

NOISE REDUCTION ACTION PLAN 2019



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ZAGREB INTERNATIONAL AIRPORT

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PURPOSE OF DOCUMENT ♦ To manage and where possible reduce impact of noise from aircraft at Zagreb International Airport establish a concept for assessing and controlling environmental noise.

SCOPE OF APPLICATION ♦ Zagreb International Airport.

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1. Preamble

Zagreb International Airport is a medium international airport located around 19 kilometers South-East from the center of Zagreb. MZLZ represents a rare example for Europe, in which the airport of the capital city is also an air force base and where one runway is used both for civil and military purposes. About 25% of the population of Croatia lives in Zagreb. In addition to being a vital component of Croatia's transport infrastructure, MZLZ is one of the busiest in Southeast Europe, handling 3.336.310 passengers and 43.688 aircraft movements in 2018.

During the closing process of the Concession Project of Zagreb Airport several environmental studies have been carried out (1) to guaranty the environmental status of the site; (2) to define the environmental action plan to be implemented by MZLZ; and (3) to confirm the legal compliance of the current operations at the airport. As a result of these studies, IFC requested from MZLZ the implementation under a very strict timeframe of a specific environmental action plan (Environmental and Social Action Plan - ESAP). Amongst the 6 actions listed in this document, one refers to noise reduction.

Indeed, airports have a range of impacts relating to social, economic and environmental areas, both positive and negative. They act as important economic generators, providing jobs, encouraging inward investment and boosting tourism. Unfortunately, there are some negative impacts for those that live and work around airports. One of the major impacts is noise and this remains a significant issue for people living or working close to airports or under flight paths. Thus, MZLZ intention is to have a very real long term and continuous commitment to, where possible, reducing this noise within its sustainability agenda.

As such MZLZ is acutely aware of its responsibilities to the local population as both a major employer and a concerned neighbor. Thus, MZLZ takes its responsibilities very seriously regarding the impact our business may have on some members of the local community and this Noise Action Plan is one of many ways its endeavors to satisfy its environmental obligations.

This action plan is designed to demonstrate how MZLZ is dedicated to take note of the concerns and suggestions from local stakeholders and, where possible, implement changes to its daily operation to ensure a management of noise issues to control and minimize the adverse effects our operations have on the local community.

This Noise Reduction Action Plan is a living document and, as such, is under constant review. It is based on the strong environmental commitment and the wide environmental knowledge of MZLZ's major shareholders. It shall be reviewed in due time and improved so as to ensure its continuous effectiveness. MZLZ will conduct an active engagement with its neighbors, where possible, to reduce the noise intrusion to as many people as possible whilst still complying with national and international regulatory constraints.

The major goal of this plan is to address all the concerns of our neighbors; and to provide a robust method of finding amicable and safe solution to major noise issues. These will include not only aircraft movements but engine testing, aircraft turnarounds, aircraft taxiing, aircraft holding, noise reporting and monitoring and improvement of information to neighbors. Where possible, MZLZ will reduce noise associated with the airport through achievable and realistic targets.

2. Glossary

dB(A)	A measure of sound pressure level („A“weighted) in decibels.
$L_{Aeq,T}$	The A-weighted equivalent continuous sound pressure level which is a notional continuous level that, at a given position and over the define time period, T, contains the same sound energy as the actual fluctuating sound that occurred at the given position over the same time period, T.
L_{day}	The L_{Aeq} over the period 0700 - 1900, local time (for strategic noise mapping this is an annual average).
$L_{evening}$	The L_{Aeq} over the period 1900 – 2300, local time (for strategic noise mapping this is an annual average).
L_{night}	The L_{Aeq} over the period 2300 - 0700, local time (for strategic noise mapping this is an annual average).
L_{DEN}	The L_{Aeq} over the period 0000 - 2400, but with the evening values (1900 - 2300) weighted by the addition of 5 dB(A) and the night value (2300 - 0700) weighted by the addition of 1à dB(A).
MZLZ	Medunarodna Zracna Luka Zagreb d.d. (Zagreb International Airport) the Concessionaire pursuant to the concession agreement with the Republic of Croatia dated 11 April 2012.
NMT	Noise monitoring Terminals
ENM	Environmental Noise Model
INM	Integrated Noise Model

3. Introduction

MZLZ cannot take aircraft noise away and so it is inevitable that some noise will be experienced by people living in the vicinity of the airport or under flight paths.

