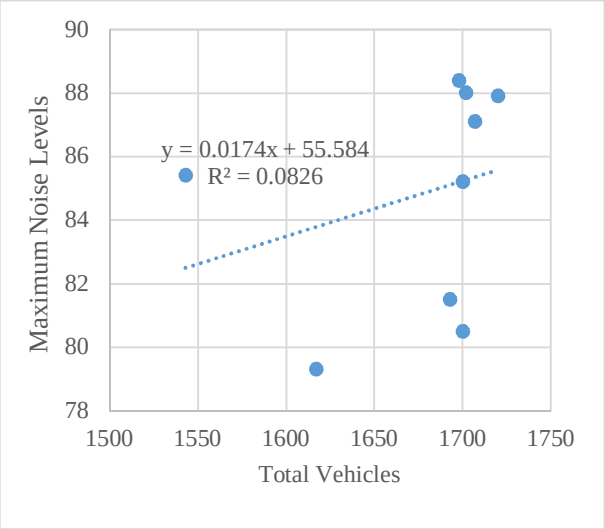


Figure 11: Graph 10

Table 6: Data of Site 3 (Flow of Traffic: Downstream on Una-Veraval Road)

Time	Total Vehicles	Average Noise Levels	Maximum Noise Levels
06:00 Am To 08:00 Am	1635	75.95	80.4
08:00 Am To 10:00 Am	1647	79.0875	82.1
10:00 Am To 12:00 Pm	1694	80.425	86.9
12:00 Pm To 02:00 Pm	1682	82.225	87.7
02:00 Pm To 04:00 Pm	1654	78.825	81.1
04:00 Pm To 06:00 Pm	1711	82.65	87.2
06:00 Pm To 08:00 Pm	1655	80.45	86.1
08:00 Pm To 10:00 Pm	1586	78.175	82.6
10:00 Pm To 12:00 Am	1499	76.8125	80.4

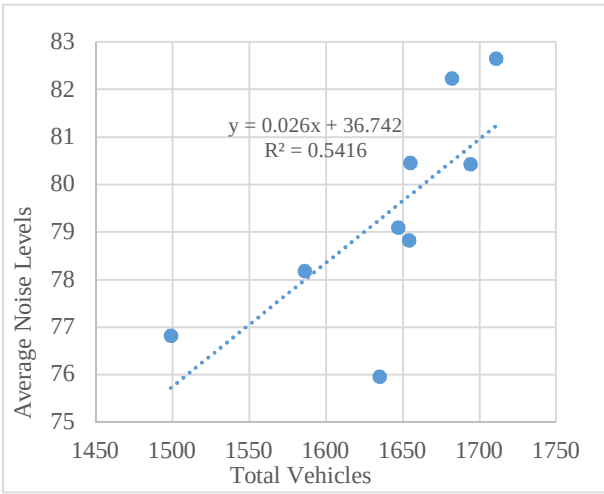


Figure 12: Graph 11

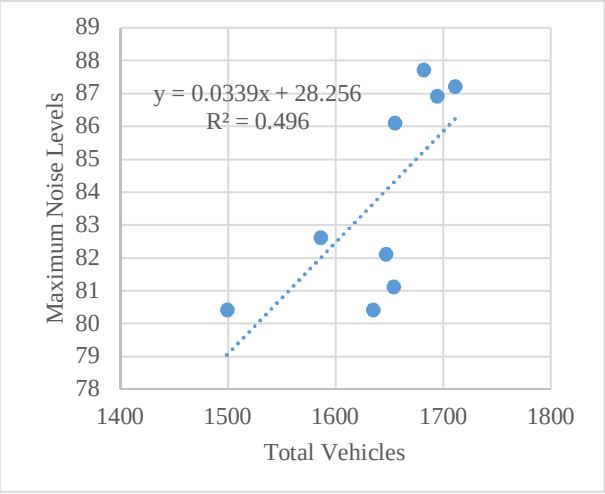


Figure 13: Graph 12

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The correlation of the total number of vehicles and the noise levels at different sites is shown in the table below. The correlation values are above 0.5 which shows a healthy relation between both the parameters [10]. It simply states that as the number of vehicles increases, the noise levels also increases

Table 7: Correlation of Total Number of Vehicles with Average and Maximum Noise Levels

Sites/Traffic Flow	Correlation Between :-	
	Total Vehicles And Average Noise Levels	Total Vehicles And Maximum Noise Levels
1 (Upstream)	0.847910447	0.838660582
1 (Downstream)	0.427577895	0.125974516
2 (Upstream)	0.943787386	0.791658498
2 (Downstream)	0.799549997	0.576540191
3 (Upstream)	0.639483803	0.287371217
3 (Downstream)	0.735928415	0.704293031

V. CONCLUSION

The Noise levels in Una Town Exceeds the limits given by the Indian standard for ambient noise levels which is listed below.

Table 8: Permissible Limits of Noise Levels Given By Indian Standards

Sr. No	Area Category	Limit in dB	
		Day Time	Night Time
1	Industrial	75	70
2	Commercial	65	55
3	Residential	55	45
4	Silence area	50	40

Road traffic noise has been recorded as a nuisance to residents and pedestrians near the major highways. The road traffic noise measured is at a level of health concern particularly to those who are working or dwelling near the periphery of NH 8 E. the ill effects of noise pollution invites the deadly psychological as well as physical disorders in a human body.

