



SUMMARY OF NOISE LEVEL MEASUREMENTS IN 2017 AND 2018 AT ZAGREB INTERNATIONAL AIRPORT

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1. GENERAL

Zagreb Airport International has implemented a system of noise monitoring in order to measure noise to gain insight into the level of the noise and to determine the area of influence on the population that lives near the airport.

Within the national framework, the Republic of Croatia has regulated aircraft noise by way of an Act restricting the obligation of noise monitoring to airport operators (Air Traffic Act, Official Gazette, No. 69/09, 84/11, 127/2013, 054/2013). It has set forth:

- (Article 122) Air navigation service provider, aircraft pilots, aircraft operators and aerodrome operators are obliged to take measures of aircraft noise protection, in accordance with the regulation adopted pursuant to this Act or EU regulations;
- (Article 123) The aircraft noise and the exhaust gases that aircraft produce during takeoffs and landings must be below the prescribed maximum levels of noise and exhaust emissions established by the regulation adopted pursuant to this Act or EU regulations. Aircraft noise which an aircraft makes during taking off and landing must be below the prescribed maximum levels of noise defined by EU regulation. Aircraft categories allowed to land at Croatian airports have been established under the Ordinance on Rules of the Air (OG 75/06) and have to have appropriate noise certificates for all civil jet aircraft operating within the Croatian airspace. Civil jets referred to in Chapter 2 Annex 16 of the ICAO can operate at Croatian airports only if they meet noise requirements. Aircraft pilots are also obliged to adhere to the procedures stipulated by the Ordinance regarding noise reduction when taking off or landing;
- (Article 124) An airport Operator operating an airport on which traffic of military jet airplanes and/or scheduled air services are carried, with more than 50 000 operations during the preceding year, is obliged to ensure constant measuring of noise on the aerodrome and its surroundings. The results of noise measuring shall be used to produce noise maps and action plans in the part relating to air traffic. Terms and methods of noise measuring shall be determined by regulations adopted pursuant to this Act or EU regulations;
- (Article 125) On the basis of results of noise measuring from Article 124, the airport operator has the obligation to establish aircraft noise protection areas in which noise level equivalent exceeds 67 dB (A), i.e. 75 dB (A).

Indeed, as stated by the Ministry of Health in its letter dated 7th January 2013 to the Ministry of Maritime Affairs, Transport and Infrastructure, "Regarding the implementations of measures of protection from air traffic noise, the regulations of the Air Traffic act (Official Gazette, No. 69/09, 84/11, 54/13, 127/13, 92/14) are applied as a special regulation in relation to the valid Noise Protection Act (Official Gazette, No. 30/09, 55/13, 153/13). The Ministry of Maritime Affairs, Transport and Infrastructure confirms in its letter to ZAL (Republic of Croatia - Ministry of Maritime Affairs, 1st February, 2013) that "with regard to noise generated by airport operations, only the Croatian Air Traffic Act (Lex Specialis) is applicable to Croatian Airports".

On the basis of Article 149 of the Air Traffic Act (Official Gazette, No. 69/09, 84/11, 54/13, 127/13, 92/14), the Minister of Maritime Affairs, Transport and Infrastructure brought Regulations on the establishment of rules and procedures regarding the introduction of operating restrictions for aircraft noise at airports in the territory of Croatia.

Main objectives of Rulebook on the establishment of rules and procedures regarding implementation of operating restrictions for aircraft noise at the airports in the territory of the Republic of Croatia (Official Gazette, No.39/13) are:

- a. prescribing rules to facilitate the introduction of operating restrictions in a uniform way at the airports on Croatian territory in order to limit or reduce the number of people that significantly affected the harmful effects of aircraft noise,
- b. defining the legal framework aimed at the protection of equal position of all market participants,
- c. promote the development of the capacity of airports in harmony with the environment,
- d. facilitate the achievement of specific targets of reduction of aircraft noise in a way adjusted to each individual airport,
- e. continuous improvement of available measures to reduce aircraft noise at airports in order to achieve the best performance with the lowest cost.

Although Zagreb International airport has less than 50 000 movements during the preceding year, Zagreb implemented a noise monitoring system on totally voluntary basis. Indeed, Zagreb International airport is aware that its commitment toward surround communities is the warranty of its future sustainable development as most solutions should be delivered locally.

During the closing process leading to the take-over of Zagreb Airport by MZLZ, the concessionaire established an Environmental Impact Analysis. Its conclusion was that with absolute certitude, the noise levels at Zagreb airport did not exceed for $L_{\text{Days, Night}}$ the 75 dB(A) thresholds and for L_{Night} the 67 dB(A) threshold set by regulation.

The purpose of this report is to define whether Zagreb Airport was under those thresholds in 2017 and remained under those thresholds in 2018. As the noise levels reported are presented in $L_{\text{Day, Evening, Night}}$ Zagreb International Airport took the decision to compare its results with the lowest threshold.

Results and associated conclusion are gathered below.

