

# REPORT ON NOISE MEASUREMENTS

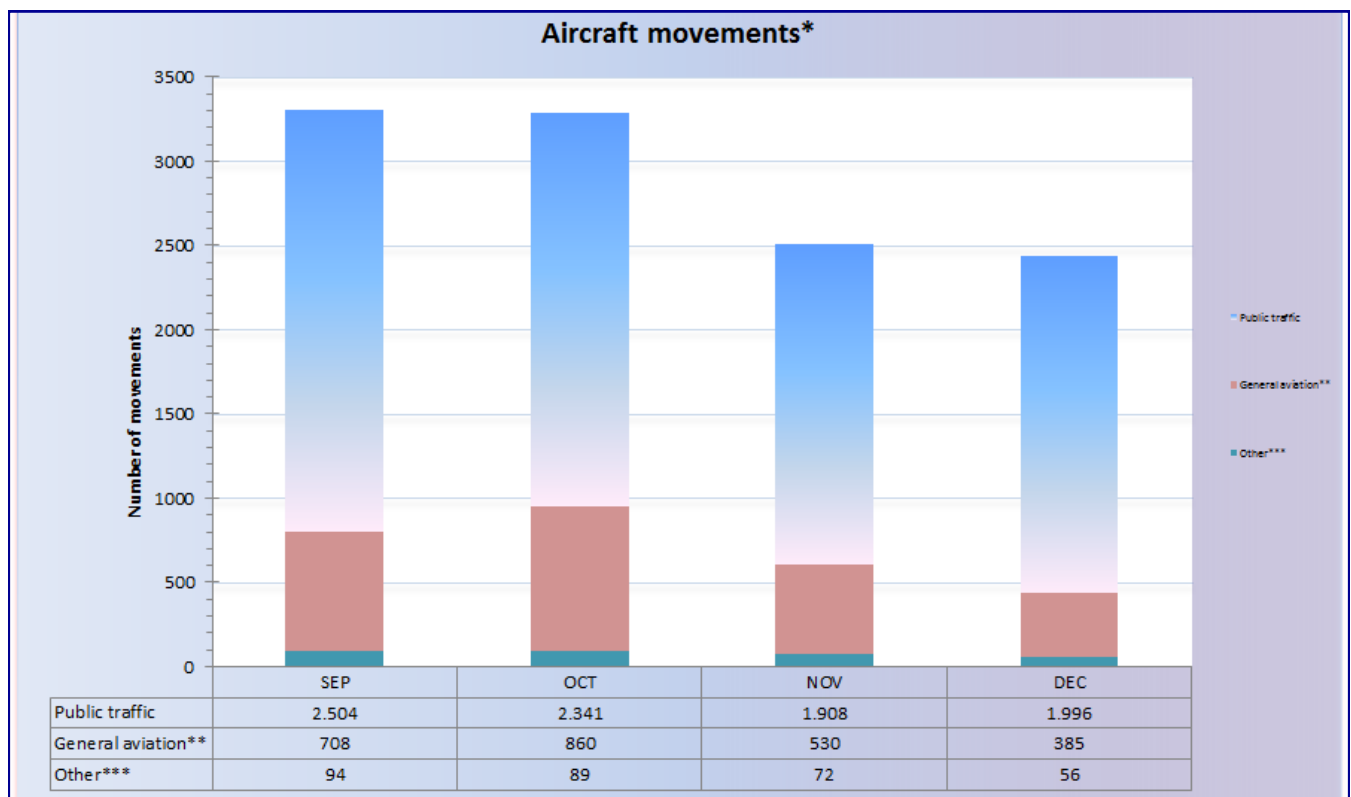
## for the period SEPTEMBER - DECEMBER 2018

### 1. TRAFFIC FIGURES - aircraft movements

Information on aircraft movements in the last four months show a slight increase, compared to the same time period last year. There were 13.543 aircraft movements, which is 0,7% more compared to the same time period last year.

The data are:

- 3.306 aircraft movements in September, which is 9,2% more compared to the same time period last year,
- 3.290 aircraft movements in October, which is 0,9% less compared to the same time period last year,
- 2.510 aircraft movements in November, which is 6,3% less compared to the same time period last year,
- 2.437 aircraft movements in December, which is 0,1% more compared to the same time period last year.



