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Research Article

ROAD TRAFFIC NOISE MAPPING AND A CASE STUDY FOR DELHI REGION

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ABSTRACT
Increasing noise level due to road traffic is a major concern for the quality of life in urban areas. It can be reduced up to some extent by adopting mitigate measures such as providing noise barriers and suitable traffic management etc. This can be achieved using noise maps, which gives the visual representation of noise level of a certain area. Therefore, in the present study, an attempt has been made to prepare noise maps for various important locations of Delhi city using GIS and Predictor software. Critical locations have been identified in preliminary survey for noise level measurements. The noise levels in terms of L_{10}, L_{50}, $L_{90,}$ and L_{eq} have been measured using digital Sound Level Meter (Larson and Davis, USA, Model – 831). Sound level measurements have been carried out during working days and under ideal meteorological conditions. The original map of Delhi has been scanned and registered/geo-referenced to specify its location by inputting coordinates. Arc-GIS have been used to create digitized map of Delhi city. Thereafter, the collected data of noise levels for various locations have been given as input parameters in predictor software for the generation of noise maps for Delhi city. The equivalent noise levels measured at various locations have been ranging from 53 dB(A) to 83 dB(A). The prepared noise maps show the variation of noise levels (L_{eq}) at different locations, which indicates the presence of traffic in terms of number and category of vehicles. Noise maps indirectly give the clear picture of traffic movement at different locations and provide guidance to traffic management peoples.

Key Words: *Road Traffic, Noise Level, GIS, Noise Mapping, Traffic Management*

INTRODUCTION
Noise mapping is (a optimization technique) in its various forms can be derived for different periods of the day or night and by using different noise indicators, noise dose-effect relationships, calculation heights, calculation techniques. The main uses of noise maps is to identify and quantify the scale of noise problems at local, regional, national level and provide information for town planning and traffic management. Urban noise is directly associated to human activities, in transport and industry development. This high population causes the increase of traffic volume and the accompanying noise pollution in a city like Delhi. The increase of noise pollution, lead to public health problems. Use of Geographic Information Systems or noise mapping software in noise mapping may play an important role to optimize quality and efficiency of noise effect studies. The results of different studies can be compared and it may be adopted in common practice globally (Kluijver *et al.,* 2003). European countries have been conducted some studies of noise mapping, now the mapping became an important aspect for the European Community environmental policy. The city of Cáceres in Spain (Barrigon *et al.,* 2002) and the city of Messina in Italy (Piccolo *et al.,* 2005) have done of such types of studies. The city of Curitiba in Brazil (Zannin *et al.,* 2002) and Valdivia in Chile (Sommerhoff *et al.,* 2004) has also done the community noise mapping.

RESULTS AND DISCUSSION
Delhi (capital of India) has maximum number of road traffic i.e. approx. seventy lakhs and due to this reason lots of noise problems in different location has been arises. Noise levels are more in the centre of

Delhi; Connought Place area i.e. more than 75 dB(A), while at outer Delhi area it is slightly low; noise contour line has been shown in Figure 1.

