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ANALYSIS OF NOISE POLLUTION HOTSPOT IN AND AROUND KUMBAKONAM USING QGIS

M.SABARI LAKSHMI , M.DHANA LAKSHMI , S.VIJAY

***Abstract*—** Project focuses on the monitoring of community noise pollution in some selected area of in and around kumbakonam zone. The objectives of our project were to monitor and to assess the existing noise levels at the selected sites. A Lutran SL-4012 sound level meter used in the measurements. The measurements were taken for 24–hours in the residential area Annai anjugam nagar kumbakonam, silent zone nearest Palakarai kumbakonam, commercial area Bigstreet kumbakonam, Industrial area Thirubhuvanam near kumbakonam. The Equivalent Continuous Sound Level (Leq), minimum noise level, average noise level and maximum noise level were measured to assist in assessing the existing noise levels at the selected sites. Results showed that the monitored noise levels in terms of Leq, in commercial area ranged between 87.9 dB(A) to 72.5 dB(A) , industrial area ranged between 73.4 dB(A) to 57.3 dB(A), residential area ranged between 64.9 dB(A) to 51.2 dB(A) and in the silent zone ranged between 56.2dB(A) to 50.7 dB(A). These levels exceeded in commercial, residential, silent zone the level recommended by the World Health Organization. The industrial area is less in compare to the level recommended by the World Health Organization. The noise pollution dB(A) readings are also plotted by graph format. These noise levels cause sleeping disturbance, interfere with speech communication and message extraction. The main causes of such noise levels are related to transportation system, motor vehicles and traffic supported by poor urban planning. To reduce such noise levels by using noise insulating materials and create peaceful environment by advertised to using noise cancellation instrument.

***Keywords* --** Monitoring ,Community, Lutran SL-4012 Sound Level Meter, Commercial Area, Industrial Area, Residential Area, Silent Zone.

I. INTRODUCTION

Noise is playing an ever-increasing role in our lives and seems a regrettable but ultimately avoidable corollary of current technology. The trend toward the use of more automated equipment, sports and pleasure craft, high-wattage stereo, larger construction machinery, and the increasing numbers of ground vehicles and aircraft has created a gradual acceptance of noise as a natural byproduct of progress. Indeed, prior to 1972 the only major federal activity in noise control legislation was a 1968 amendment to the Federal Aviation Act, whereby the FAA was directed to regulate civil aircraft noise during landings and takeoffs, including sonic booms. Nevertheless, various noise-monitoring studies and sociological surveys in recent years have indicated the need for noise abatement. Noise pollution is thus another environmental pollutant to be formally recognized as a genuine threat to human health and the quality of life. The fundamental insight we have gained is that noise may be considered a contaminant of the atmosphere just as definitely as a particulate or a gaseous contaminant. There is evidence that, at a minimum, noise can impair efficiency, adversely affect health, and increase accident rates. At sufficiently high levels, noise can damage hearing immediately. Several organizations such as World Health Organization, International Labour Organization (ILO) and Occupational Safety and Health Administration (OSHA) have setup new standards for noise and take appropriate actions against their sources. As a result of continuous hard work, standards for noise pollution level in various work places during various times were developed.

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TABLE 1 NOISE STANDARDS DEVELOPED BY CPCB, WHO, ILO AND OSHA ORGANIZATION

S.NO	AREA CODE	CATEGORY OF AREA/ZONE	Limits of Leq dB(A)	
			DAY TIME	NIGHT TIME
1	A	Industrial area	75	70
2	B	Commercial area	65	55
3	C	Residential area	55	45
4	D	Silence Zone	50	40

1) CHARACTERISTICS OF NOISE

For all practical purposes, noise may be defined as unwanted sound; therefore, noise characteristics are essentially sound characteristics. Sound waves propagate through an elastic medium at a speed intrinsic to that material. In a gaseous medium such as air, sound waves produce significant changes in the density of the air, which, in turn, produce pressure changes. The parameter lending itself to quantification is sound pressure, the incremental variation in pressure above and below atmospheric pressure. In engineering terms, the acoustic pressure can be viewed as the gage pressure. Comfort requires that the sound level, from all sources, should be of the order of 65 dB or less some typical noise levels are as follows 100–110 Jet fly-by at 300 m (1000 ft.)90–100 Power mowers 80–90 Heavy truck 64 km/h (40 mph) at 15 m (50 ft.), food blender (at receiver), Motorcycle at 15 m (50 ft.) 60–70 Vacuum cleaner (at receiver), air conditioner at 6 m (20 ft.) 40–50 Quiet residential–daytime 20–30 Wilderness Noise levels in general have increased over the years and some authorities hold that average noise levels in cities have increased at about 1 dB per year for the last 30 yr.

