



NOISE LEVEL STUDY AND ASSESSMENT IN THE SOUTHERN PART OF PANEVĖŽYS

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Submitted 22 Sept. 2008; accepted 15 Dec. 2009

Abstract. Noise is a relevant problem faced not only by Lithuania but across the world. With motor traffic flow increase, the noise caused by them is also growing and in particular noisy are heavy vehicles and motorcycles. Noise measurements were taken near the main streets in the southern part of Panevėžys. Measurements were made during three time periods of the day: in the daytime (from 6 a.m. to 6 p.m.), in the evening (from 6 p.m. to 10 p.m.) and at night (from 10 p.m. to 6 a.m.). In this part of the city noise is mainly generated by cars. The measured noise levels were compared with the noise level limit (NLL) in the measurement places where the NLL is most often exceeded. Noise level analysis and traffic flows are presented in the work. As the performed measurements show, the NLL in the daytime was exceeded by 65%, in the evening by 88%, and at night by 71% of all the total measurements made. The equivalent NLL was exceeded by up to 14 dBA and the maximum NLL – by up to 17 dBA. The highest excess of the NLL was recorded by streets with the heaviest traffic.

Keywords: traffic noise, noise level in the living environment, noise level limit (NLL).

1. Introduction

In Lithuania, as in other countries, efforts are made to reduce the surrounding noise and avoid its adverse impact on human health and the quality of the environment (Usinavičienė *et al.* 2004).

In most towns, the average noise increase is 1–3 dB per year (Gražulevičienė *et al.* 2003). The noise level is forecast to double in 15 years (Grubliauskas and Butkus 2004).

The main noise sources are generated by traffic on streets where in some cases motor traffic accounts for up to 80% of the total noise level in the territories of cities (Žeromskas 1998). The main cause of noise is an increasing number of old technically disorderly cars and continuously expanding activities of motor transport companies. Over the last 10 years the traffic in Lithuania increased 2.4 times. Due to the afore-mentioned reasons, the number of road accidents grew, car queues became longer and more time is spent at crossings, whereas all that resulted in increased environmental pollution with vehicle exhaust gas and noise generated by motor vehicles (Henckens *et al.* 2000).

Many town citizens suffer from the traffic-generated noise. Traffic is the most prevailing source of noise in towns (Grubliauskas and Butkus 2007). Traffic-generated noise accounts for 60–80% of the noise prevailing in towns. It has a negative effect in all the territories of towns: residential areas, hospitals, sanatoriums, recreation areas, town centres, utility and industrial territories (Kindurytė and Oškinis 2003).

The boundary of Panevėžys southern part stretches over Pušalotas, Nemunas, Klaipėda, Vilnius, and Basanavičius streets and the river of Nevėžis. The south-eastern part of Panevėžys is dominated by dwelling houses and 5-storied buildings. The south central part, like the entire southern part, is dominated by high-rise dwellings. Locations away from the city centre are dominated by industrial objects. Multi-storied dwelling houses and collective garden areas without bustling streets are prevailing in the south-western part.

The aims and tasks of the work are to determine the distribution of noise levels among zones and compare them with the noise level limit (NLL), to determine measurement places where the NLL is exceeded most often and analyse the causes predetermining the NLL excess.

2. Investigation methods

Measurements of the traffic-generated noise are taken in the territories within the zone of influence of the traffic-generated noise. Noise measurements were taken at the selected locations of Panevėžys town which are the most suitable for the characterisation of the environmental acoustics addressed. The measurement locations are selected considering the amount and speed of passing traffic in different sections of streets, street paving, the background noise of the area, the vegetation and the development of the area. The places and number of noise measurement locations depend on the investigated environment and spatial spread of noise within it.

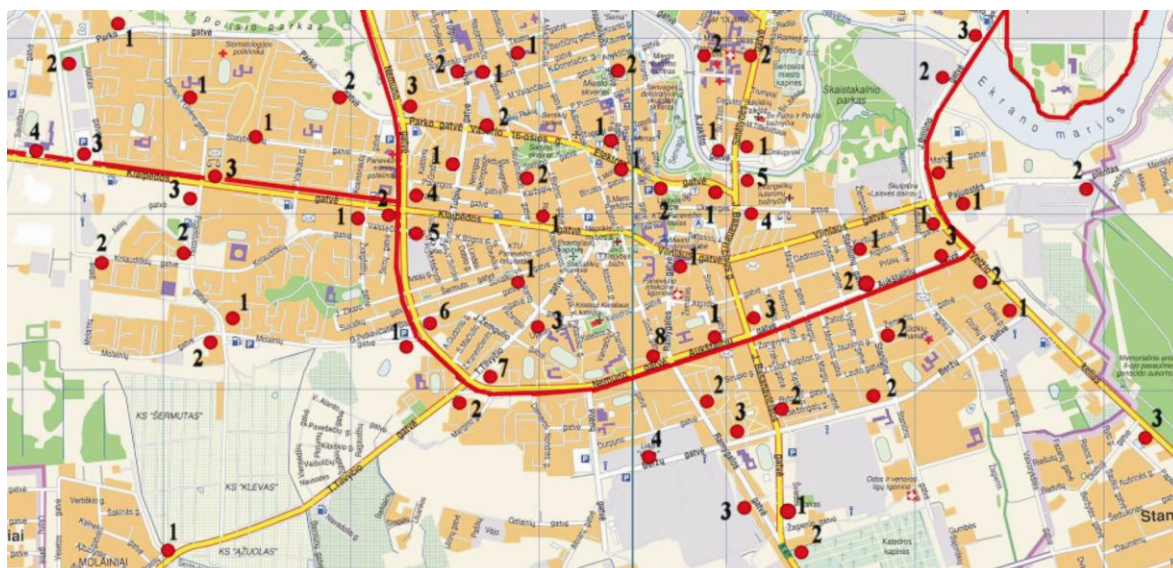


Fig. 1. Measurement location layout in Panevėžys town

In order to establish the levels of traffic-generated noise at different periods of the day, measurements were taken at each of the six measurement locations at a different time of the day: in the daytime (from 6 a.m. to 6 p.m.), in the evening (from 6 p.m. to 10 p.m.) and at night (from 10 p.m. to 6 a.m.). Fig. 1 shows six measurement locations where noise measurements are made within twenty four hours by measuring traffic-generated noise levels for 15 minutes each hour.