However, MZLZ undertakes to manage noise responsibly and reduce the impact of its operations wherever possible. It is for this reason that MZLZ takes the issue of noise very seriously, and why the following long-term objective for the management of aircraft noise has been set: "To limit aircraft noise impacts and gain the trust of our stakeholders that we are using best practicable means to achieve this goal, and to continue this approach into the future, within the framework established by government."

In MZLZ approach to noise management five key themes have been set for over the following years. These themes establish a framework for the airport's Noise Action Plan and help inform neighbors of its priorities. They are:

1. Reducing noise impacts wherever practicable. This includes:
 - a. Quietest practicable aircraft operations
 - b. Effective and credible noise mitigation schemes.
2. Engaging with communities affected by noise impacts to better understand their concerns and priorities, reflecting them as far as possible in airport noise strategies and communication plans.
3. Influencing planning policy to minimize the number of noise-sensitive properties around our airports.
4. Organizing ourselves to continue to manage noise efficiently and effectively.
5. Continuing to build on our understanding of aircraft noise to further inform our priorities, strategies and targets.

4. Zagreb International Airport

Aircraft landing and taking off are the main source of noise pollution. The most common types of aircraft operating at MZLZ, making approx. 90% of all flights, include modern turbo propeller Bombardier de Havilland Canada DHC Dash 8 Q400 followed by Airbus A318-A321 family, Canadair CL-600, Regional Jet CRJ- 1000, CRJ-700, Bombardier E170 and E190, which belong to ICAO Cat B and C, respectively, with the rest including bigger ICAO Cat D and E Boeing 777 - 300 and Airbus A330 - 200, respectively.

Within the 292 ha concession area, MZLZ is equipped with one runway of 3,250 m length and 45 m width, allowing 30 operations per hour. The runway thresholds are made of concrete, and the middle part is made of asphalt. Considering its present physical characteristics, the maneuvering area and the apron can handle all types of aircraft used today in civil aviation.

Croatia Airlines currently accounts for around 54% of all traffic at Zagreb Airport. The airline operates a hub system at Zagreb Airport and it envisages this continuing and strengthening in the future. The other main airlines using Zagreb are Turkish Airlines, Lufthansa, Austrian Airlines, Germanwings, British Airways, Qatar Airways, Air France, KLM, Aeroflot, Swissair, Emirates, Korean Air, Fly Dubai and other airlines which between them account for a further 46% of the traffic.

Total passengers at Zagreb are expecting to rise from 3.336.310 in 2018 to 10, 8 million by 2045, reaching 5 million in 2022 and 8 million in 2035. Total number of movements recorded in 2018 was 43.688, total movements are forecast to range between 138,500 and 153,500 by 2045, representing average annual growth rates of 3.6% and 3.9% respectively.

	Passengers traffic		MTOW		Operations		Cargo(t)	
	2017	2018	2017	2018	2017	2018	2017	2018
January	168.788	191.276	62.299	71.901	2.798	3.039	695	946
February	154.679	170.658	56.245	64.514	2.570	2.692	640	993
March	192.533	223.642	67.499	78.460	3.144	3.143	851	1.109
April	240.168	253.843	76.419	89.311	3.296	3.384	754	1.150
May	268.847	300.676	89.349	102.465	3.752	4.023	756	1.081
June	310.921	331.533	102.010	107.039	3.934	4.124	894	1.111
July	351.532	379.308	107.516	118.447	4.161	4.461	1.162	1.272
August	347.663	372.590	107.569	115.603	4.138	4.393	1.130	1.077
September	330.855	345.770	104.341	110.634	3.937	4.176	1.342	1.281
October	297.682	318.074	98.793	105.821	3.865	3.970	1.214	1.234
November	222.697	234.075	76.038	84.820	3.078	3.223	1.111	1.171
December	205.682	214.865	71.482	75.553	2.912	3.060	1.169	1.250
Total	3.092.047	3.336.310	1.019.560	1.124.568	41.585	43.688	11.718	13.675