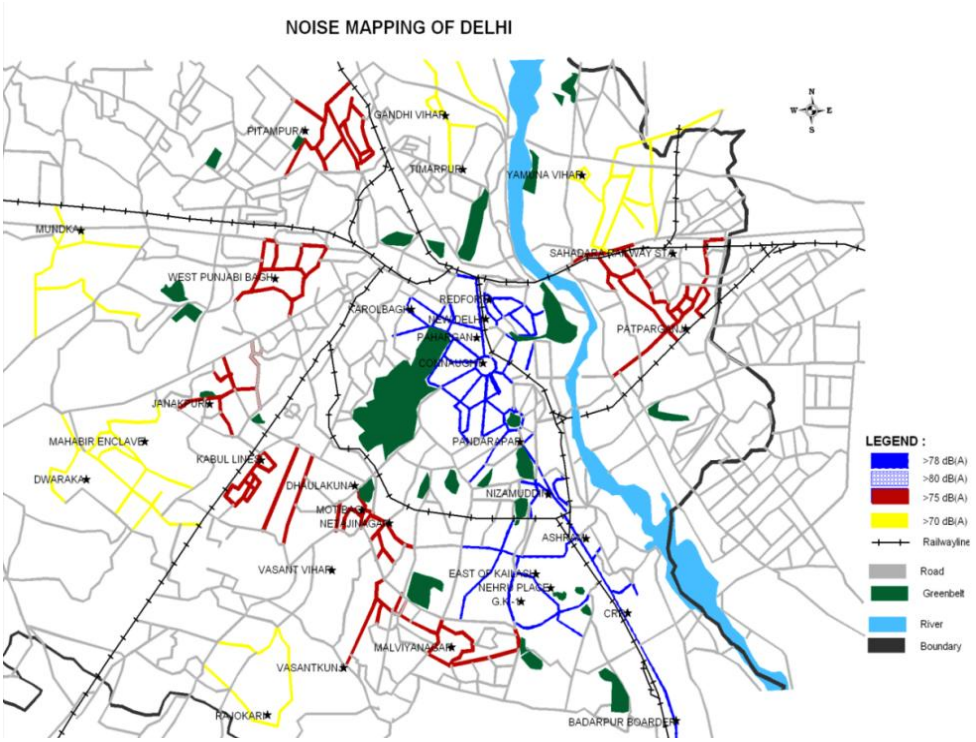

Figure 1: Noise Mapping of Delhi

Sonogramme at Sarai Kalay Khan Road has been shown in Figure 2 clearly says the congestion and changes in frequencies levels, exposure levels. There are two types of noise mapping; vertical noise mapping and horizontal noise mapping. In Figure 3 the horizontal noise mapping and noise their attenuation with varying distance, it is 80 dB(A) at 3.5m and at 56m it is around 70 dB(A), while at 225m it is around 60-65 dB(A) and at 896m distance it is around 55 dB(A) have been shown.