Motor traffic-generated noise was measured in the period of April, May and June and in autumn (September–October). Traffic in the town is the heaviest during the afore-mentioned periods. In addition, noise measurement during the cold season of the year under complicated weather conditions is impossible. It cannot be done when it's snowing, raining, when there is mist or the wind speed exceeds 5 m/s. When the wind speed is from 1 to 5 m/s, a microphone is covered with a special shield. Noise measurements are carried out when the relative humidity is not higher than 80% and air temperature is from 0 °C to 30 °C.

Considering the development of the area and the peculiarities of noise dispersion, distances from the noise source to the measurement location can be adjusted. In territories that are closer than 7.5 metres from the axial trajectory line of a vehicle the noise is measured at place that is at 1- or 2- meter distance from the house wall, at a height of 4 m from the territory's surface by turning the microphone towards the source of noise.

Prior to and after taking measurements, the device is calibrated according to an instructive manual. If the calibration results differ by more than 2 dBA, the noise measurements are repeated.

When measuring the noise level with a precision of Bruel & Kjaer mediator 2260, the relative measurement error is $\pm 1.5\%$.

Prior to making noise level measurements, the meteorological conditions are determined: the relative air humidity, air temperature and wind speed. These data determine whether the measurements can be performed.

3. Investigation results and analysis

Velžis street (Fig. 2) is one of the town's main streets used to access the town from Anykščiai direction. This four-lane street is loaded with heavy car and vehicle flows. Cars drive along the street at a speed of around 60 km/h. In the daytime the equivalent noise level limit (NLL) was exceeded by 5 dBA in the 1st measurement location and by 8 dBA in the 2nd one; a high NLL excess in the 2nd measurement location was predetermined by the traffic of 1 020 cars and 98 heavy vehicles within the measurement time.

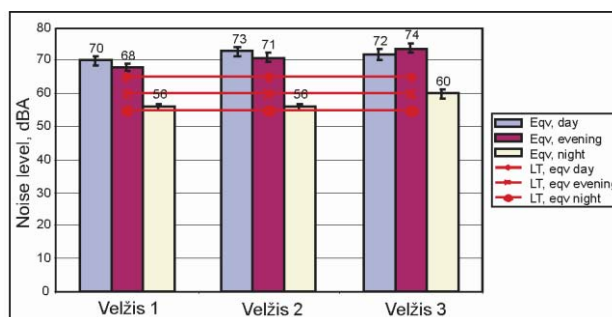


Fig. 2. Dynamics of equivalent noise levels in Velžis street within twenty four hours

In the evening the highest excess of the equivalent noise level, 14 dBA, was recorded in the 3rd measurement location which was passed by 1 101 cars and 62 heavy vehicles during the time of measurement. In the evening the highest excess of the equivalent noise level, 5 dBA, was recorded in the 3rd measurement location which was passed by 659 cars and 40 heavy vehicles during the time of measurement. The lowest noise level was recorded in the 1st measurement location which was passed by 714 cars and 66 heavy vehicles in the daytime, 646 cars and 55 heavy vehicles in the evening, and 589 cars and 41 heavy vehicles at night.

In Velžis street (Fig. 3), in the daytime the maximum NLL was exceeded by 15 dBA in the 3rd measurement location, in the evening the maximum NLL was exceeded

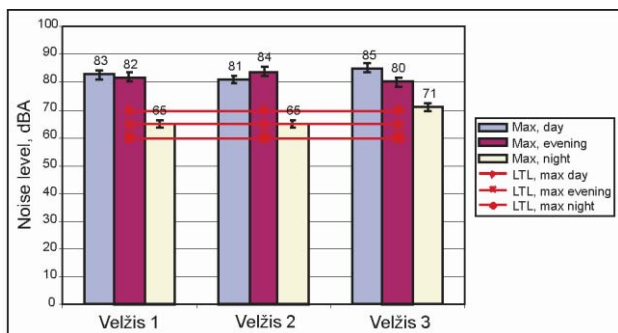


Fig. 3. Dynamics of maximum noise levels in Velžis street within twenty four hours

by up to 19 dBA, and at night the maximum NLL was exceeded by up to 11 dBA.

Beržai street is a two-lane street where four measurement places were selected. In the daytime the equivalent NLL was exceeded by 2 dBA in the 1st measurement location and by 3 dBA in the 3rd measurement location where the noise level was predetermined by the traffic of 940 cars and 46 heavy vehicles.

In the evening the highest equivalent NLL excess, 12 dBA, was recorded in the 4th measurement location. A high excess of the NLL was predetermined by the traffic of 811 cars and 57 heavy vehicles. The traffic of 890 cars and 37 heavy vehicles predetermined the NLL excess of 10dBA in the 1st measurement location.

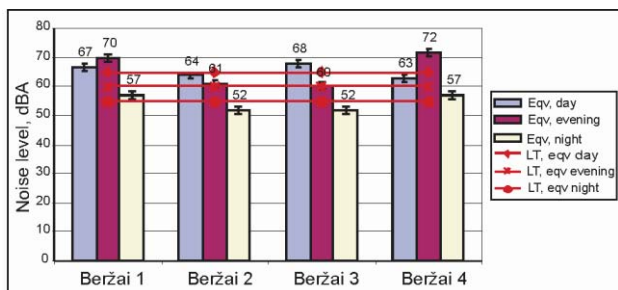


Fig. 4. Dynamics of equivalent noise levels in Beržai street within twenty four hours

In Beržai street (Fig. 4), at night the NLL was higher by 2 dBA in the 1st and 4th measurement locations. These measurement locations were passed by the maximum of 433 cars and 14 heavy vehicles at the time of taking measurements.

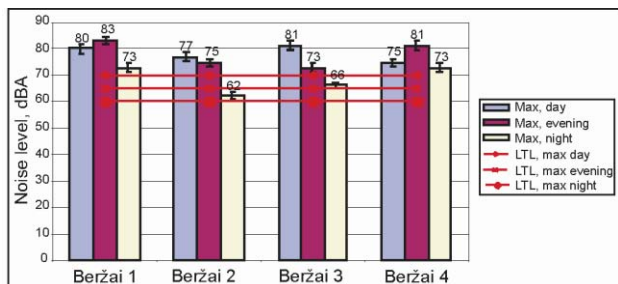


Fig. 5. Dynamics of maximum noise levels in Beržai street within twenty four hours

In Beržai street (Fig. 5), in the daytime the maximum NLL was exceeded by up to 11 dBA, in the evening the maximum NLL was exceeded by up to 18 dBA, and at night the maximum NLL was exceeded by up to 13 dBA.