The sound pressure level represents the magnitude of a noise source and is one of the characteristics that can assess whether a given noise is considered to be annoying. There are other characteristics, both intrinsic to the noise and its context, that dictate whether people will consider it to be annoying

1. Frequency content or bandwidth
2. Duration
3. Presence of pure tones or transients
4. Intermittency
5. Time of day
6. Location (or activity)

The above factors introduce much subjectivity into noise pollution characterization, and various rating schemes have been devised by psych acousticians and researchers that are meant to correlate with the annoyance-related characteristics of a noise signal.

2) STANDARDS

The Noise Control Act of 1972 became Public Law PL 92574 in October of that year. Under the Act, the Environmental Pollution Agency (EPA) had to develop criteria identifying the effects of noise on public health and welfare in all possible noise environments and to specify the noise reduction necessary for protection with an adequate margin of safety. The EPA's basic "Identification of Levels" document (3) was published in March 1974 and it concluded that virtually all of the population is protected against lifetime hearing loss when annual exposure to noise, averaged on a 24-h daily level, is less than or equal to 70 A-weighted decibels (dB(A)) (See Section 6 for discussion on A-weighted decibels.) This noise-level goal forms the initial base of the long-range federal program designed to prevent the occurrence of noise levels associated with the adverse effect on public health and welfare. Even so, noise levels in excess of 55 dB (A) can cause annoyance. The federal government's regulatory development and related activity is aimed at the annoyance-type noises that pervade the community. These noises in the approximate order of importance, especially to urban communities, are (1) surface transportation noise, (2) aircraft noise, (3) construction equipment and industrial noise, and (4) residential noise. Although states and municipalities retain primary responsibility for noise control, they often rely on EPA recommended limits of noise levels and exposures. Presently, industry is governed by noise regulations adopted by OSHA (Occupational Safety and Health Administration), which sets noise exposure limits at an employee's location for environments of steady noise, mixed noise, and impact noise. For steady noise (i.e., noise at a constant dB (A) level over a period of time), a maximum exposure of 90 dB (A) (about the sound level emitted from a loud engine) for an 8-h day is prescribed, with a halving of exposure time for each additional 5-dB (A) increment.

3) SOURCES

In trying to identify the various sources of noise, one immediately thinks of the din that characterizes modern cities. In fact, a major emphasis has been placed on community sound studies in urban areas (5–10). This owes to the demonstrable fact that urban areas are generally noisier than rural areas, and because larger numbers of people live in urban areas, where they are presumably affected by the noise, the benefits may be expected to be proportionally larger. Urban noise levels are a complex mixture of noise from transportation, factories, industries, machines, and people. Basically, noise sources can be grouped into three types: transportation, industrial, and residential. Transportation sources of noise are comprised principally of automotive and aircraft noises, motorcycles, scooters, and snowmobiles should also be considered. A main contributor to transportation noise is automotive traffic. At speeds in excess of 60 miles/h (mph), tire noises are most discernible, whereas at lower speeds, engine noises tend to dominate. The road gradient can also have an effect on vehicular noise emission; for example, a 5% road gradient adds about 3 dB(A) to truck noise, whereas the effect on cars is usually insignificant. Noise levels increase as the number of vehicles and average speed increases. Aircraft noises have been the source of nuisance complaints from the public for a long time. Here again, various factors, such as the amount of aircraft activity, flight paths, takeoff, and approach and landing procedures, determine the amount of noise contributed to the total level. For example, the reduction in community noise from a plane at an altitude of 3000 ft as opposed to 1500 ft (prior to entering its glide slope) can be as much as 9 dB(A). Some industrial operations and equipment are significant noise sources. Principal examples are machinery or machine tools, pneumatic equipment, high-speed rotating or stamping operations, and duct, fan, and blower systems. Typical noise levels for operating personnel may be quite high. Noise levels of 105–115 dB(A) are encountered in grinding polycarbonates and other tough plastics; industrial wood saws emit noise levels of 100–105 dB(A) depending on the type of wood being cut; noise levels of 100–110 dB(A) are common with lathe operations; and structure-borne noises from gear housings can vary between 92 and 105 dB(A). In some cases, the personnel exposure time is small, perhaps 10 min for a quick equipment check. In other cases, a full 8-h day may be spent in the vicinity of the noise. Community exposure to such noises would, of course, depend on the proximity to the noise sources, and ambient noise levels in residential areas could be affected by more than 10 dB(A). Residential sources, both indoor and outdoor, may not seem so significant at first. However, when one considers air conditioners, lawn mowers, power saws, dishwashers, kitchen and laundry appliances, television, stereos, pets, and children, the overall severity of these sources cannot be ignored. Furthermore, the simple increase in the numbers of tools, cars, gadgets, and appliances used by modern industrial societies can create a substantial noise burden.