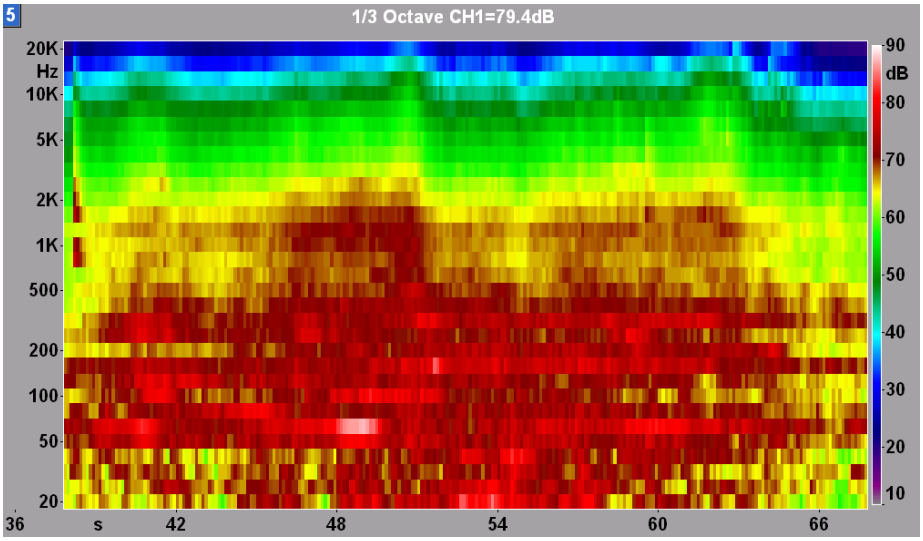

Figure 2: Sonogramme during pass-by noise

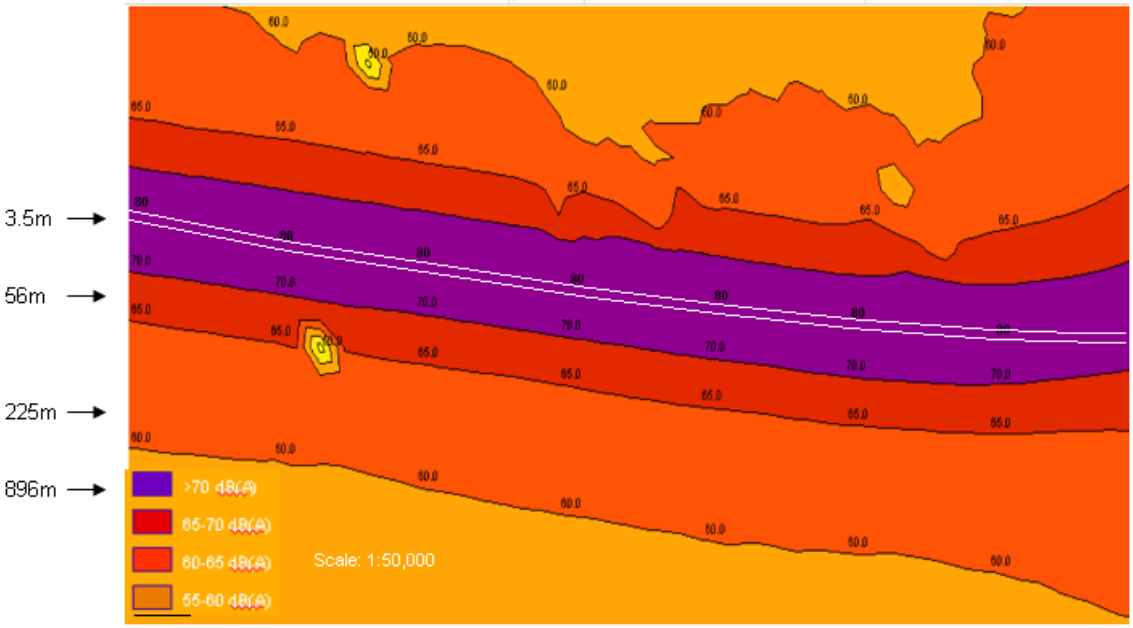

Figure 3: Horizontal noise mapping

Vertical and Horizontal Noise Mapping at Nehru place, Delhi

Noise mapping clearly gives the picture of noise pollution either it is horizontal or vertical shown in Figure 4. At Nehru place on the road noise levels varies between 80-82.6 dB(A), while till 10th floor vertical height noise levels are more than 70 dB(A), means the people whose are staying till that floor are exposed with that levels of noise. Noise mapping gives a clear-cut picture of exposed area and number of people exposed with varying noise levels.