In Ramygalą street (Fig. 6), the 3rd and 4th measurement locations are in a one-way traffic section with slower and less intense traffic and the NLL was not exceeded in these measurement locations. The first 2 measurement locations are distinguished by heavier traffic with 1 060 and 993 cars, and 102 and 111 heavy vehicles having passed them, where the NLL was exceeded by 6 dBA and 8 dBA, respectively.

In the evening, Ramygalą street had the traffic of 1 058 cars and 87 heavy vehicles in the 1st and 1 168 cars and 92 heavy vehicles in the 2nd measurement locations; the NLL in the 1st measurement location was exceeded by 12 dBA, and in the 2nd measurement location – by 14 dBA, while a high excess of the NLL was predetermined by a high traffic intensity.

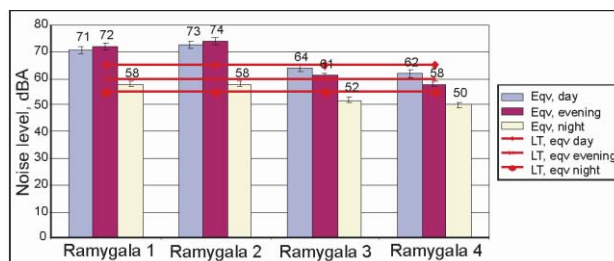


Fig. 6. Dynamics of equivalent noise levels in Ramygalą street within twenty four hours

At night the NLL was exceeded by 3dBA only in the 1st and 2nd measurement locations, which was predetermined by the traffic of 234 and 239 cars, and 46 and 45 heavy vehicles, respectively; whereas in the 3rd and 4th measurement locations the NLL was not exceeded.

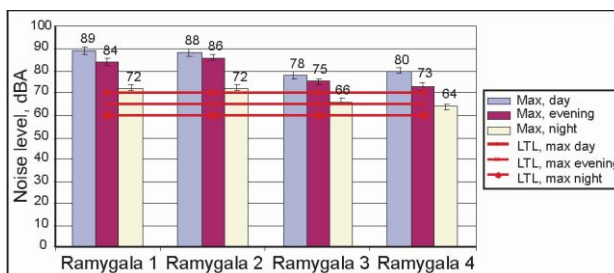


Fig. 7. Dynamics of maximum noise levels in Ramygalą street within twenty four hours

In Ramygalą street (Fig. 7), in the daytime the maximum NLL was exceeded by 8 to 29 dBA, in the evening the maximum NLL was exceeded by 8 to 21 dBA, and at night the maximum NLL was exceeded by 4 dBA to 12 dBA.

In Tilvytis street (Fig. 8), the traffic flow is nearly the same in the daytime and in the evening, and the noise level recorded there in the daytime and in the evening differed only by 2 dBA. At night the NLL was exceeded by a maximum of 3 dBA in the 1st measurement location.

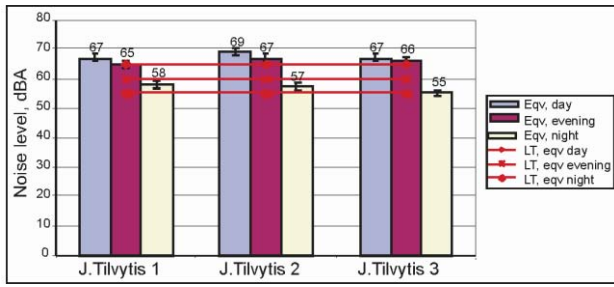


Fig. 8. Dynamics of equivalent noise levels in J. Tilvytis street within twenty four hours

During the daytime measurements the 1st measurement location was passed by the biggest number of vehicles – 693 cars and 42 heavy vehicles, whereas during evening measurements it was passed by 462 cars and 25 heavy vehicles. During night measurements 81 cars and 11 heavy vehicles passed the 1st measurement location.

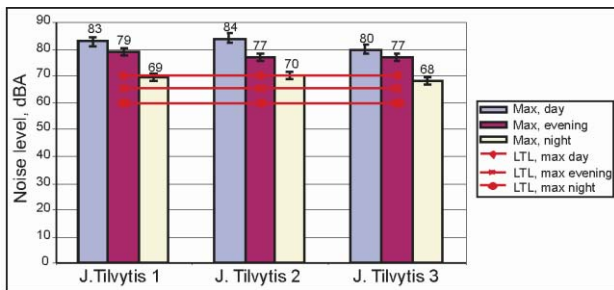


Fig. 9. Dynamics of maximum noise levels in J. Tilvytis street within twenty four hours

In Tilvytis street (Fig. 9), in the daytime the maximum NLL was exceeded by 13 dB(A), in the evening the maximum NLL was exceeded by up to 14 dB(A) and at night by 10 dB(A).

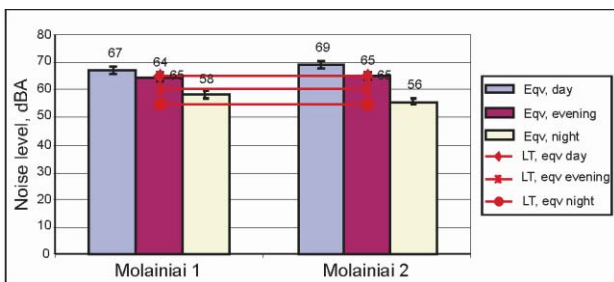


Fig. 10. Dynamics of equivalent noise levels in Molainiai street within twenty four hours

A four-lane Molainiai street (Fig. 10) stretches over a dwelling-house district and is not distinguished by a heavy traffic.

In the daytime the NLL was exceeded by 2 dB(A) in the 1st and by 4 dB(A) in the 2nd measurement locations. Such a noise level was predetermined by the traffic of 734 cars and 5 heavy vehicles in the 1st and 680 cars and 4 heavy vehicles in the 2nd measurement locations.