2. NOISE MONITORING TERMINAL – FACILITY MAP

The system of permanent noise monitoring which was introduced in Zagreb international Airport consists of four fixed and one portable measuring device.

The positions of the fixed noise measuring device in Zagreb International Airport (NMT - Noise Monitoring Terminal):

- NMT 1 measures noise near Threshold 05
- NMT 2 measures noise near Threshold 23
- NMT 3 measures noise in the village of Obrezina
- NMT 4 measures noise in the village of Donja Lomnica



Two fixed measuring devices are close to the edges of runway 05 and 23. Distance of station NMT 1 from edge of runway 05 about 306 meters, distance of station NMT 2 from edge of runway 23 about 307 meters. The third and fourth station are fixed devices set at settlement Obrezina and Donja Lomnica. The portable device has its own power supply, which can be transferred to any location around the airport.

2.1 Results of measuring noise levels for the year 2017.

LOCATION NEAR THRESHOLD 05 – Noise Monitoring Terminal 1 (NMT 1)

Measured noise levels near location of Threshold 05 where NMT 1 is located vary from 65,0 dB up to 68,6 dB.

LOCATION NEAR THRESHOLD 23 – Noise Monitoring Terminal 2 (NMT 2)

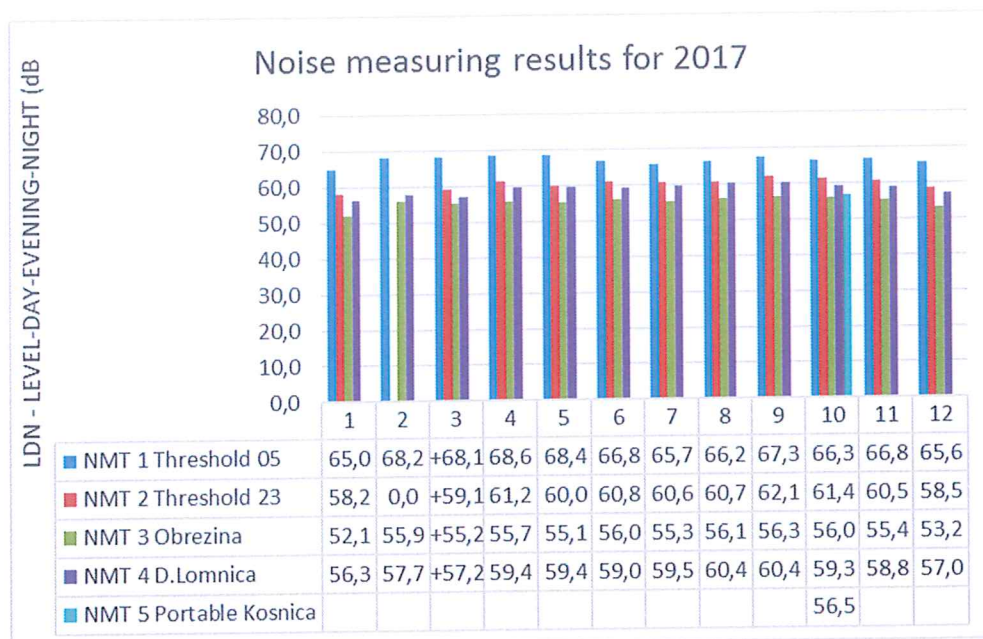
At the location near Threshold 23 noise levels were below 65 dB.

LOCATION IN THE VILLAGE OF OBREZINA – Noise Terminal Monitoring 3 (NMT 3)

At the location in the village of Obrezina noise levels were below 65 dB.

LOCATION IN THE VILLAGE DONJA LOMNICA – Noise Terminal Monitoring 4 (NMT 4)

At location of the village Donja Lomnica noise levels were below 65 dB.



2.2 Results of measuring noise levels for the year 2018.

LOCATION NEAR THRESHOLD 05 – Noise Monitoring Terminal 1 (NMT 1)

Measured noise levels near location of Threshold 05 where NMT 1 is located vary from 65,2 dB up to 69,2 dB.

LOCATION NEAR THRESHOLD 23 – Noise Monitoring Terminal 2 (NMT 2)

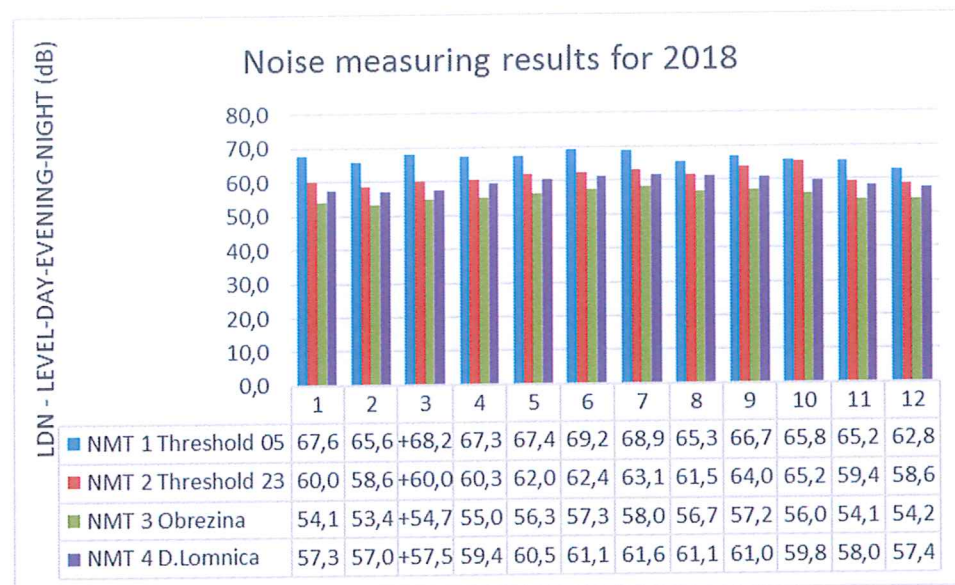
Measured noise levels near location of Threshold 23 where NMT 2 is located vary from 58,6 dB up to 65,2 dB.

