International Journal of Advance Research in Science and Engineering
Volume No.08, Issue No.06, June 2019
www.ijarse.com
IJARSE
ISSN: 2319-8354

ASSESSMENT AND MODELLING OF NOISE DUE TO RAILWAY ASSETS FOR LUCKNOW CITY

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ABSTRACT

Railways are the second largest source of noise pollution after road traffic noise pollution and it effects the humans and the workers who travel and live in localities along the railway tracks. The various sources of railway noise which causes annoyance are warning horns, wheel-track interference noise, brake squeals, loudspeakers, trolleys on platforms etc. This study was done for Lucknow railway station which is situated in the heart of Uttar Pradesh. Lucknow railway station consists of two main sub railway stations i.e. Lucknow NR railway Station and Lucknow NE railway station which is also known as Lucknow Junction railway station. The Noise monitoring was done for outer platforms of Lucknow railway station using sound pressure level meter. The noise monitoring was done for 8 hours by considering the peak hours of Lucknow Railway station. The Modelling and mapping of railway noise was done using MAS Environmental health consultancy tool available for use for free of cost and the modelling results were validated using the on site measurements. The results revealed that the highest noise was produced in the night time for Lucknow NR railway station and in the morning time the noise was at its peak for Lucknow NE railway station. The peak noise was measured and it was found that horns are the reasons for the peak sound level in morning as well as night. The recorded peak noise for Lucknow NR railway station was 117.9 dB in the night time and for day time it was minimum i.e. 90.9 dB.

Keywords*- contours, peak sound level, sound pressure level (SPL), sound level modelling, noise indices*

INTRODUCTION

Noise pollution is known for among the major causes to impact the people living in urban areas across the world.Due to rapid urbanization, industrialization and development in communication and transportation the noise levels have reached to an extreme level (Rajesh B.Hunashal, 2012).The word ‘noise’ has been derived from the latin word “Nausea” which means “unwanted sound” or the sound that is unpleasant or unexpected (Pawar et al.2010).Thephenomenon of noise is associated with rapid industrialization, urbanization and population growth (Alam, 2011).

We have introduced here a sound propagation model that is fully complaint to ISO 9613-2 which is internationally accepted for the purpose of prediction of noise levels in the outdoor environment and it is considered as one of the most accurate and recent authentic prediction model for sound propagation. The validity of this model will be checked by comparing it with the on site measurements taken at the outer platforms in Lucknow.

STUDY AREA

Lucknow, which is the capital city of Uttar Pradesh, situated in northern India is chosen for study. Lucknow has two main railway stations which connect to various parts of India. The noise monitoring was done on the outer platforms i.e. platform no.1 for both the railway stations. The Coordinates of Lucknow railway station are**26°49′55″N 80°55′08″E** having an elevation of 123.500 metres (405.18 ft).

Fig-1 : Site Map of Study Area including Lucknow Junction and Lucknow NR railway station

MATERIALS AND METHODS:

Noise Level Monitoring-The monitoring of noise level in Lucknow railway stations was done only for outer platforms where a large number of facilities are provided forthepassengers and moreover a lot of crowd gathers only in outer platforms of the railway stations. The noise level monitoring was done for platform number 1 of Lucknow NR railway station and Lucknow Junction railway station.The noise reading in dB(A) was recorded for every 15 second interval and a total of 1920 readings were taken for each platform.The monitoring was done for peak hours of railway on the basis of number of trains entering and leaving Lucknow railway station. The following peaks hours were decided for the present study - **(1)** 10:30 am – 12:30 pm **(2)** 1:00 pm-3:00 pm **(3)** 5:00 pm -7:00 pm **(4)** 9:00 pm - 11:00 pm

The class 1 sound pressure level meter was used to measure the sound level produced at each point.The sound pressure level meter was placed at a height of 1.5 metre above the platform level. The readings were taken by installing the sound pressure level meter at angle of 90 degrees with respect to the tracks.

Fig -2 : Class 1 Sound Pressure Level Meter

RESULTS AND DISCUSSIONS

Decibel Monitoring

The Noise Readings were taken for every 15 seconds frequency on platform no. 1 of Lucknow NR railway station. The readings were collected in a batch of 2 hours and a total 1620 readings were recorded for the Lucknow NR railway station.