In the evening the NLL was exceeded by 4 dB(A) in the 1st and by 5 dB(A) in the 2nd measurement locations. The maximum NLL excess in both measurement locations was the result of the traffic of 625 and 619 cars and 3 and 4

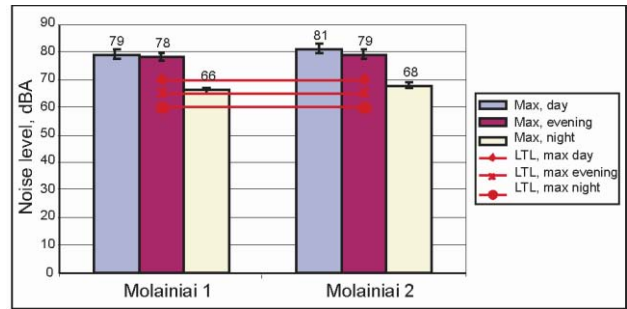


Fig. 11. Dynamics of maximum noise levels in Molainiai street within twenty four hours

heavy vehicles. Since the street stretches over a residential district, both the traffic flows and the noise generated by them are similar in the daytime and in the evening.

In Molainiai street (Fig. 11), in the daytime the maximum NLL was exceeded by 9 to 11 dB(A), in the evening – by 13 to 14 dB(A), and at night – by 6 dB(A) to 8 dB(A).

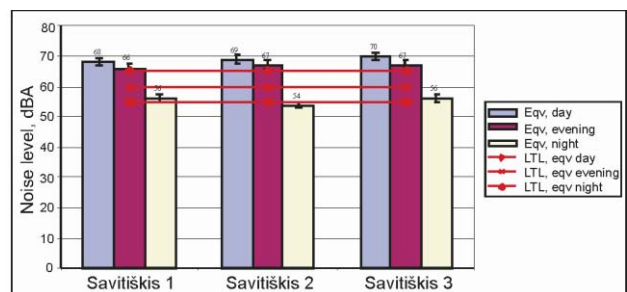


Fig. 12. Dynamics of equivalent noise levels in Savitiškis street within twenty four hours

Savitiškis street (Fig. 12) consists of two lanes separated by a grass-plot. Heavy traffic is not typical of this street. The traffic of 630 cars and 140 heavy vehicles in the 1st measurement location during daytime measurements predetermined the excess of the NLL by 3 dB(A); the traffic of 660 cars and 129 heavy vehicles resulted in the NLL excess of 4 dB(A) in the 2nd measurement location. The highest excess of the NLL, 5 dB(A), was recorded in the 3rd measurement location which was passed by 716 cars and 132 heavy vehicles. The level of noise in this street was increasing in proportion to increasing traffic.

In the evening the equivalent NLL was exceeded by 6 dB(A) in the 1st measurement location where the noise level was predetermined by the traffic of 516 cars and 123 heavy vehicles. In the 2nd and 3rd measurement locations the NLL was exceeded by 7 dB(A) due to the traffic of 547 and 532 cars, and 119 and 125 heavy vehicles, respectively.

At night the equivalent NLL was exceeded by 1 dB(A) only in the 1st and 3rd measurement locations where the noise level was predetermined by 384 and 422 cars, and 6 and 4 heavy vehicles, respectively.

In Savitiškis street (Fig. 13), in the daytime the maximum NLL was exceeded by 12 to 14 dB(A), in the evening the maximum NLL was exceeded by 12 to 14 dB(A), and at night the maximum NLL was exceeded by 5 dB(A) to 10 dB(A).

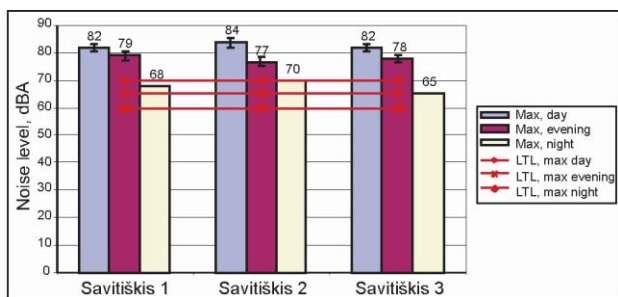


Fig. 13. Dynamics of maximum noise levels in Savitiškis street within twenty four hours

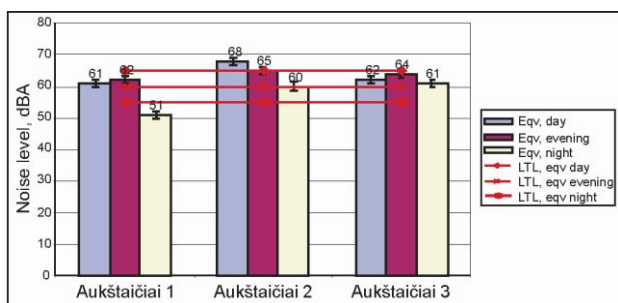


Fig. 14. Dynamics of equivalent noise levels in Aukštaičiai street within twenty four hours

A two-lane Aukštaičiai street (Fig. 14) stretches over a district of multi-apartment dwelling houses. Cars run along the street at a speed of around 50 km/h. The street is distinguished by a low traffic. In the daytime the equivalent NLL was exceeded by 3 dBA only in the 2nd measurement location due to 390 cars and 27 heavy vehicles having passed it; the 2nd and 3rd measurement locations were passed by 293 and 339 cars, and 34 and 51 heavy vehicles and the NLL was not exceeded there.

In the evening the noise level in the 1st and 3rd measurement locations was higher than in the daytime, and in the 2nd measurement location, which was passed by 363 cars and 33 heavy vehicles, the NLL was exceeded by 5 dBA, and in the 3rd, which was passed by 380 cars and 18 heavy vehicles, an excess of 4 dBA was recorded.

At night the equivalent NLL was exceeded by 5 dBA in the 2nd measurement location and by 6 dBA in the 3rd measurement location. The noise level was predetermined by the traffic of 305 and 346 cars, and 22 and 20 heavy vehicles.