4) EFFECTS

Sound is of great value to mankind. It warns of danger and appropriately arouses and activates all of us. It allows us the advantages of music and speech. It can calm or excite us it can elicit our joy or sorrow. However, irrelevant or excessive sound becomes noise and is undesirable. People react to noise through its effect on the nervous system, and at this point, a certain amount of subjectivity and value judgment enters our considerations; for example, not all people react to noise in the same way. A lawn mower and motorcycle may emit an equivalent sound level, but a certain portion of the population may find one to be inoffensive and the other to be annoying. At the high and low ends of the noise-level scale, the effects on humans are obvious; for example, at 30 dB(A), noise is not an annoyance, whereas at 120 dB(A), it is definitely annoying to the point of producing physical discomfort in all hearers. It is at the in-between values of noise level that humans show varying susceptibility to it. Effects of noise include physiological and annoyance types. In the former category, there is evidence indicating that exposure to noise of sufficient intensity and duration can permanently damage the inner ear, with resulting permanent hearing loss. Loss of sleep from noise can increase tension and irritability. even during sleep, noise can lessen or diminish the relaxation that the body derives from sleep. In the annoyance category, noise can interfere with speech communication and the perception of other auditory signals. the performance of complicated tasks can be affected by noise. Noise can adversely affect mood, disturb relaxation, and reduce the opportunity for privacy. In all of the above ways, noise can detract from the enjoyment of out environment and can affect the quality of human life. The following are also to be affected by Intense noise can affect growth of chickens and egg production. Traffic noise could be hampering the reproductive process of frog in metro Politian areas by drowning out the mating calls of males. Noise causes to increasing incidence. Even out board motor noise can confuse some whales and dolphins. In dairy cows, excessive noise reduces feed consumption, milk yield, and rate of milk release.

5) MEASUREMENT

An effective noise abatement program is difficult to establish without an adequate survey and assessment of the noise problem. However, attempting to quantify ambient noise levels can be a tedious and frustrating undertaking. Unlike air and water pollution measurements, noise measurements must include subjective as well as objective factors; that is, a straightforward physical measurement of noise magnitude must be augmented with subjective loudness and annoyance-related factors. This complication has given rise to a multitude of units, rating scales, and measurement schemes. Nevertheless, there are some basic elements that must be considered with regard to the magnitude of noise and its frequency and temporal distribution. These elements will be considered in the following paragraphs along with some of the more prominent noise measurement parameters. Noise levels are commonly measured by a hand-held instrument called a sound-level meter that gives either a single-number evaluation of the time-varying pressure in decibels or a spectral breakdown of the signal. The most vital part of a sound meter is the microphone, and an important measure of microphone performance for noise surveys is its directional response to sound. When noise comes from many different directions (owing to multiple sources and reflections from walls, ground, etc.), the measuring microphone must respond identically to the various noises regardless of the angle of incidence. The sound pressure level is a purely objective quantification of noise based on the measured physical property, sound pressure. The effect of noise on humans, however, depends not only on its magnitude but also on its frequency content because the ear is not equally sensitive to noise (and its loudness) at all frequencies in the audible range of 20–20,000 Hz. Attempts to characterize the frequency response of the human ear by subjective methods have given rise to psychoacoustic data, which, in turn, have been used to develop frequency correction factors. Thus, a frequency-weighting system was derived according to which some frequencies were emphasized more than others. This system yields a single-number rating of the noise, representing noise levels in a manner similar to the subjective impression of the human ear. This particular weighting system is designated scale "A" and readings using this system are expressed as A-level decibels or dB(A). Sound-level meters are available that allow the sound to pass through an electronic A-weighting network, thus yielding a single number that approximates the response of a human ear to the sound. The A-scale places less emphasis on low-frequency sound (below 500 Hz), and provides more weight to annoying middle- and high-frequency sounds (500–4000 Hz). In practice, regulations are set limiting the maximum permissible level of A-weighted sound that may be emitted from a source. An alternate weighting scale, C-weighting, was developed to incorporate the human response to loud and typically lower-frequency sound sources such as explosions. Because the use of dB(C) is typically in niche applications, the use of the more utilized dB(A) will be considered here. An A-weighted sound-level measurement is the least complex noise evaluation system. It is adequate, perhaps, to quantify human response to a noise, but it does not give any information on how various frequency components contribute to a particular noise dB(A) level. This type of frequency information is most useful when designing a noise control system. Because absorption materials and other noise control products exhibit different noise attenuation characteristics at different frequencies, choosing the proper materials and devices must be based on a frequency analysis of the noise source. For such an analysis, an instrument called the octave band analyzer is most commonly used. As its name implies, this instrument separates the noise frequency spectrum into contiguous frequency bands one octave in width and it measures the sound pressure level in each of the bands. Some modern sound-level meters incorporate octave band