Based on the results of this study the following conclusion can be drawn:

A. There is a high correlation between traffic volume and noise level as per the statistical modeling of the noise data in the range of threshold of pain to very loud noise.

B. The major noise source in the study area is traffic vehicles contributing in the range of 85 to 89 dB(A) and is very frequent and disturbing. All the values exceed outdoor noise limit by the World Health Organization (WHO, 2000).

C. Long-term exposure toward noise levels more than 70 dB(A) can cause trouble, hypertension, high stress levels, hearing loss, sleep disturbances, and other harmful effects to the people living around the highway

VI. RECOMMENDATIONS

A. The accompanying proposals could fill in as noise decrease measures for the review zone given that no current crucial reduction measures are set up.

B. Driving sense culture should be there among drivers.

C. Highway Code Implementation, for example, marking of highways such as speed limits, directions, keep clear, no u-turn, and so on and arrangement of caution or risk signs could incredibly diminish the activity noise level

D. The punishments that ought to be forced on sentenced wrongdoers for security and organization incorporate fines, withdrawal of driver's permit and reevaluation and testing. Such punishments could reestablish rational soundness on this road.

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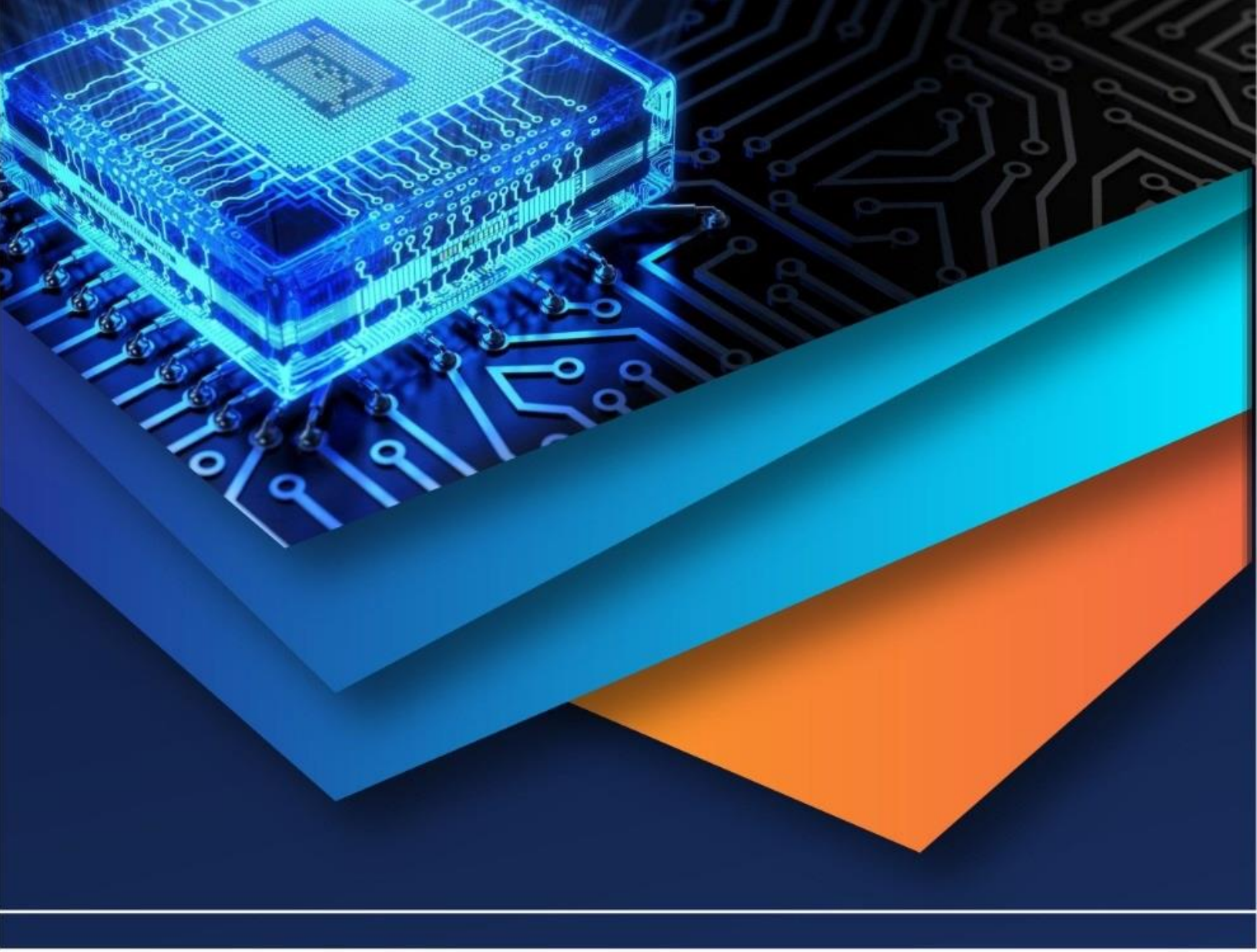
E. Noise Pollution Policy should be executed and legitimate authorization measures are in this manner basic to create sufficient noise control arrangements.

F. Education: - In order to accelerate the awareness on traffic noise pollution on this road and any other roads, it is recommended that a public awareness on the effect of traffic noise should be created through the media such as television, radio, and symposia.

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