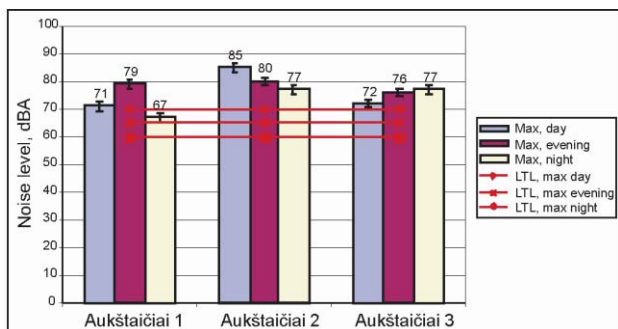


Fig. 15. Dynamics of maximum noise levels in Aukštaičiai street within twenty four hours

In Aukštaičiai street (Fig. 15) in the daytime and in the evening the maximum NLL was exceeded by 15 dBA, at night the maximum NLL was exceeded by 7 to 17 dBA.

In Projektuotojai street, in the daytime the equivalent NLL was not exceeded; the daytime noise level was predetermined by the traffic of 414 to 432 cars, and 20 to 31 heavy vehicles.

In the evening the equivalent NLL was exceeded by 5 dBA in the 1st measurement location due to the traffic of 441 cars and 25 heavy vehicles. In the 3rd measurement location the NLL was exceeded by 4 dBA due to the traffic of 427 cars and 16 heavy vehicles.

At night, in the 2nd measurement location the equivalent NLL was exceeded by 4 dBA due to the traffic of 340 cars and 9 heavy vehicles. The equivalent NLL was exceeded by 5 dBA in the 1st and 3rd measurement locations where the noise level was predetermined by the traffic of 393 and 375 cars, and 13 and 15 heavy vehicles.

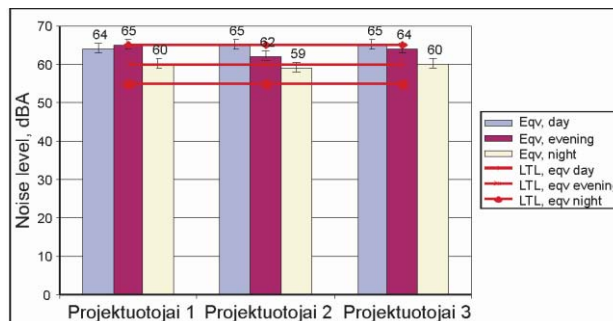


Fig. 16. Dynamics of equivalent noise levels in Projektuotojai street within twenty four hours

In Projektuotojai street (Fig. 16), in the daytime and in the evening the intensity of traffic is similar, the recorded noise level in the daytime reached 64–65 dBA not exceeding the equivalent NLL, and such a noise level in the daytime was predetermined by the traffic of 414 and 432 cars, and 20 to 31 heavy vehicles.

In the evening the noise level was nearly the same as in the daytime but upon the NLL decrease by 5 dBA the NLL in the 1st measurement location was exceeded by 5 dBA, which was predetermined by the traffic of 441 cars and 25 heavy vehicles. In the 3rd measurement location the NLL was exceeded by 4 dBA due to the traffic of 427 cars and 16 heavy vehicles.

At night, the equivalent NLL was exceeded by 4 dBA in the 2nd measurement location due to the traffic of 340 cars and 9 heavy vehicles, the equivalent NLL in the 1st and 3rd measurement locations was exceeded by 5 dBA due to the traffic of 393 and 375 cars, and 13 and 15 heavy vehicles.

In Projektuotojai street (Fig. 17), in the daytime the maximum NLL was exceeded by 6 to 10 dBA, in the evening the maximum NLL was exceeded by 14 to 16 dBA, and at night the maximum NLL was exceeded by 12 dBA to 17 dBA.

In Parkas street (Fig. 18), traffic is not heavy and the noise level is not high.

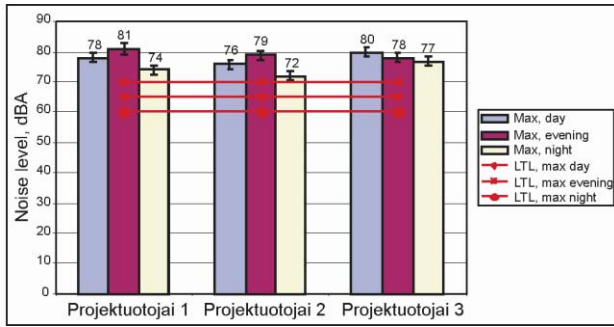


Fig. 17. Dynamics of maximum noise levels in Projektuotojai street within twenty four hours

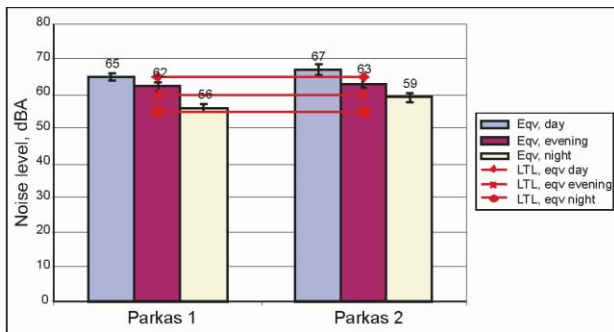


Fig. 18. Dynamics of equivalent noise levels in Parkas street within twenty four hours

In the daytime the equivalent NLL was exceeded by 2 dBA in the 2nd measurement location and in the evening the NLL was exceeded in both measurement locations.

In the evening the equivalent NLL was exceeded by 2 dBA in the 1st measurement location where the noise level was determined by the traffic of 405 cars and 14 heavy vehicles, and by 3 dBA in the 2nd measurement location due to the traffic of 311 cars and 15 heavy vehicles.

In the evening the equivalent NLL was exceeded by 1 dBA in the 1st measurement location where the noise level was determined by the traffic of 294 cars and 11 heavy vehicles, and by 4 dBA in the 2nd measurement location due to the traffic of 352 cars and 7 heavy vehicles. A higher noise level in the 2nd measurement location was determined by a higher speed of cars.