LOCATION IN THE VILLAGE OF OBREZINA – Noise Terminal Monitoring 3 (NMT 3)

At the location in the village of Obrezina noise levels were below 65 dB.

LOCATION IN THE VILLAGE DONJA LOMNICA – Noise Terminal Monitoring 4 (NMT 4)

At location of the village Donja Lomnica noise levels were below 65 dB.



2.3 Comparison of year 2018 noise level data with the year 2017 noise level data

Observation period for noise levels data comparison is 2017 and 2018. The results are shown below:

LOCATION NEAR THRESHOLD 05 – Noise Monitoring Terminal 1 (NMT 1)

The highest increase in noise levels was recorded in Jul 2018 by 3,2%.

The highest decrease in noise levels was recorded during February 2018 by 2,6%.

LOCATION NEAR THRESHOLD 23 – Noise Monitoring Terminal 2 (NMT 2)

The highest increase in noise levels was recorded in October 2018 by 3,9%.

The highest decrease in noise levels was recorded during February and November 2018 by 1,1%.

LOCATION IN THE VILLAGE OF OBREZINA – Noise Terminal Monitoring 3 (NMT 3)

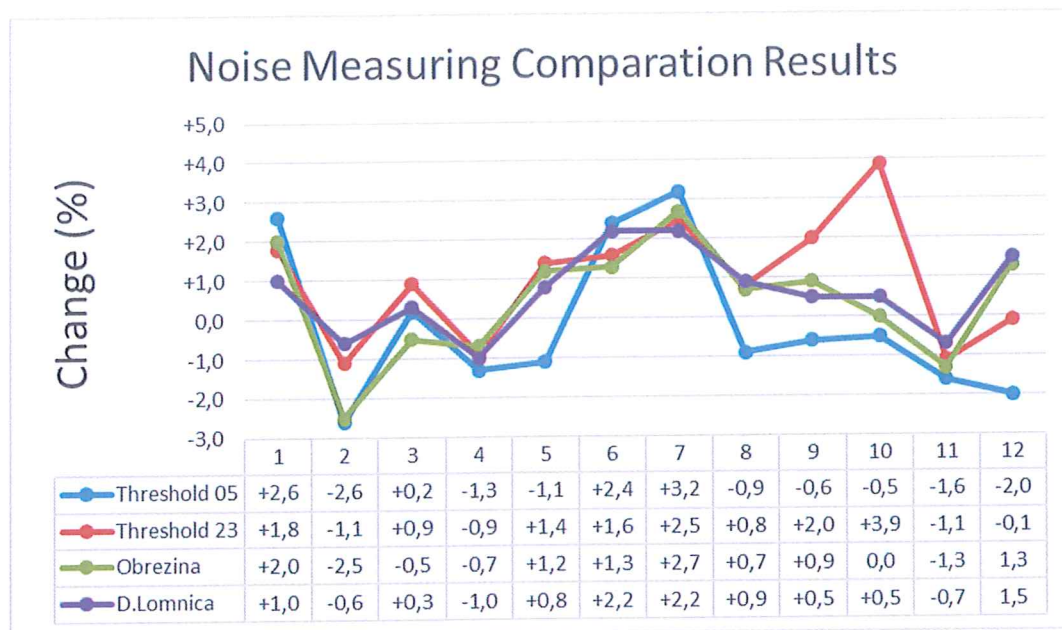
The highest increase in noise levels was recorded in July 2018 by 2,7%.

The highest decrease in noise levels was recorded during February 2018 by 2,5%.

LOCATION IN THE VILLAGE DONJA LOMNICA – Noise Terminal Monitoring 4 (NMT 4)

The highest increase in noise levels was recorded in June and July 2018 by 2,2%.

The highest decrease in noise levels was recorded during April 2018 by 1,0%.



In addition, further research into the noise level increase demonstrated that the noise increase was a direct result of the military aircraft operations. Indeed the current Noise Monitoring Terminals (NMTs) record noise levels produced by the military aircraft and such measured values are included with the total measured results. However Zagreb Airport has no impact on military aircraft neither operations.