\* landing or takeoff of aircraft

\*\* commercial, business and private aircrafts and helicopters which have a maximum of 19 seats and do not exceed the weight of 44 tons

\*\*\*school, position or technical flights (without passengers)

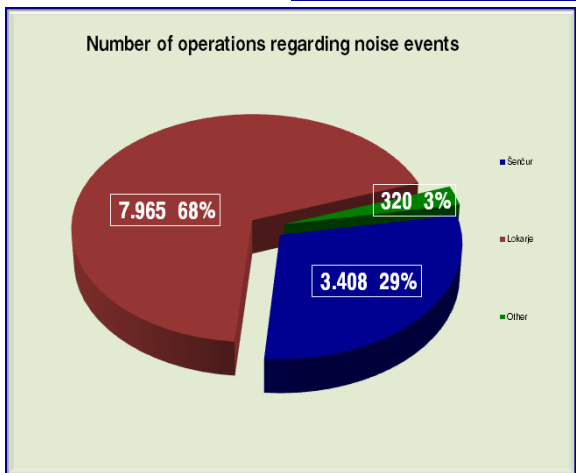
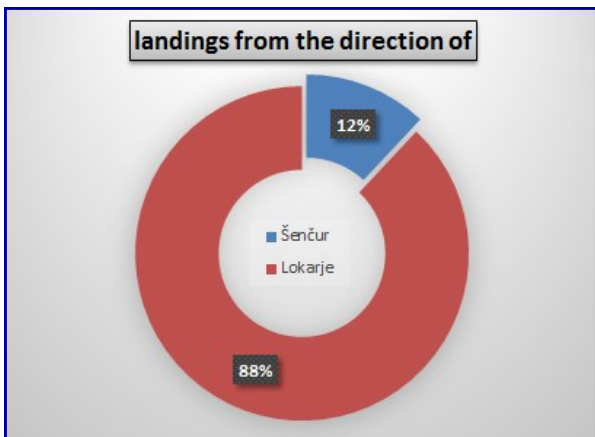
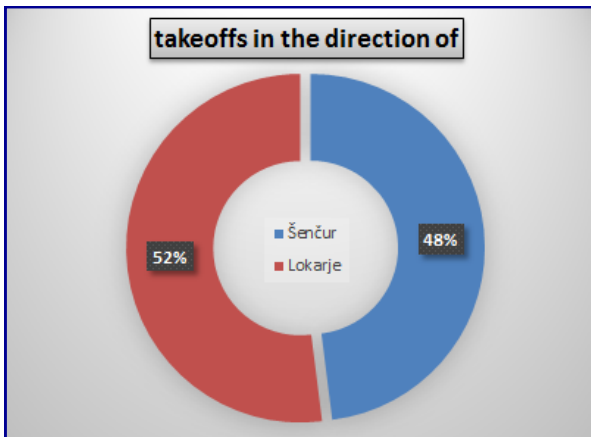
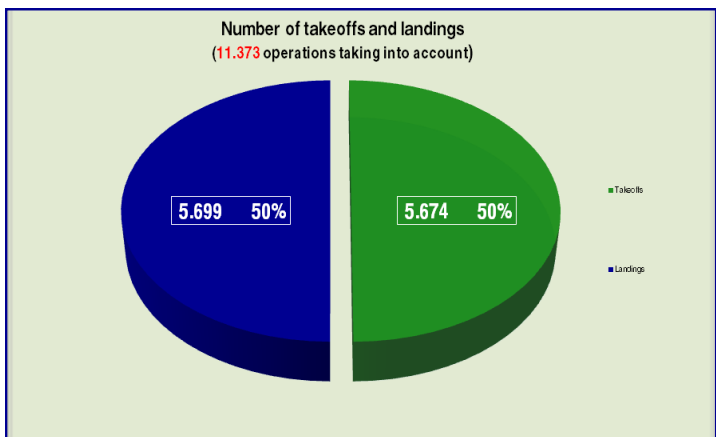
## 2. NOISE POLLUTION SOURCE DATA - measuring terminals

In the last four months of this year measuring terminals have taken 11.373 operations\* (5.674 takeoffs and 5.699 landings) into account. Overflights of school aircraft flights and most of military and police helicopter flights are not included in this number.

The share of takeoffs in the direction of Šenčur was 52% and the share of landings from the direction of Šenčur was 12%; also in the direction of Lokarje 48% and from the direction of Lokarje 88%.

Including the overflights, the measuring terminals have taken 11.693 operations into account, of which 3.408 (29%) operations are the takeoffs and landings in/from the direction of Šenčur and 7.965 (68%) operations are the takeoffs and landings in/from the direction of Lokarje. The number of other events, related to overflights of school aircraft flights and military and police helicopter flights, is 320 (3%).

\* Note: 1.5% of operations is not included due to uncertainty of data – the impact on the result of noise is negligible < 0,06 dB(A)



Source: ZVD Institute of Occupational Safety d.o.o.