measurements. An octave is the interval between two sounds having a basic frequency ratio of 2, that is, the upper cutoff frequency is twice the lower cutoff frequency and the center frequencies are progressively doubled for each octave. In noise studies, the center frequencies are 31.5, 63, 125, 250, 500, 1000, 2000, 4000, and 8000 Hz. The center frequency of each octave band is the geometric mean, or the square root, of the lower and upper cutoff frequencies; that is, $f0 = \sqrt{f1 f2}$ where *f*0 is the center frequency in Hertz, *f*1is the lower cutoff frequency in Hertz, and *f*2 is the upper cutoff frequency in Hertz. Table 2 illustrates the center, lower, and upper frequencies for each of the octave bands in the range of human hearing. The sound pressure level versus frequency information provided by the octave band analyzer usually enables one to identify the dominant noise bands and thereby select the proper control materials. There are, however, certain noise control cases (e. g., sound reduction of machinery noise) in which narrower-band analyzers become necessary. In such instances, so-called narrow-band (or spectrum) analyzers are used. Half-octave analyzers have an upper cutoff frequency of 2 times the lower cutoff frequency, third *f*1 octave analyzers have an upper cutoff frequency equal to the cube root of 2, or 1.26, times the lower cutoff frequency; tenth-octave analyzers have an upper cutoff frequency equal to the tenth root of 2, or 1.07, times the lower cutoff frequency. The definition of center frequency still applies to narrow-band analysis.

Consequently a table of center frequencies and frequency ranges (as in Table 3) may be constructed for any of the above fractional octave analyzers. For example, the lowest band of the one-third octave analyzer covers the range from 22 to 28 (22 × 1.26) Hz and the center frequency is 25 Hz. The next band covers the range from 28 Hz to 35 (28 × 1.26) Hz and the center frequency is 31.5 Hz, and so on into higher-frequency bands. In addition to magnitude and frequency, noise can also have a temporal or time-varying character. This additional dimension of time establishes the need for supplementary equipment to record temporal variations in sound pressure levels. A temporal parameter of great value in determining noise control in indoor spaces is the reverberation time. The reverberation time (RT) of a space is defined as the time required for the sound pressure level to decay 60 dB. The usual equipment required to measure the RT for noise control purposes consists of an impulsive sound source, a sound-level meter, and a recording device. The RT is calculated from the sound decay curve based on the measurement of slope. Temporal distribution is particularly useful for determining and expressing noise exposure in urban areas, where the noise levels fluctuate considerably in the course of a 24-h day. One way of evaluating temporal characteristics of noise is by expressing noise levels (*L*) represented by *Lx*, where *x* is the maximum percent of the time that a specified dB(A) level may be exceeded. Thus, *L*1 may be read as a noise level that is exceeded only l% of the time—a very high noise level indeed; on the other hand, *L*95 may be regarded as background noise that is exceeded 95% of the time. *L*50 corresponds to a temporal median noise level. *Lx* for a particular community may be determined either by a sufficiently advanced sound-level meter or direct acquisition and manipulation with a digital computer. The results are shown as a curve whose ordinate is the percent of time a sound level *h* is exceeded and the abscissa is the sound level (in dB(A)). Another way of expressing the temporal behavior of community noise is by the equivalent sound level (*L*eq) as shown in Eq. (1). This is a single-number noise descriptor whose mathematical definition for a time interval *t*1 to *t*2 is