Modelling of Noise levels

The modelling of noise level was done for platform No.1 and the receiver was placed at a height of 1.5 meter above the floor level. The L_{eq}values, which were measured, were used as reference in ISO 9613 model and mapping of noise levels was done. The Input data used in modelling for attenuation of outdoor propagation of sound were temperature, humidity and Ground Factor. The Table below represents the Input data used-

Ground Factor (G)	0	Hard Ground
Temperature (° C)	20	December,2018
Humidity (%)	65	On 09/12/18

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ISSN: 2319-8354

The peak sound pressure level was 117.9 dB for night time and for other durations it was below this peak value.

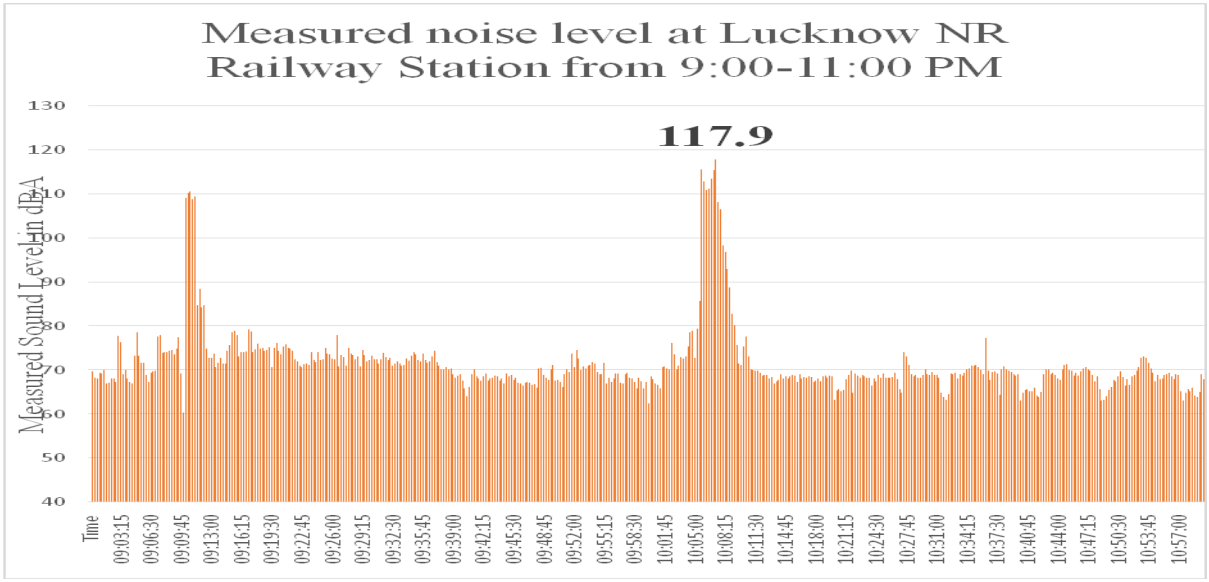

Fig-3: Peak sound pressure level recorded during 9-11 PM for Lucknow NR railway station