5. Regulation

The Croatian Government fully recognizes the ICAO Assembly 'balanced approach' principle to aircraft noise management. The 'balanced approach' consists of identifying the noise problem at an airport and then assessing the cost-effectiveness of the various measures available to reduce noise through the exploration of four principal elements, which are:

- Reduction at source (quieter aircraft)
- Land-use planning and management
- Noise abatement operational procedures (optimizing how aircraft are flown and the routes they follow to limit the noise impacts)
- Operating restrictions (preventing certain (noisier) types of aircraft from flying either at all or at certain times).

The International Civil Aviation Organization (ICAO) encourages states not to apply operating restrictions as a first resort but only after consideration of the benefits to be gained from other elements of the balanced approach.

ICAO states that operating restrictions are not employed as a first resort and that they are only employed after careful consideration of the benefits to be gained from all other elements of the balanced approach. This forms part of the Government's 'control, mitigate and compensate' approach that is included in the Future of Air Transport White Paper. The White Paper recognizes that today's aircraft are much quieter than their predecessors, but that increased activity might still lead to a deterioration of the noise environment around airports.

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 69/09, 84/11, 54/13, 127/13, 92/14). 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. 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;

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, 41/16, 114/18). 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.

Within the context of the international and national framework it advises that MZLZ having less than 50 000 movements during the preceding year will implement a noise reduction plan on totally voluntary basis. MZLZ is aware that its commitment toward surround communities is the warranty of its future sustainable development as most solutions should be delivered locally.

6. Noise Monitoring Equipment and Software

Since 2006, Zagreb Airport has installed a system of noise monitoring, consisting of 4 Noise monitoring Terminals (NMT), and 2 computer programs: Environmental Noise Model (ENM) and Integrated Noise Model (INM). Functionalities of these two computer programs are the following:

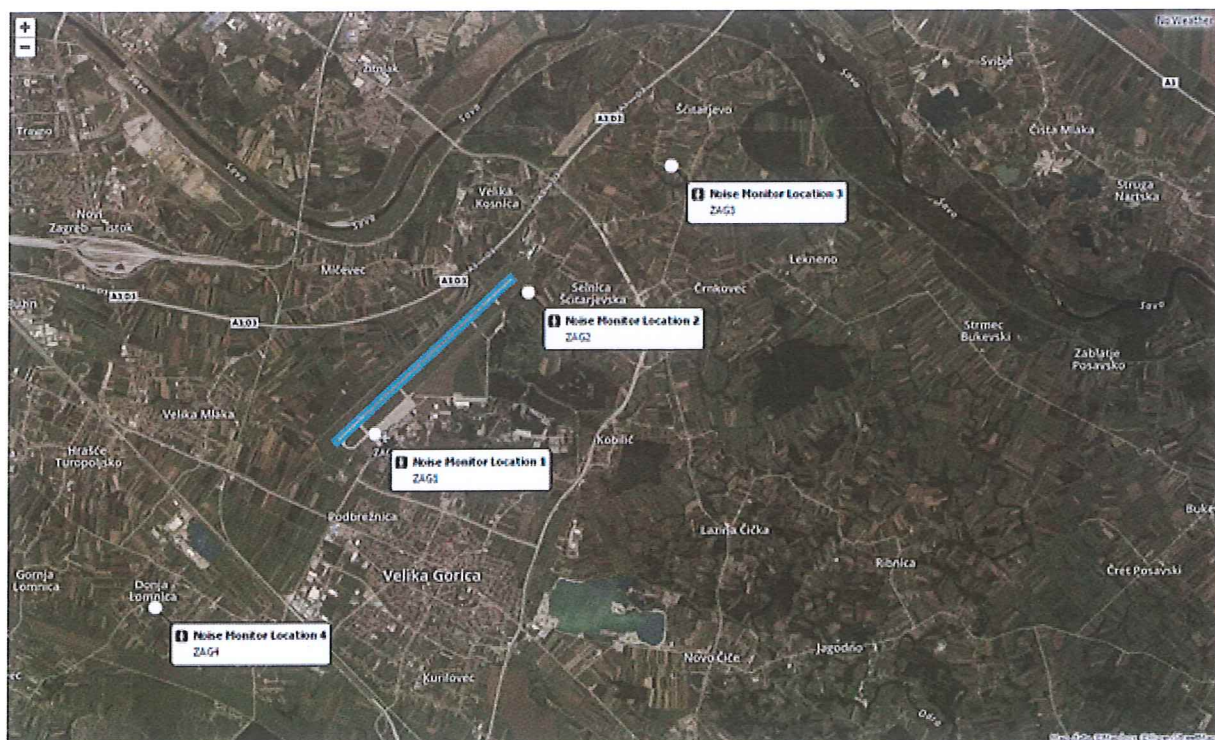
- ENM is a program used to monitor and analyze data received from monitoring terminals;
- INM is used for the creation of noise charts and simulations of noise levels for long term forecasts.