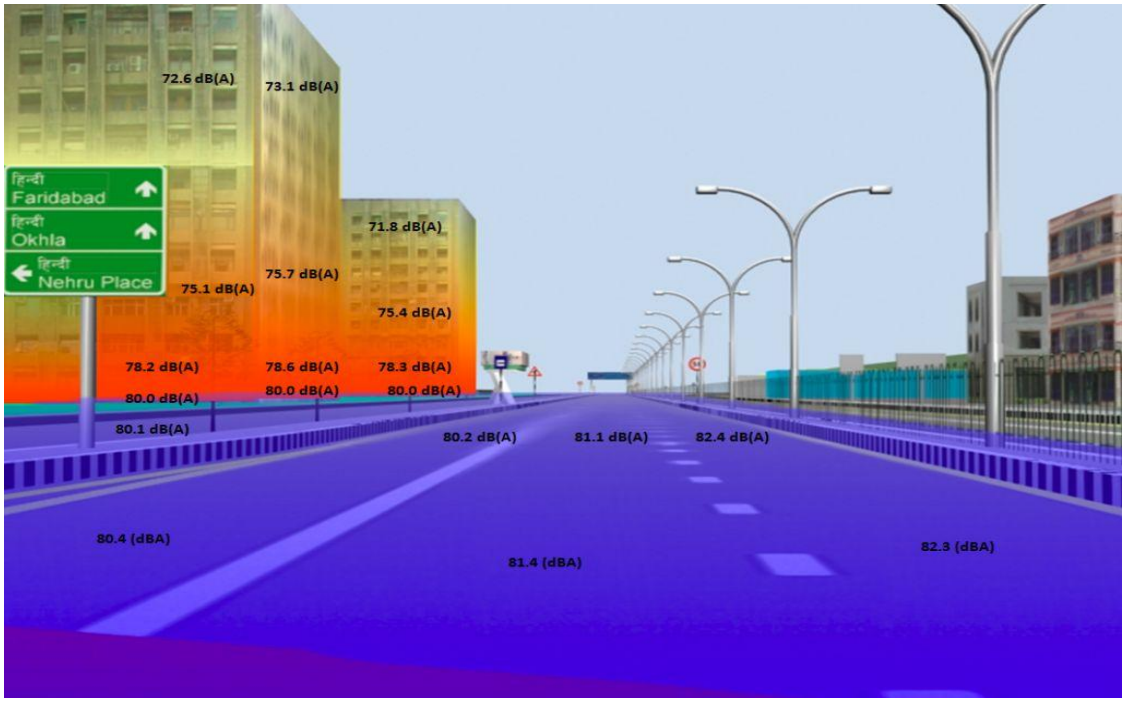

Figure 4: Vertical and Horizontal Noise Mapping at Nehru Place, Delhi

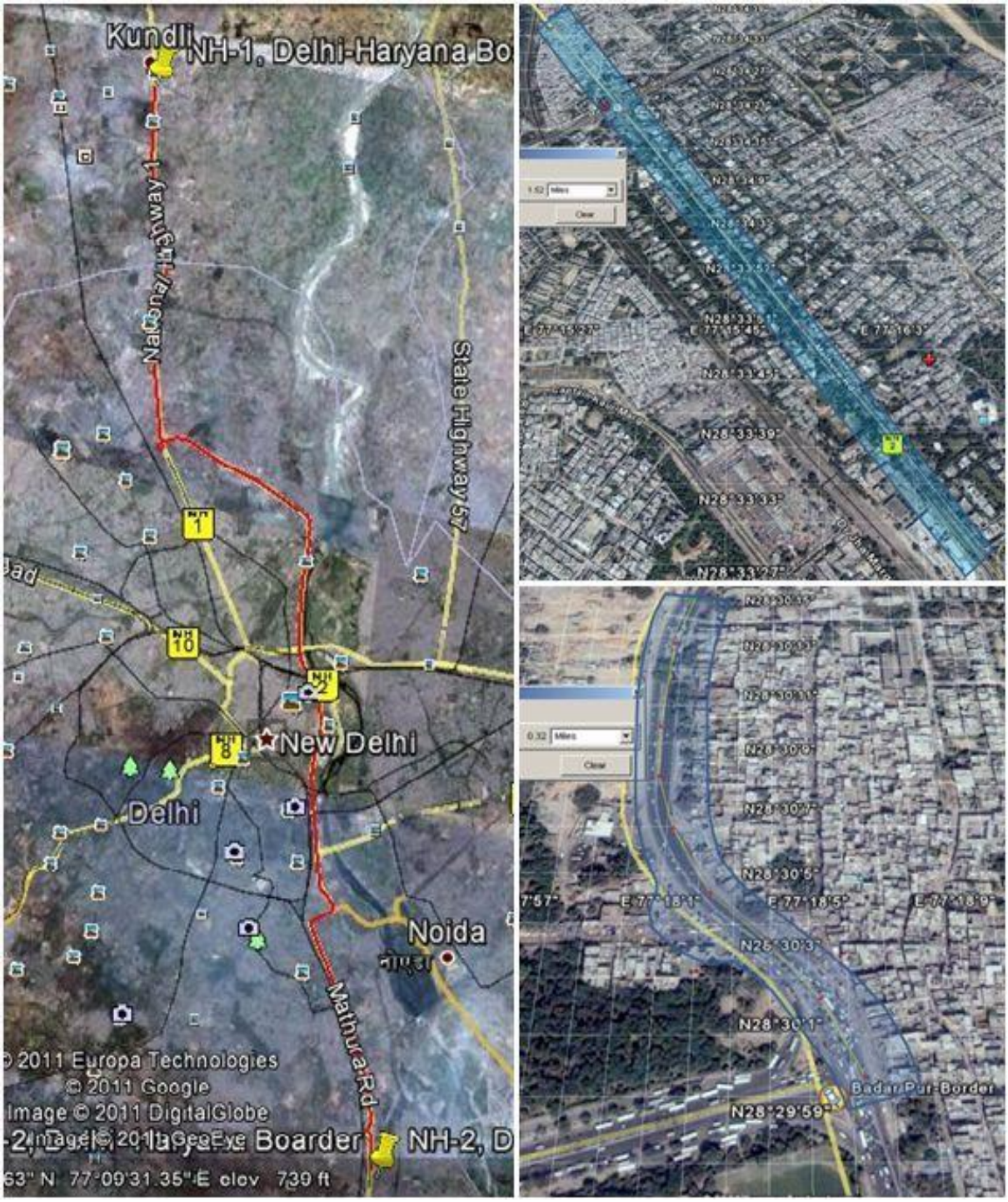

Figure 5: Road Length 52 km acoustical treatments required in only 3.5 km

Figure 5 shows the corridor from Badarpur border to Kundli border, the total length of the corridor is 52 km, if acoustical treatments is given to just 3.5km the noise problem can be solved.

Figure 6 Ashram Flyover, before construction of the flyover the noise exposure was till 70 meters but after the construction the flyover noise exposure expanded to 400m. With noise mapping, noise exposure at Ashram chowk in during day, evening and night are shown in Figure 7, 8 and 9.