In Parkas street (Fig. 19), in the daytime the maximum NLL was exceeded by 7 to 11 dBA, in the evening

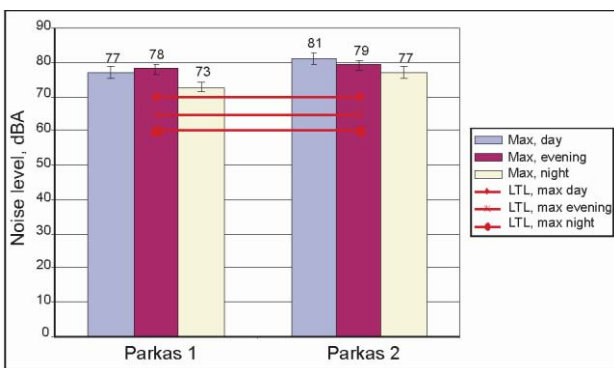


Fig. 19. Dynamics of maximum noise levels in Parkas street within twenty four hours

the maximum was exceeded by 13 to 14 dBA, and at night the maximum NLL was exceeded by 13 dBA to 17 dBA.

Biliūnas street (Fig. 20) differs from the other town streets by its four lanes separated by a grass-plot. Cars run along this street at a speed of 60 km/h. Three measurement locations were selected in this street. The recorded difference in noise levels in all the measurement locations during different time periods of the day was similar showing a mere difference of 1 dBA. In the daytime the equivalent NLL was exceeded by 1 to 2 dBA. The noise level was determined by the traffic of cars from 797 to 841 cars and that of heavy vehicles – from 76 to 88 heavy vehicles during the period of measurement.

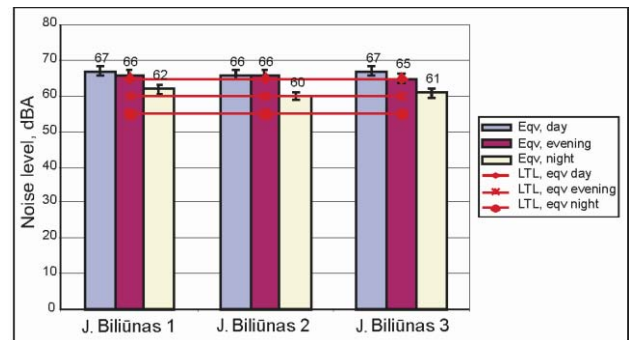


Fig. 20. Dynamics of equivalent noise levels in J. Biliūnas street within twenty four hours

In the evening the equivalent NLL was exceeded by 5 to 6 dBA, and the noise level in the daytime, like in the evening, was predetermined by a heavy traffic of cars and heavy vehicles. The traffic of cars was from 717 to 804, and that of heavy vehicles – from 79 to 92.

At night the NLL was exceeded by 5 to 7 dBA. The traffic of cars changed from 631 to 698 and that of heavy vehicles – from 52 to 71.

In the evening and in the daytime the traffic of cars and the noise level generated by them nearly did not change.

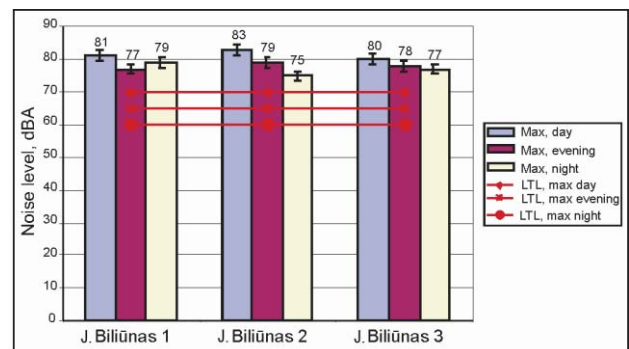


Fig. 21. Dynamics of maximum noise levels in J. Biliūnas street within twenty four hours

In Biliūnas street (Fig. 21), in the daytime the maximum NLL was exceeded by 10 to 13 dBA, in the evening the maximum NLL was exceeded by 12 to 14 dBA, and at night the maximum NLL was exceeded by 15 dBA to 19 dBA.

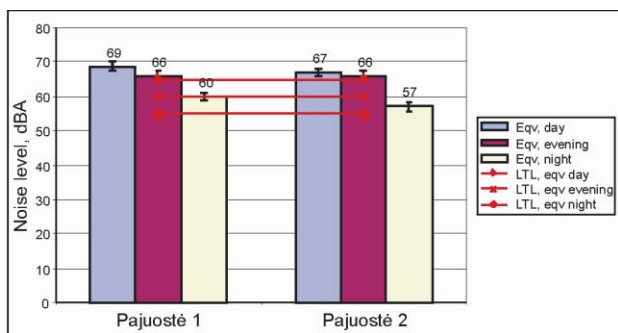


Fig. 22. Dynamics of equivalent noise levels in Pajuostė street within twenty four hours

In Pajuostė street (Fig. 22), in the daytime the equivalent NLL was higher by 4 dBA in the 1st and 2nd measurement locations. A higher noise level was predetermined by the traffic of 360 cars and 44 heavy vehicles, whereas the noise level in the 2nd location was predetermined by the traffic of 308 cars and 40 heavy vehicles.

The excess of the NLL by 6 dBA in both measurement locations in the evening was predetermined by the traffic of 288 and 273 cars, and 35 and 41 heavy vehicles. At night the NLL was exceeded by 5 and 2 dBA. A higher excess of the NLL was recorded in the 1st measurement location which was predetermined by the traffic of 257 cars and 23 heavy vehicles. The noise level in the 2nd measurement location was predetermined by the traffic of 261 cars and 19 heavy vehicles.

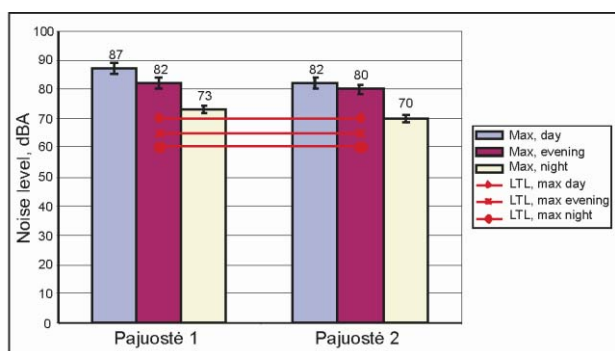


Fig. 23. Dynamics of maximum noise levels in Pajuostė street within twenty four hours

In Pajuostė street (Fig. 23), in the daytime the maximum NLL was exceeded by 12 to 17 dBA, in the evening the maximum NLL was exceeded by 15 to 17 dBA, and at night the maximum NLL was exceeded by 10 dBA to 13 dBA.