$L_{eq} = 10\log[1/(t2-t1) \{^{t2}_{t1} P^2_A / P^2_0 \, dt]$

Where,

Leq = Equivalent continuous sound pressure level [dB]

P_0 = Reference pressure level = 2011Pa

P_A = Acquired sound pressure in Pa

t1 = Start time of measurement

t2 = End time of measurement

TABLE 2

Lower cutoff	Center frequency	Upper cutoff
22	31.5	44
44	63	88
176	250	352
352	500	706
706	1000	1414
2828	4000	5656
5656	8000	11312

Most of the measurements and parameters described above have been designed to characterize ambient noise levels and community exposure to noise. Such measurements aid in formulating legislation and standards and in devising community-related noise control programs. In contrast to community noises, there are industrial noises within factories, workshops, and so forth that must be monitored in order to determine compliance with OSHA noise regulations. Such acoustical measurements are meant to evaluate employee exposure to work-related noises and require different measuring techniques.

In order that measurement accuracy is ensured, acoustical instruments such as sound-level meters and dosimeters must be calibrated regularly. Calibration is required by OSHA before and after each day of use. If measurements are continuous over a period of hours, periodic checks on calibration are recommended. These calibration checks are necessary to obtain valid data. Calibrators called pistonphones are available that allow a rapid field calibration of acoustical instruments. Also, when purchasing instruments, it is worthwhile to ensure that the instruments are amenable to field calibration. Having to return an instrument to the factory for calibration can be time-consuming and expensive.

Hearing conservation programs to monitor sound responses of employees are also part of the noise measurement program. Hearing tests are performed on employees with the aid of an audiometer. Basically, the employees listen through headphones to test tones generated at various frequencies and the employees respond to what they hear. Such tests, carried out annually, detect changes in the employees' hearing ability.

In order that noise measurements are valid for legal purposes, they and the devices that make these measurements must meet certain standards that were developed by the American National Standards Institute (ANSI). Indeed, if action against an alleged violation is contemplated, meter and recorder construction, calibration, and use must conform strictly to ANSI standards; if not, the quality and validity of the tests and data will come into question. In the above paragraphs, we have tried to present some of the more salient features of noise measurement and instrumentation.

Figure 1 Lutran sl-4012 sound level meter

II. METHODOLOGY

The methodology adopted includes a study of existing condition, real- time work made to explore the general system followed in the noise pollution mitigation measure. The methodology is presented as a flow chart in Figure 2.1