Figure 6: Ashram Flyover

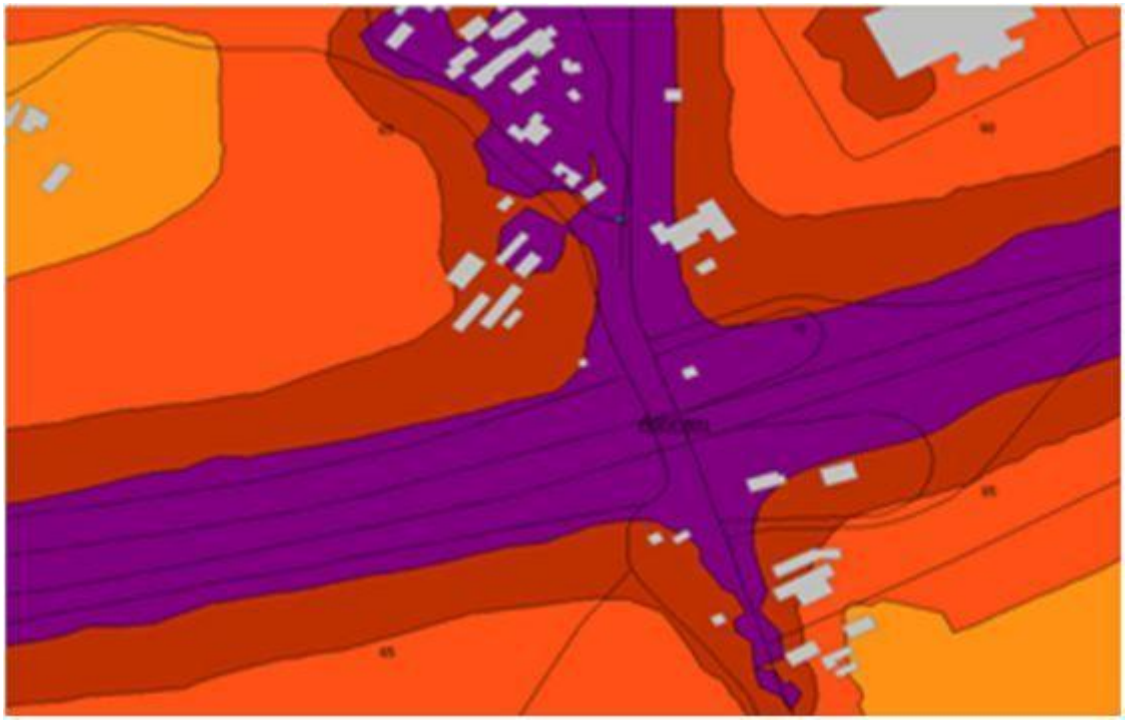

Figure 7: Ld (Noise day)

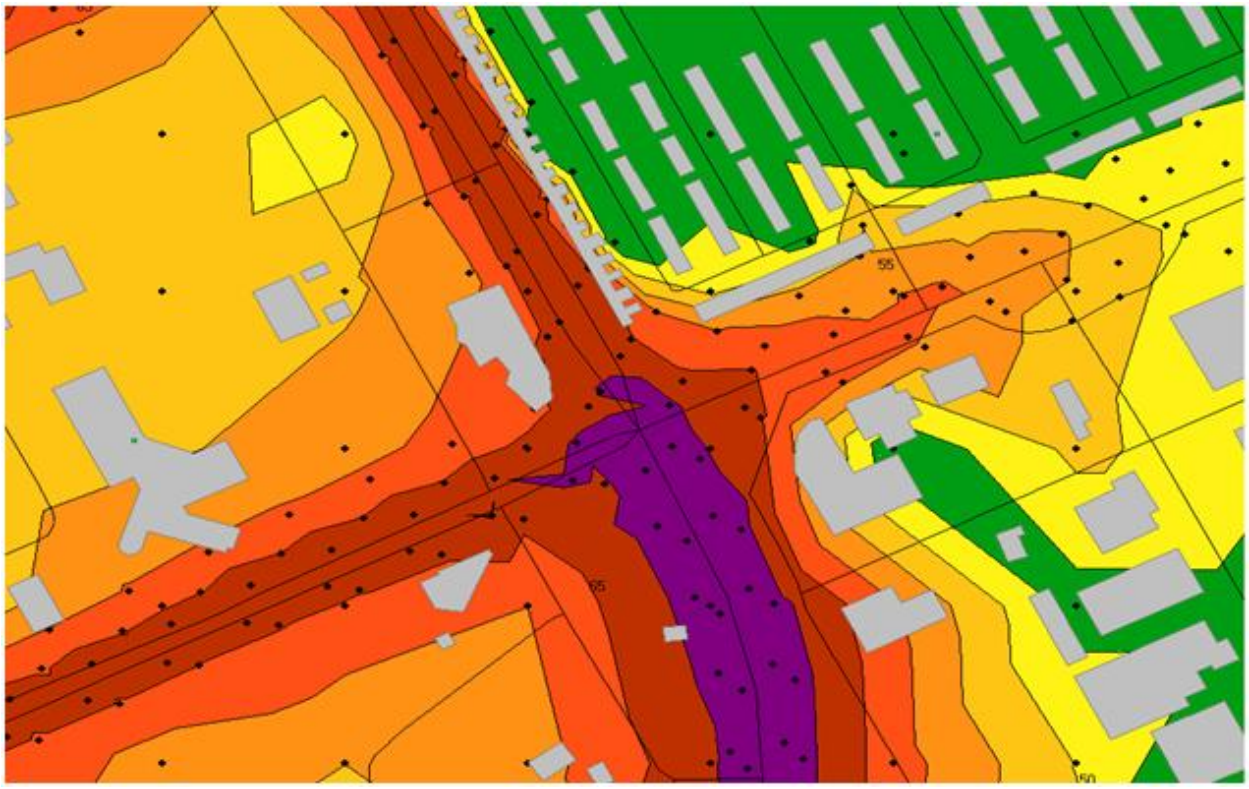

Figure 8: Le (Noise evening)