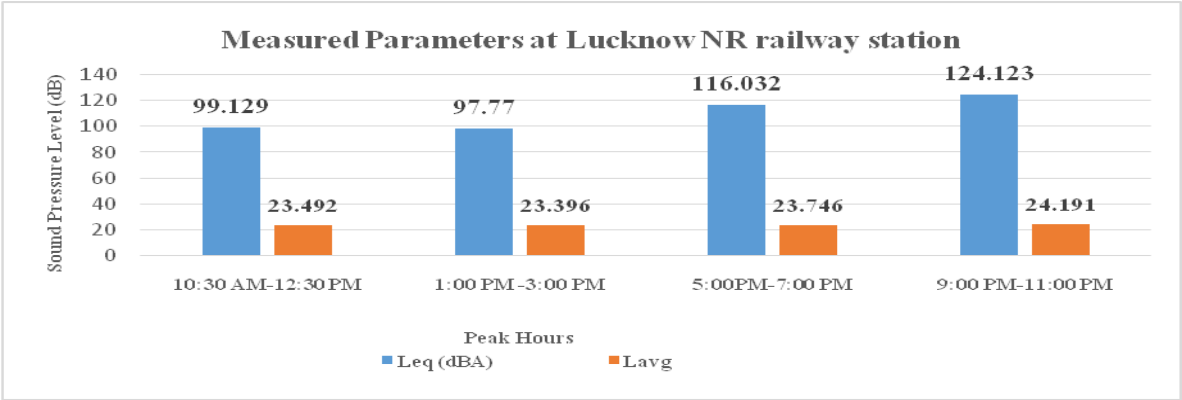

Fig – 4: Measured Parameters for Lucknow NR railway station during peak hours

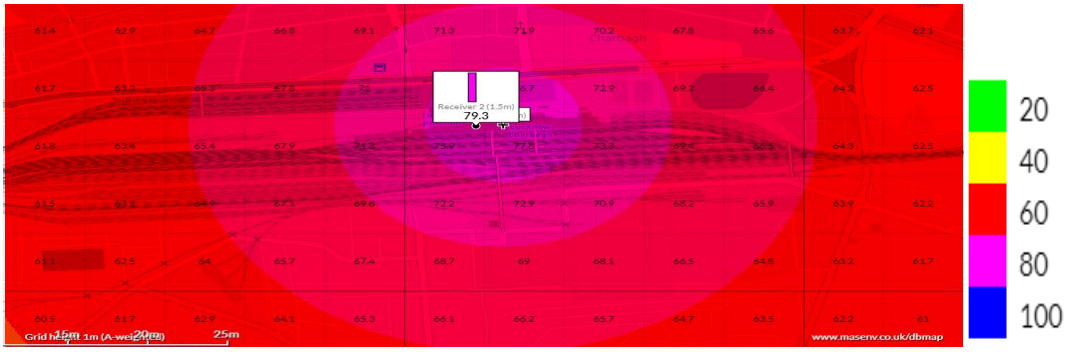

Fig- 5: Noise Modelling for Lucknow NR Railway Station during 10:30 am – 12:30 pm

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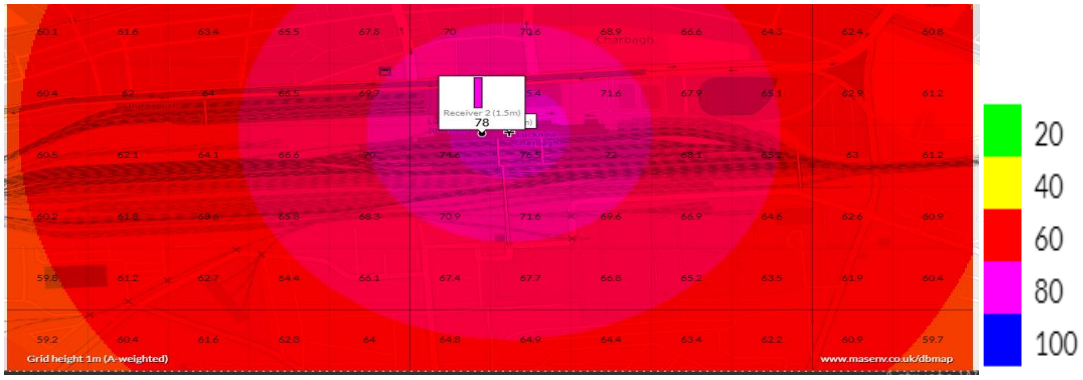