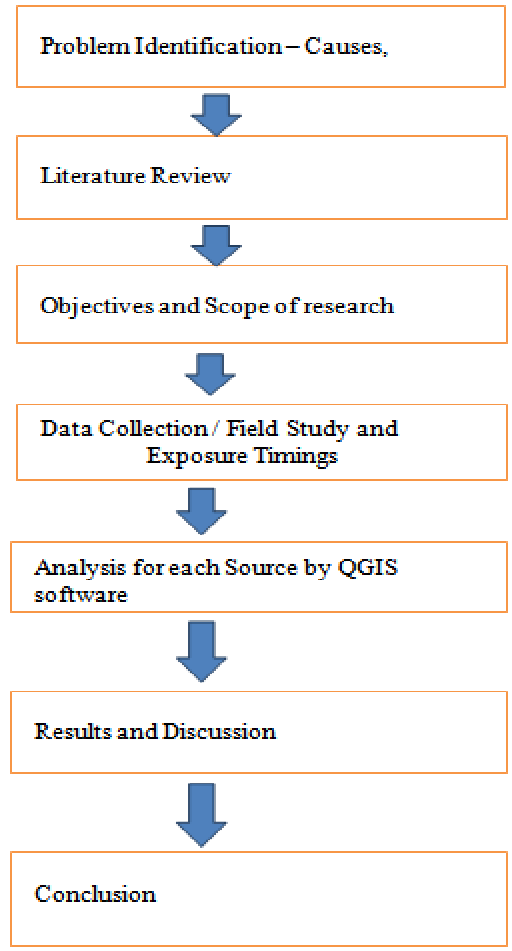

Figure 2 chart of methodology

III. EQUIPMENT DETAILS

1)GENERAL

An important part of noise assessment is the actual measurement of the noise levels. The 'A' weighted network was used as it corresponds very closely to a person's hearing sensitivity. The noise level at all locations were measured with the help of **LUTRAN SL-4012** Sound level meter with **AUTO-RANGE AND RS-232C** is as shown in figure 3.1.

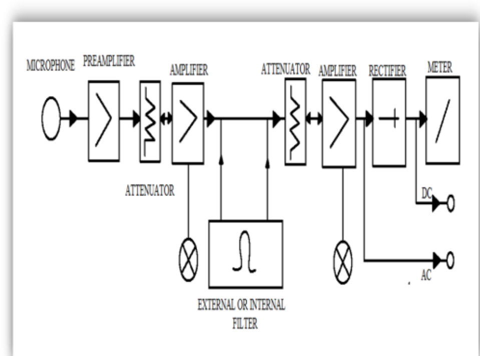

Figure 3 Block diagram of the sound level meter

It is the Large LCD display, easy to read. Main functions are designed to meet IEC 651 type 2. A & C weighting networks comply with standards. 0.5" standard microphone head. Time weighting (Fast & Slow) dynamic characteristic Modes.

AC output for system expansion.RS232 computer interface. Auto range & Manual range selection. Available for external calibration adjustment. Condenser microphone for high accuracy & long-term stability. Memory function to store the Max. & Min value. Hold and MAX. Hold functions. LCD display for low power consumption & clear read-out even in bright ambient light condition. Operation key used push button. Using the durable, long-lasting components, including a strong, light weight ABS-plastic housing case. Small and light weight design allow one hand operation.

2) SPECIFICATIONS

Display : 52 mm x 32 mm LCD (Liquid crystal display), 5 digits with annunciator
Function : dB (A & C frequency weighting), Time weighting (Fast, Slow), Hold, Memory (Max. & Min.), Max. hold, AC output, RS232 output
Measurement range : 30 - 130 dB
Resolution : 0,1 dB
Range selector : Auto range
Manual range : 3 range, 30 to 80 dB, 50 to 100 dB, 80 to 30dB, 50 dB on each step, with over & under range indicating
Frequency : 31,5 to 8.000 Hz
Microphone type : Electric condenser microphone
Microphone size : Out size, 12.7 mm DIA. (0.5 inch) Weighting Network : Characteristics of A & C Time weighting (Fast & Slow) : Fast: t=200 ms, Slow: t=500 ms "Fast" range is simulated the human ear response time "Slow" range is easy to get the avg. values of vibration sound level The "Fast" & "Slow" response range are designed to meet IEC 651 type 2 requirement
Calibrator : B&K (Bruel & Kjaer) multifunction acoustic calibrator 4226
Output Signal : AC output: AC 0.5 Vrms corresponding to each range step Output impedance – 600 ohm RS232.
output Terminal 1 : RS232 computer interface terminal, photo couple
Output terminal : isolated Terminal 2: AC output terminal
Terminal socket size: 3.5 mm dia. phone socket
Calibration VR : Build in external calibration VR, easy to calibrate on 94 dB level by screw driver
Operating Temperature : 0 to 50°C (32 to 122°F)
Operating humidity : less than 80%RH
Power Consumption : approx. DC 6 mA
Dimension : 268 x 68 x 29 mm (10,6 x 2,7 x 1,1 inch)
Weight : 285 gr. (0,63 lb), including battery
Accessory included : Instruction Manual
Optional Accessories : 94 dB Sound Calibrator: SC-941
94 & 114 dB Sound Calibrator: SC-942
RS232 cable (isolated RS232 cable): UPCB-02
Application windows software: SW-U801-WIN