In 2014, Zagreb Airport completed the upgrade of the system for noise monitoring. Thus, the noise monitoring system will include a connection to the radar of Croatia Control (Croatian air traffic control) which benefits are speed and accuracy of processing of flights operating data. In this way Zagreb Airport will obtain accurate information of aircraft movements over districts in its immediate vicinity and allow for the automatic co-relation of landing and take-off operations with noise levels on monitoring terminals. This upgrade enables a more precise mapping of corridors in the creation of noise charts and the tolerance (or deviation levels) will be further reduced.

In addition, NMT3 has been moved from the roof of passenger building to the district Obrezina, in order to have all monitoring terminals in a direct approach and departing zone of the Zagreb Airport.

System of Noise Monitoring at Zagreb Airport International has four Noise Monitoring Terminals:

- NMT1 is located near runway threshold 05,
- NMT2 is located near runway threshold 23,
- NMT3 is located in district of Obrezina,
- And NMT4 is located in district of Donja Lomnica.



Every five year, a noise chart is produced, which includes operations and characteristics for each type of aircraft. The created noise contours are compared to the results registered in on site. This approach confirms that the methodology to produce noise charts is correct. The tolerance is less than 0.5 dB, it is acceptable for this kind of monitoring and production of noise maps.

7. Summary of the existing Noise results

In history, several noise assessment reports have been made: Institut IGH, Plc., October, 2012; Zračna Luka Zagreb Airport, 2010; Zračna Luka Zagreb, 2009; and Inženjering za naftu i plin Ltd, July 2000. Their synthesis is complex as:

- older reports are not valuable anymore, since noisiest airplane (Stage II planes, as the Tupolev-154) have been banned from Zagreb airport in 2010,
- the expression of the noise measurement varies strongly among them (noise is expressed either in L_{den} or L_{eq} , and very often averaged over a full day or a month, which renders the comparison with regulated thresholds, expressed in day and night periods, impossible),

Using its monitoring system, MZLZ has performed continuous noise monitoring.