Staniūnai street (Fig. 24) is a four-lane street stretching over district of dwelling-houses.

The equivalent NLL was not exceeded in the daytime in Staniūnai street.

The excess of the NLL by 2 dBA in the evening in both measurement places was predetermined by the traffic of 233 and 231 cars, and 3 heavy vehicles.

At night the NLL was exceeded by 3 dBA in the 1st and by 1 dBA in the 2nd measurement locations. A higher excess of the NLL was recorded in the 1st measurement location which was predetermined by the traffic of

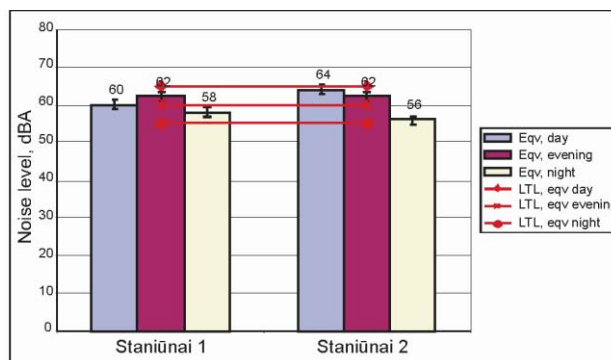


Fig. 24. Dynamics of equivalent noise levels in Staniūnai street within twenty four hours

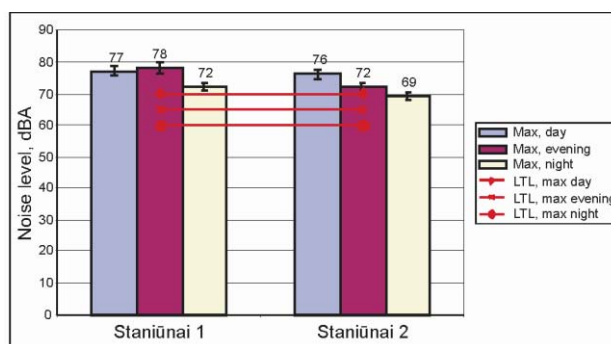


Fig. 25. Dynamics of maximum noise levels in Staniūnai street within twenty four hours

157 cars and 1 heavy vehicle. The noise level in the 2nd measurement location was predetermined by the traffic of 114 cars.

In Staniūnai street (Fig. 25), in the daytime the maximum NLL was exceeded by 6 to 7 dBA, in the evening the maximum NLL was exceeded by 7 to 13 dBA, and at night the maximum NLL was exceeded by 9 dBA to 12 dBA.

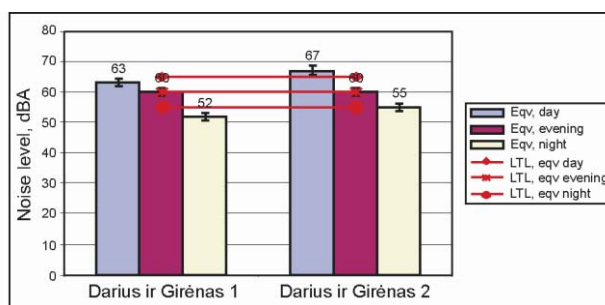


Fig. 26. Dynamics of equivalent noise levels in Darius and Girėnas street within twenty four hours

In Darius ir Girėnas street (Fig. 26), in the daytime the equivalent NLL was exceeded by 2 dBA only in the 2nd measurement location, which was predetermined by the traffic of 492 cars and 31 heavy vehicles.

The noise level in the evening was predetermined by the traffic of 224 and 230 cars, and 19 and 25 heavy vehicles, but the NLL was not exceeded.

At night the equivalent NLL was not exceeded.

In Darius ir Girėnas street (Fig. 27), in the daytime the maximum NLL was exceeded by 4 to 11 dBA, in the evening the maximum NLL was exceeded by 8 to 12 dBA, and

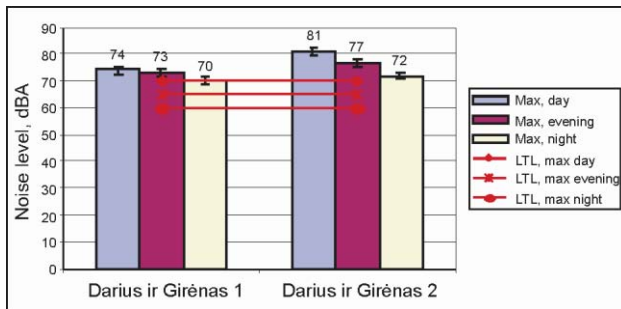


Fig. 27. Dynamics of maximum noise levels in Darius ir Girėnas street within twenty four hours

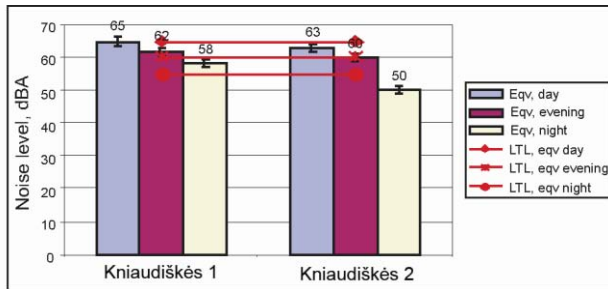


Fig. 28. Dynamics of equivalent noise levels in Kniaudiškės street within twenty four hours

at night the maximum NLL was exceeded by 10 dBA to 12 dBA.

In Kniaudiškės street (Fig. 28), in the daytime the equivalent NLL was not exceeded, and the noise level of the daytime was predetermined by the traffic of 342 and 300 cars, and 14 and 16 heavy vehicles.

In the evening the equivalent NLL was exceeded by 2 dBA only in the 1st measurement location where the noise level was predetermined by the traffic of 286 cars and 12 heavy vehicles.

At night, like in the evening, the equivalent NLL was exceeded by 3 dBA only in the 1st measurement location where the noise level was predetermined by the traffic of 251 cars and 5 heavy vehicles.