Fig-6: Noise Modelling for Lucknow NR Railway Station during 1:00 pm – 03:00 pm

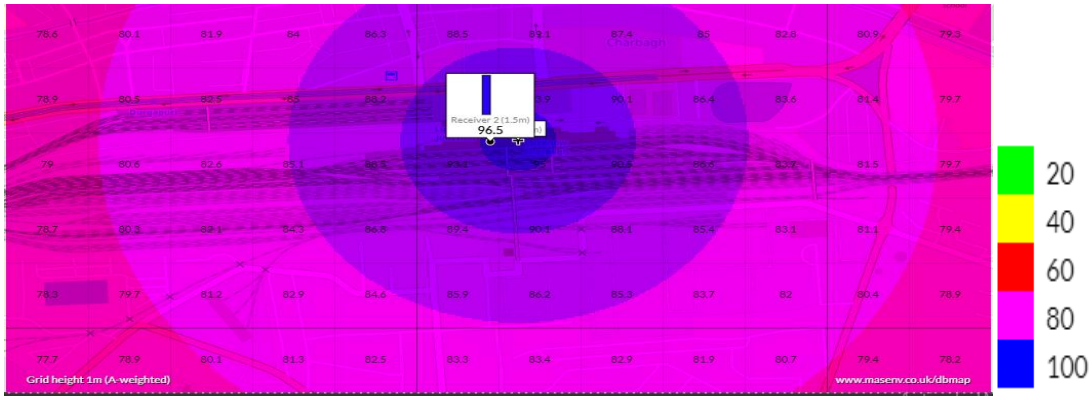

Fig-7: Noise Modelling for Lucknow NR Railway Station during 5:00 pm – 07:00 pm

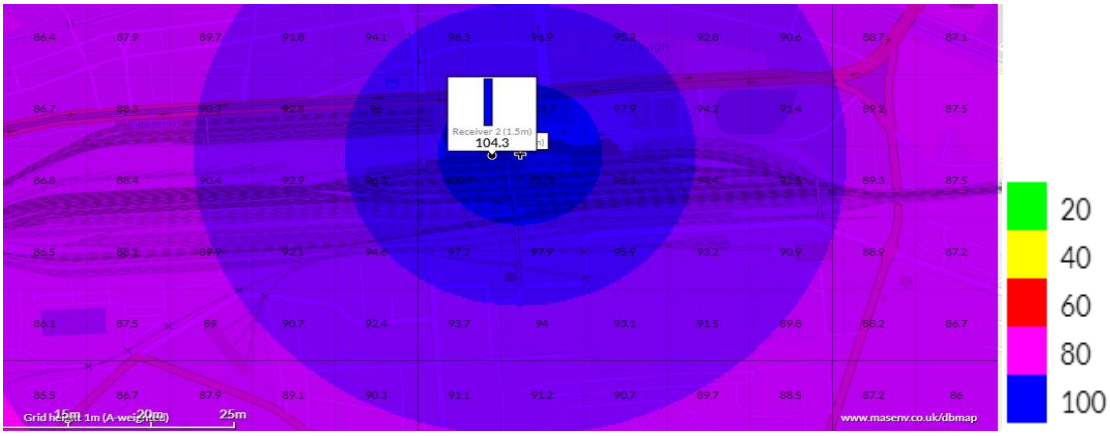

Fig-8: Noise Modelling for Lucknow NR Railway Station during 9:00 pm – 11:00 pm

CONCLUSIONS

This Study shows how the noise due to railway varies with different peak hours in day as well as night. For Lucknow Junction railway station the highest noise was recorded during the day time period from 10:30 AM to 12:30 PM and for Lucknow NR railway station the highest noise was recorded during the night time period from 09:00 PM to 11:00 PM. The Modelling results also satisfies the on- site measurements of railway noise where the noise contours at 5 m intervals show peak noise at Night for NR railway station and for day Lucknow Junction shows highest noise.

REFERENCES

[1] Alam, W., 2011. GIS based assessment of noise pollution in Guwahati City of Assam, India. *International Journal of Environmental Sciences*, *2*(2), pp.731-740.

[2] Bhave, P.P. and Kulkarni, N., 2015. Air pollution and control legislation in India. *Journal of The Institution of Engineers (India): Series A*, *96*(3), pp.259-265.

[3] Chiocchia, G., Clerico, M., Salizzoni, P. and Marro, M., 2010, April. Impact assessment of a railway noise in an alpine valley. In *10ème CongrèsFrançaisd'Acoustique*.

[4] Džambas, T., Lakušić, S. and Dragčević, V., 2018. Traffic noise analysis in railway station zones. *Applied Acoustics*, *137*, pp.27-32.

[5] Hunashal, R.B. and Patil, Y.B., 2012. Assessment of noise pollution indices in the city of Kolhapur, India. *Procedia-Social and Behavioral Sciences*, *37*, pp.448-457.

[6] Khaiwal, R., Singh, T., Tripathy, J.P., Mor, S., Munjal, S., Patro, B. and Panda, N., 2016. Assessment of noise pollution in and around a sensitive zone in North India and its non-auditory impacts. *Science of the Total Environment*, *566*, pp.981-987.

[7] Licitra, G., Fredianelli, L., Petri, D. and Vigotti, M.A., 2016. Annoyance evaluation due to overall railway noise and vibration in Pisa urban areas. Science of the total environment, 568, pp.1315-1325.

[8] Pathak, V., Tripathi, B.D. and kumar Mishra, V., 2008. Evaluation of traffic noise pollution and attitudes of exposed individuals in working place. *Atmospheric Environment*, *42*(16), pp.3892-3898.

[9] Protocol for ambient level noise monitoring, *CPCB*, July 2015