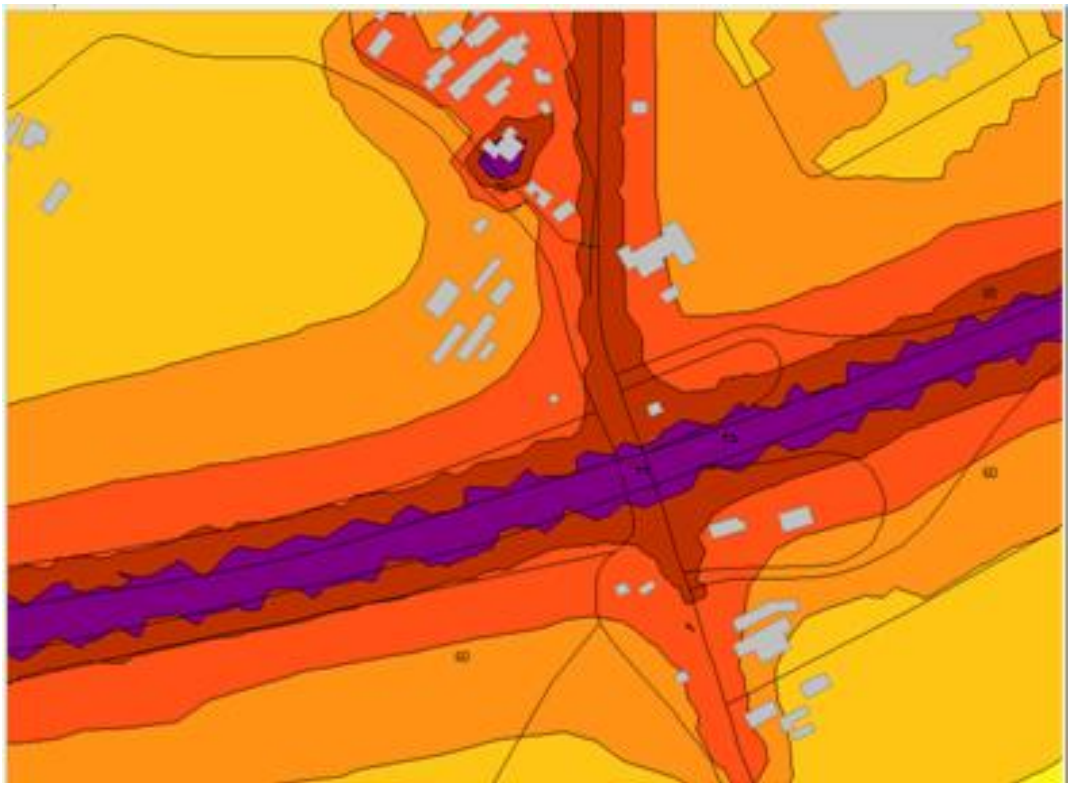

Figure 9: Ln (Noise night)

CONCLUSION

Horizontal and vertical noise profile, exposure during day, evening and night has been shown through noise mapping, using predictor software. Noise mapping is also called optimization technique which has been proved by this study. If out of 52 km the authority applies noise barrier to just 3.5 km the problem will be solved at Badarpur-Kundli corridor. At Ashram flyover there is an urgent need of noise barrier as the exposure area has increased both horizontally as well as vertically. This was a pilot study hence a complete comprehensive study of noise mapping is required to find the hot spot and suggest best remedial measures accordingly.

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