7.1 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)

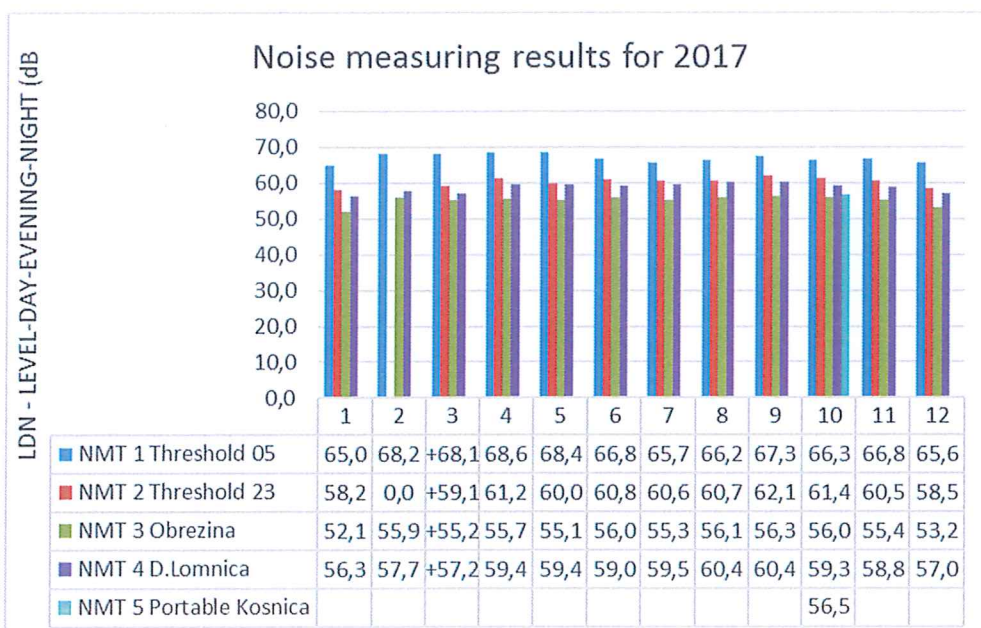
At the location near Threshold 23 noise levels were below 65 dB.

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.



7.2 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)

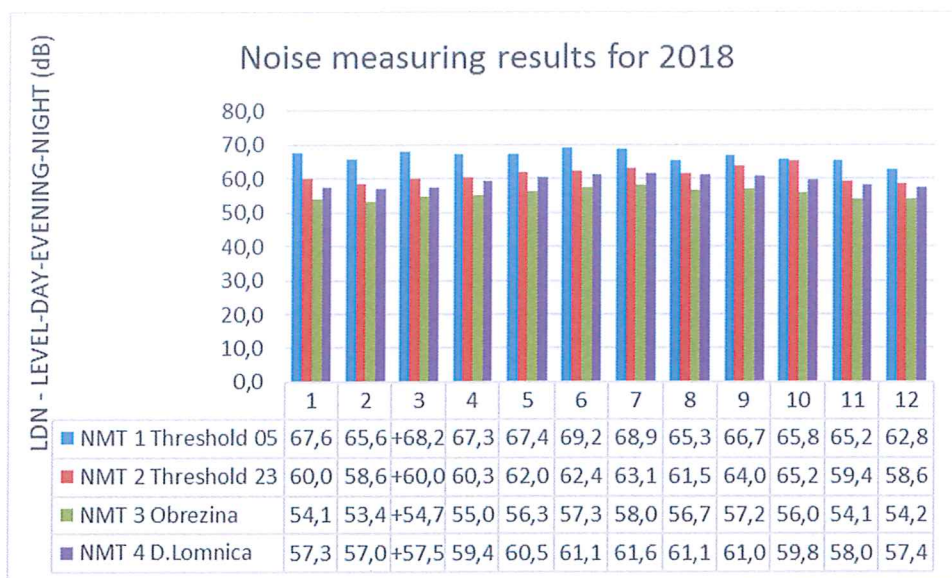
Measured noise levels near location of Threshold 23 where NMT 2 is located vary from 58,6 dB up to 65,2 dB.

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.