IV. NOISE POLLUTION OBSERVATION AND CALCULATION

1) COMMERCIAL AREA

Noise levels were recorded at BIGSTREET (**COMMERCIAL AREA**) in kumbakonam, Tamil Nadu, India. The noise levels were recorded from morning (04.02.2017) 06.00 AM to (05.02.2017) 05.45 AM at Saturday to Sunday through the location. Noise measurements were taken at distances of 1 m from nearest road border. The height of noise measurement was 1m above the road surface. . The continuous noise level in commercial area is calculated by the following equation

$L_{eq} = 10\log[1/(t2-t1) \{^{t2}_{t1} P^2_A / P^2_0\, dt]$
L_{eq}(Day time) = 87.9 dB(A)
L_{eq}(Night time) = 72.5 dB(A)

2) INDUSTRIAL AREA

Noise levels were recorded at THIRUBHUVANAM (**INDUSTRIAL AREA**) near kumbakonam, Tamil Nadu, India. The noise levels were recorded from morning (06.02.2017) 06.00 AM to (07.02.2017) 05.45 AM at Monday to Tuesday through the location. Noise measurements were taken at distances of 3 m from nearest road border. The height of noise measurement was 1m above the road surface. . The continuous noise level in an industrial area is calculated by the following equation

$L_{eq} = 10\log[1/(t2-t1) \{^{t2}_{t1} P^2_A / P^2_0\, dt]$
L_{eq} (Day time) = 73.4 dB(A)
L_{eq}(Night time) = 57.3 dB(A)

3) RESIDENTIAL AREA

Noise levels were recorded at ANNAI ANJUGAM NAGAR (**RESIDENCIAL AREA**) in kumbakonam, Tamil Nadu, India. The noise levels were recorded from morning (02.02.2017) 06.00 AM to (03.02.2017) 05.45 AM at Thursday to Friday through the location. Noise measurements were taken at distances of 1 m from nearest road border. The height of noise measurement was 1m above the road surface. The continuous noise level in residential area is calculated by the following equation

$L_{eq} = 10\log[1/(t2-t1) \{^{t2}_{t1} P^2_A / P^2_0\, dt]$
L_{eq} (Day time) = 64.9 dB(A)
L_{eq}(Night time) =51.2 dB(A)

4) SILENT ZONE

Noise levels were recorded at near PALAKARAI government hospital **SILENT ZONE** in kumbakonam, Tamil Nadu, India. The noise levels were recorded from morning (03.02.2017) 06.00 AM to(04.02.2017) 05.45 AM at Friday to Saturday through the location. Noise measurements were taken at distances of 10 m from nearest road border The height of noise measurement was 1m above the road surface. . The continuous noise level in silent zone is calculated by the following equation

$L_{eq} = 10\log[1/(t2-t1) \{^{t2}_{t1} P^2_A / P^2_0 \, dt]$

L_{eq} (Day time) =50.7 dB(A)

L_{eq}(Night time) = 56.2 dB(A)