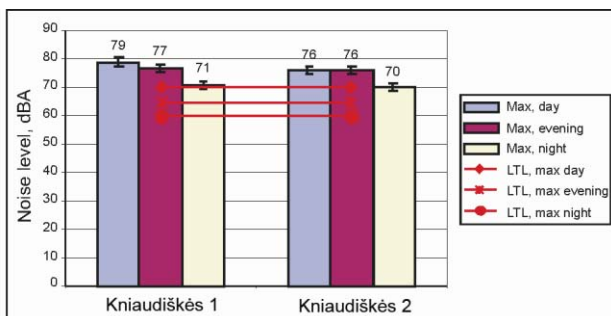


Fig. 29. Dynamics of maximum noise levels in Kniaudiškės street within twenty four hours

In Kniaudiškės street (Fig. 29) in the daytime the maximum NLL was exceeded by up to 9 dBA, in the evening the maximum NLL was higher by up to 12 dBA, and at night the maximum NLL was exceeded by up to 11 dBA.

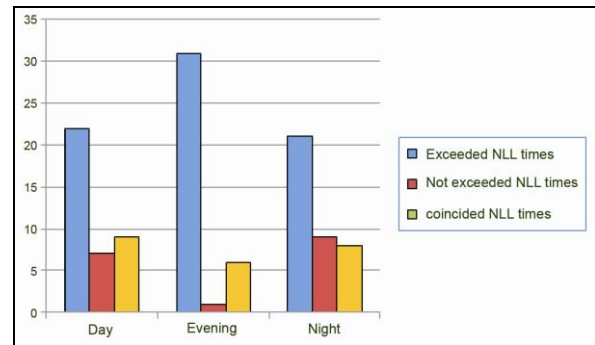


Fig. 30. The number of instances when the NLL was exceeded, non-exceeded and satisfied during all noise measurements in the daytime, in the evening and at night

Generalization of the measurement results is presented in Fig. 30. Measurements were taken in 38 measurement locations. In the daytime the equivalent NLL was exceeded in 22 instances, at night the NLL was exceeded in 21 instance, whereas the NLL was exceeded most often, in 31 out of 38 instances, in the evening. The noise level often is the same in the daytime and in the evening.

The noise level did not exceed the NLL 7 times in the daytime, 9 times at night and only 1 time in the evening.

The equivalent noise level recorded in the daytime in 9 instances satisfied the NLL, the noise level in the evening in 6 instances satisfied the NLL and that at night – only in 1 instance.

4. Conclusions

1. The measurement of dynamics of the noise level in the daytime, in the evening and at night in the southern part of Panevėžys shows that the recorded excess of the noise level limit (NLL) accounted for 65% in the daytime, 88% in the evening and 71% at night of the total measurements.

2. The highest NLL excess was recorded in streets with heavier traffic of cars and heavy vehicles.

3. The maximum noise level in the daytime normally reached 80–85 dBA exceeding the NLL by 10–15 dBA; the maximum noise level recorded in the evening reached 75–79 dBA exceeding the NLL by 10–14 dB, and at night the maximum noise level in the majority of measurement locations reached 77 dBA exceeding the NLL by up to 17 dBA.

4. In the southern part of Panevėžys the highest excess of the equivalent NLL in the daytime was recorded in Velžis and Ramygala streets where the NLL was exceeded by up to 8 dBA, in the evening the highest excess of the NLL was recorded in Velžis and Ramygala streets where the NLL was higher by up to 14 dBA, and the highest excess of the NLL at night was recorded in Ramygala and Pajuostė streets where the NLL was exceeded by up to 5 dBA.

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TRIUKŠMO LYGIO PIETINĖJE PANEVĖŽIO DALYJE TYRIMAI IR VERTINIMAS

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Santrauka

Triukšmas – ne tik Lietuvoje, bet ir visame pasaulyje aktuali problema. Automobilių srautams vis labiau didėjant, didėja ir jų keliamas triukšmas, ypač triukšmingi yra sunkvežimiai ir motociklai. Triukšmo tyrimai atlikti Panevėžio pietinėje dalyje prie pagrindinių gatvių. Matavimai vyko skirtingu paros laiku: dieną 6–18 val., vakare 18–22 val. ir naktį 22–6 val. andomis. Šioje miesto dalyje pagrindinė triukšmo priežastis – automobiliai. Triukšmo lygis, išmatuotas vietose, kuriose dažniausiai viršijamas, lyginamas su leidžiamosiomis normomis. Atlikta triukšmo lygių ir transporto srautų analizė. Iš duomenų matyti, kad leidžiamasis triukšmo lygis dieną viršytas 65 %, vakare 88 %, o naktį – 71 % atliktų matavimų. Ekvivalentinis triukšmo lygis viršytas iki 14 dBA, o maksimalusis leidžiamasis – iki 17 dB. Labiausiai triukšmo lygis viršijamas prie gatvių, kuriose pravažiuoja daugiausia automobilių.

Reikšminiai žodžiai: transporto triukšmas, triukšmas gyvenamojoje aplinkoje, leidžiamasis triukšmo lygis.

ИССЛЕДОВАНИЕ И ОЦЕНКА УРОВНЯ ШУМА В ЮЖНОЙ ЧАСТИ ГОРОДА ПАНЕВЕЖИСА

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Резюме

Шум является актуальной проблемой не только в Литве, но и во всем мире. С увеличением автомобильных потоков неизбежно увеличивается и вызываемый ими (особенно грузовиками и мотоциклами) шум. Исследования шума проводились в южной части города Паневежиса, вблизи основных улиц в разное время суток: днем с 6 до 18 часов, вечером с 18 до 22 часов и ночью с 22 до 6 часов утра. В этой части города основным источником шума являются автомобили. Измеренные уровни шума были сравнены с допустимыми уровнями для мест, в которых он чаще всего превышен. Произведен анализ уровней шума и транспортных потоков. Из данных измерений видно, что допустимый уровень шума в дневное время был превышен в 65%, вечером – в 88%, а ночью – в 71% проведенных измерений. Эквивалентный уровень шума превышен до 14 дБа, а максимально допустимый – до 17 дБа. Уровни шума особенно увеличены вблизи улиц, по которым проезжает больше всего автомобилей.

Ключевые слова: транспортный шум, шум в жилой среде, допустимый уровень шума.

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