7.3 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)

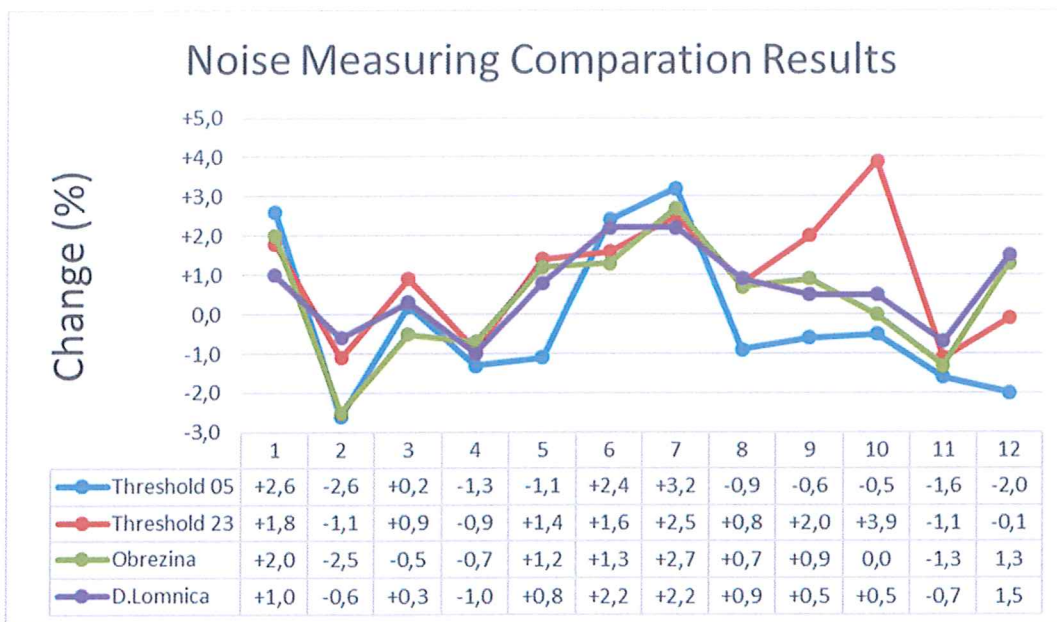
The highest increase in noise levels was recorded in July 2018 by 2,7%.

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%.



By carefully investigating the Zračna Luka Zagreb data of 2010, the Institut IGH, Plc. report from October 2012 and the raw data from 2009, it can be demonstrated that:

- “[...] the noise contours at Zagreb Airport do not require any relocation or implementation of any compensation or mitigation plan,
- [...] there is no resettlement requirement related to noise issues pertaining to New Passenger Terminal”.

These conclusions are included in the letter of the Croatian Ministry of Maritime Affairs, Transport and Infrastructure (Republic of Croatia, 1st February, 2013).

8. Proposed action plan for Noise reduction

8.1 Monitoring and reporting

MZLZ moved the NMT3 from its previous location (Administrative building, near control tower) to new location (village Obrezina). Summary of noise level measurements for 2017 and 2018 have been performed and published at MZLZ official web page. From 2015 noise level analysis is performing on monthly basis and results are presented to the management. Reporting will be on monthly basis for management. At the beginning of each year noise level measurement for previous year will be published on MZLZ official web page.

An annual report is published on official MZLZ web page and is available to all parties.

8.2 Operating procedures with ATC, airlines and Ground Handling

As a second step in its action toward noise reduction, MZLZ will actively coordinate with the third parties and relevant authorities for the development of a noise reduction action plan. In plan is Noise Committee that consist of MZLZ representatives, ATC and airlines.

Following noise abatement procedures are published in MZLZ AIP manual:

Noise abatement departure procedure RWY 05

Aircraft operators shall follow NADP 1 noise abatement departure procedure, according to ICAO Doc. 8168 OPS/611 VOL I (PANS-OPS VOL I).

Noise abatement departure procedure RWY 23

Aircraft operators shall follow NADP 1 noise abatement departure procedure, according to ICAO Doc. 8168 OPS/611 VOL I (PANS-OPS VOL I).

Noise Committee will be organized on May 2019 in order to find out the best solution for noise reduction.