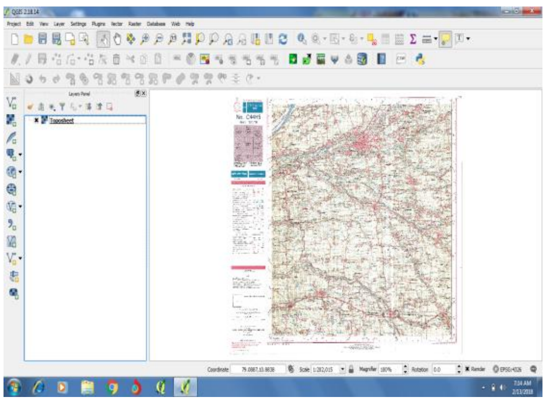

Figure 4 Kumbakonam Toposheet in QGIS

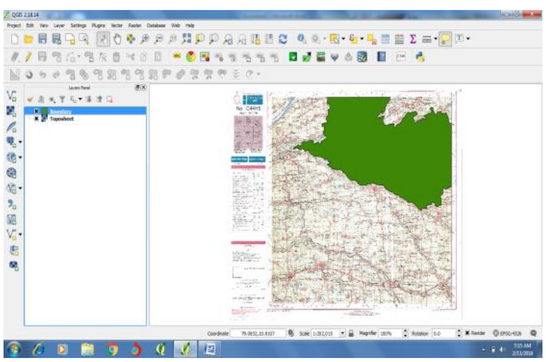

Figure 5 Digitizing Kumbakonam Taluk Boundary

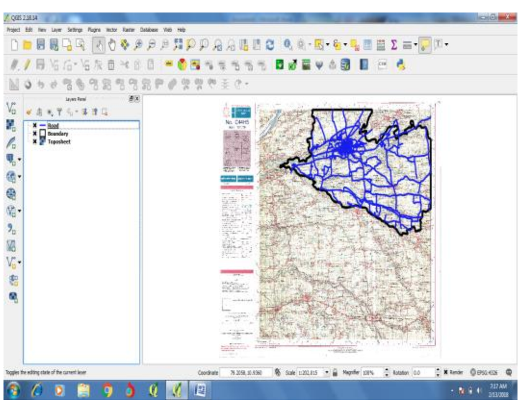

Figure 6 Digitizing Kumbakonam Road Network

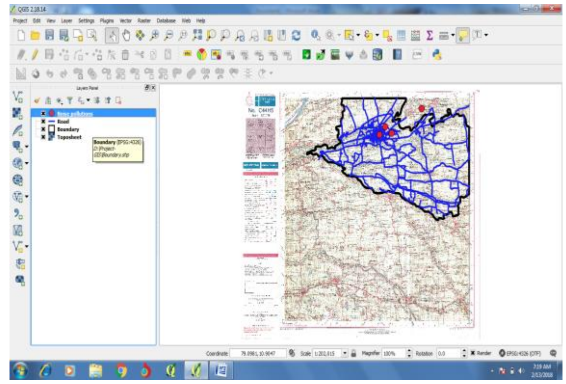

Figure 7 Digitizing Noise Pollution Area in QGIS

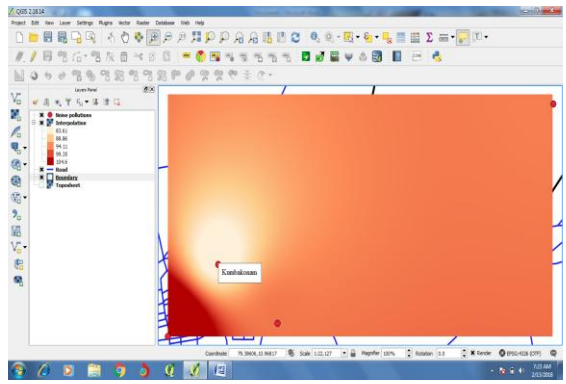

Figure 8 Noise Pollution – HOTSPOT

V. CONCLUSION

The Results showed that the monitored noise levels in terms of Leq, in commercial area ranged between 87.9 dB(A) to 72.5 dB(A) , industrial area ranged between 73.4 dB(A) to 57.3 dB(A), residential area ranged between 64.9 dB(A) to 51.2 dB(A) and in the silent zone ranged between 56.2dB(A) to 50.7 dB(A). These noise levels exceeded in commercial, residential, silent zone the level recommended by the World Health Organization. The industrial area is less in compare to the level recommended by the World Health Organization. So we give solution to reduce such noise levels by using noise insulating materials and create peaceful environment by advertised to using noise cancellation instrument.

TABLE 3 LEQ STANDARD VS ACTUAL VALUE

S.No.	Category of Area/Zone	Limits of leq dB(A)		Actual leq dB(A)	
		Day time	Night time	Day time	Night time
1	Residential area	55	45	64.9	51.2
2	Silent zone	50	40	56.2	50.7
3	Commercial area	65	55	87.9	72.5
4	Industrial area	75	70	73.4	57.3

TABLE 4 NOISE POLLUTION MINIMUM, MAXIMUM DB(A) VALUE TO FREQUENCY (HZ)VALUE

Category of Area	Minimum Value dB(A)	Minimum Value Hz	Maximum Value dB(A)	Maximum Value Hz
Commercial area	30.8	34.67369	123.7	1531087
Industrial area	31.2	36.30781	95.2	57543.99
Residential area	30.4	33.11311	95.8	61659.5
Silent zone	30.1	31.98895	79.6	9549.926

VI. SCOPE OF FUTURE WORK

To innovate the noise controlling equipment to control the noise level in exceeded places to prevent the harmful effects causing to humans, animals and birds to create the peaceful environment. Construct the building by using some noise insulating materials to prevent unwanted noise entered into the buildings.

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