Operating procedure “Precise approach supported by satellite technology”

In order to enable the use of optimal curve approach, as related to the so-far linear approach in the final phase of approach, MZLZ will cooperate with CATC and strongly advocate to CATC that it develops and publish approach charts for optimal curve approach for precision approach Category I through using satellite navigation. Such approach would provide shorter airport approach length, which directly means saving of fuel and avoidance of flight over the inhabited areas, when necessary or justified. Such systems are based on American GPS satellites under operating name GNSS, or, on European satellite system Galileo under operating

name EGNOS. Zagreb Airport Ltd will consult with Croatia Air Traffic Control and with assistance of Eurocontrol, develop such approach charts.

For this measure is primary responsible of ATC (MZLZ can be partner during of implementation) and is implemented under AIP RH LDZA AD 2.24.

Operating procedure “Continuous Descent Approach - CDA”

In order to provide better traffic flow and reduce the noise of aircraft in approach, a landing technique called „Continuous Descent Approach” (CDA) has been developed and is being implemented around the world CDA, when compared to conventional landing technique, enables maintaining of aircraft on greater height, i.e. the postponement of the beginning of aircraft descent from the cruising height -until the moment of crossing the approach line under appropriate final approach glideslope of 3°. A benefit of such technique is that the engine, during this entire descent procedure, is in the ideal or almost ideal operating mode. Such way of approach has positive effects: seriously reduced noise level, reduced fuel consumption and reduced emission of harmful exhausts towards the inhabited areas under landing corridors in the immediate vicinity of the airport. CDA technique can be applied with any type of aircraft, under the condition that the pilots are prepared and trained for its application, and that the airport and flight control have the adequate equipment for its realization.

This procedure is implemented by ATC in STAR procedures under AIP RH LDZA AD 2.24.

Operating procedure “Low Power – Low Drag”

Procedure „Low Power – Low Drag” is a technique of noise reduction applied in the approach, when pilot flies with minimum strength as long as possible, postpones the moment of setting flaps in the position for landing and postpones the moment of pulling out of landing gear - until the optimum moment in the approach phase. By such procedure the flight resistance is reduced to minimum, as well as the landing under increased resistance in shorter time. Such technique of approach must be done in accordance with all flight control requests, specifically observing all rules of safe flight.

Not yet implemented. First MZLZ needs to inform Airline Operation Committee about this measure and see their opinion on this idea.

Less using of reverse thrust during evening and night when safety conditions allow

Using of reverse thrust is temporary opening of system on jet engines for directing of thrust into opposite direction or change of propeller angle of prop-aircraft with aim to direct the thrust forward and thus help slowing down of the aircraft. Using of reverse thrust is used on airports all over the world, has benefits of saving the wearing out of brakes and needing shorter runway for landing. However, from the aspect of noise level, using of reverse thrust is unfavorable, especially for the inhabited areas located in the immediate vicinity of the runway. Many airports forbade the use of reverse thrust for landings during night, i.e. between 22:00 and 06:00 o'clock. Forbiddance of use of reverse thrust has its positive and negative factors.

MZLZ needs to inform Airline Operation Committee about this measure and see their react on this idea. Using reverse thrust can be done if it will not have any influence on safety aircraft landing and it is usually forbidden during night. As for now MZLZ has less than 2% night flights (from 6am – 7am).

Operating procedure for “Continuous Climb Operations”

Operating procedure for Continuous Climb Operations (CCO) is a procedure approved by aircraft manufacturer and flight control that enables continuous climbing after leaving the runway under the same slope as in landing and climbing phases. Procedure of noise reduction during take-off is changed in relation to conventional take-off in a way that on 1.500 ft above ground level the power is decreased but the aircraft

continues to climb with minimum speed of up to 3.000 ft. Only at that altitude the climbing slope decreases and flaps lower. Benefits of this procedure in relation to conventional are seen in avoidance of horizontal segment in climbing. Namely, in conventional procedure, after certain height of climbing the aircraft is being positioned into horizontal flight for a certain time, and after that it again begins to climb. In that horizontal flight it is generated certain noise towards the settlement under the corridor. When we apply CCO procedure, the aircraft continuously climbs and transfers into horizontal flight only when the noise no more can affect the inhabited areas under the corridor, and puts the flaps/wings into configuration which should have been put into much earlier, had the flight been performed in the conventional procedure.

In order to reduce the noise effects to wider surroundings, MZLZ suggests that together with Croatian Air Traffic Control instructions will be issued to airman demanding a decrease of engine power after take-off, from 100 % to the percentage which does not impede the safety of reaching the requested height (altitude) with reference to obstacles on take-off.

Part of Performance Based Navigation (PBN) implementation project in Croatia, LDZA SID/STAR RNAV full implementation planned for 04/2019 by ATC.

Testing of aircraft engines on the airport surfaces

With regard to noise produced by operations on the ground, MZLZ refers to noise generated by aircraft during operations of aircraft handling, maintenance and repairs and servicing. Although such type of noise is generally kept under control, in order to avoid complaints from the nearby inhabited population, MZLZ actively monitor the implementation of preventive measures related to noise production of 10 dB or more. Mitigating measures can include a relocation of place for testing aircraft engines on MZLZ engine testing may occur on following locations:

1. Positions on east apron – engine testing allowed only in low engine power: E1, E2, E3, E4, E5, E5R, E6, E7, E8, E8L, E8R, E9, E10, E10R, E11
2. Position on east apron - possible engine testing with much higher power than low engine power at E11 but all safety parameters must be met.

Testing of aircraft engines is very noisy activity, so that these maintenance operations will be prohibited at night (sleeping time). In case the engines are run near a hangar, the hangar shielding effect can reduce level of noise near hangar of 10 to 25 dB. The most effective noise reduction method when maintaining jet engine, is using of noise deflector. Portable or fixed deflector usually enables reduction of noise level of 10 to 25 dB, depending on the sound insulation between the silencer and aircraft engine. MZLZ will study the merits of the implementation of such noise deflectors.

After formation of "Noise Committee" this topics will be one of subject for discussion with Croatia Airlines Maintenance Department. The result must be to find optimal location and aircraft position to fulfill all requirements regarding reducing noise during engine testing.

Using GPU instead of APU

The main source of noise when aircraft is on the ground and being handled – is the operation of aircraft APU system when it is on the apron. The passenger terminal provides 400 HZ at the gates in the terminal. GPU system for aircraft power supply will be forbidden during handling operations at these gates. The existing systems will continue to be used at the remote aprons.

Passenger Terminal has 8 air bridges with implemented GPU power supply. Using those air bridges aircraft will reduce using APU and the result will be less noise during handling.

8.3 Passive measures

In case the above measures do not provide satisfying results, it may, subject to applicable law, become necessary to implement passive measures of sound insulation of buildings in zones exposed to exceeded air traffic noise emissions. In such a case the implementation of such activities will be described in an additional action plan.

Passive measures would include manufacture and installation of noise barriers and noise deflectors. Deflectors of engine power should be positioned in place foreseen for engine testing, so that the stream of exhaust gases is redirected from horizontal to vertical. Besides, onto engine testing positions should be put noise barrier walls made of materials, which absorb sound, and direct them to fit the settlements.

8.3.1 Environmental noise charge

If the monitoring determines that the noise made by aircraft at airport is above the noise levels permitted by applicable law, MZLZ may introduce an Environmental noise charge as follows:

1. Implement and collect an environmental noise charge from all departing aircrafts, in order to pay for the noise insulation of houses affected by noise within noise contours defined by applicable law.
2. Implement and collect a penalty fee for those aircrafts that exceed permitted noise levels or do not respect defined corridors, landing and take-off procedures or are flying at lower altitude than permitted, or land during restricted times such as night time.

8.3.2 External communication

The External communication to third parties is realized through:

- the Airport Environmental Committee - to be scheduled at least once per year.
- Communication with local communities - MZLZ started to communicate with local communities
- Complaints and enquiries - MZLZ will continue to offer official website as options for complaints and enquiries.
- MZLZ official website