### 3. MEASUREMENT RESULTS - noise indicators

The following environment noise indicators were calculated in the last four months of this year, based on the measured noise data of individual events, associated with air traffic (takeoffs, landings, overflights of aircrafts):

Measuring terminal	Noise indicators [dB(A)] - monthly average																Limit values [dB(A)]			
	September				October				November				December				Decree on limit values for environment noise indicators			
	L <sub>D</sub>	L <sub>E</sub>	L <sub>N</sub>	L <sub>DEN</sub>	L <sub>D</sub>	L <sub>E</sub>	L <sub>N</sub>	L <sub>DEN</sub>	L <sub>D</sub>	L <sub>E</sub>	L <sub>N</sub>	L <sub>DEN</sub>	L <sub>D</sub>	L <sub>E</sub>	L <sub>N</sub>	L <sub>DEN</sub>	L <sub>D</sub>	L <sub>E</sub>	L <sub>N</sub>	L <sub>DEN</sub>
1 Šenčur I.	57	57	43	58	57	55	45	57	56	55	38	56	56	52	38	55	58	53	48	58
2 Lokarje	50	50	45	53	50	50	43	52	49	50	41	51	49	50	40	51	58	53	48	58
3 Kranj	54	52	39	54	53	52	41	54	52	50	39	52	52	48	39	51	58	53	48	58
4 Šenčur II.	54	53	38	54	54	53	39	54	53	51	38	53	52	47	37	51	58	53	48	58

Source: ZVD Institute of Occupational Safety d.o.o.

The table shows the daily calculated noise indicators:

- **Indicator L<sub>d</sub>** in dB(A) shows the daily noise load, due to the air traffic. The day time lasts between 6<sup>00</sup> and 18<sup>00</sup>. Depending on the number of noise events at each measuring point, we determined the average hourly noise load, on the basis of data on noise levels in dB (A) and the duration of the events t(s), which was sent to us as measurement data, by the measuring terminal. We use this hourly noise load for determining individual noise indicator.
- **Indicator L<sub>e</sub>** in dB(A) shows noise load, similar to the L<sub>d</sub> indicator, but at evening time that lasts between 18<sup>00</sup> and 22<sup>00</sup>. This is the time period when people are more susceptible to the disturbance. Therefore, 5 dB (A) is added during this time period.
- **Indicator L<sub>n</sub>** in dB(A) describes the night time that lasts between 22<sup>00</sup> and 06<sup>00</sup>. It is assumed that the population, around the airport (or other noise sources), is resting during this time period. Disturbances during this time period may have a profound impact on health and relaxation. Therefore, 10 dB (A) is added during this time period.
- **Indicator L<sub>den</sub>** in dB(A) represents the total daily noise load.

Regarding the seriousness of the excess, we marked the excessive noise indicators with a green highlighted print, for excesses up to 3 dB (A), with a blue highlighted print for excesses between 3 and 6 dB (A) and with a red highlighted print for excesses over 6 dB (A). A research on the noise pollution source is carried out for all the red and blue markings.

NOTE: average noise values are determined in accordance with the requirements of the Decree on limit values for environment noise indicators (OG RS No. 43/2018). Calculations are based on measured noise levels sent from different measuring terminals. They measure total noise and overflight noise of each aircraft. Weather conditions have a partial impact on results, which we are trying to eliminate as far as possible. The wind and thermal inversion still have a partial impact on the measuring results. Based on the SIST ISO 1996-2 standard, data have the uncertainty of about 3 dB (A), since it is not possible to completely exclude the effects of weather conditions (rain, wind, thermal inversion). This means that the actual result varies within -3 and +3 dB (A) of the written.

## 4. ANALYSIS - the loudest aircrafts and noise trend

The following events, in conjunction with takeoffs and landings, were the loudest in the last four months of this year:

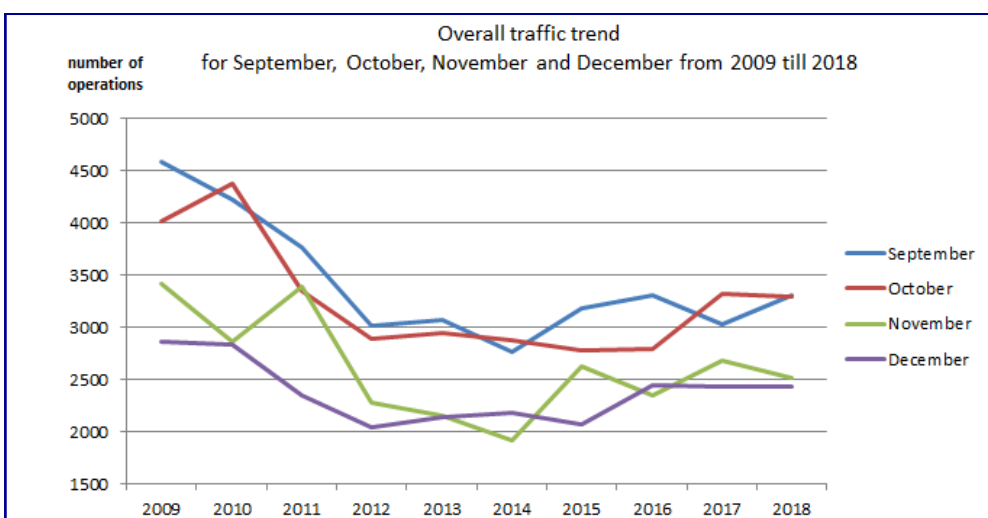
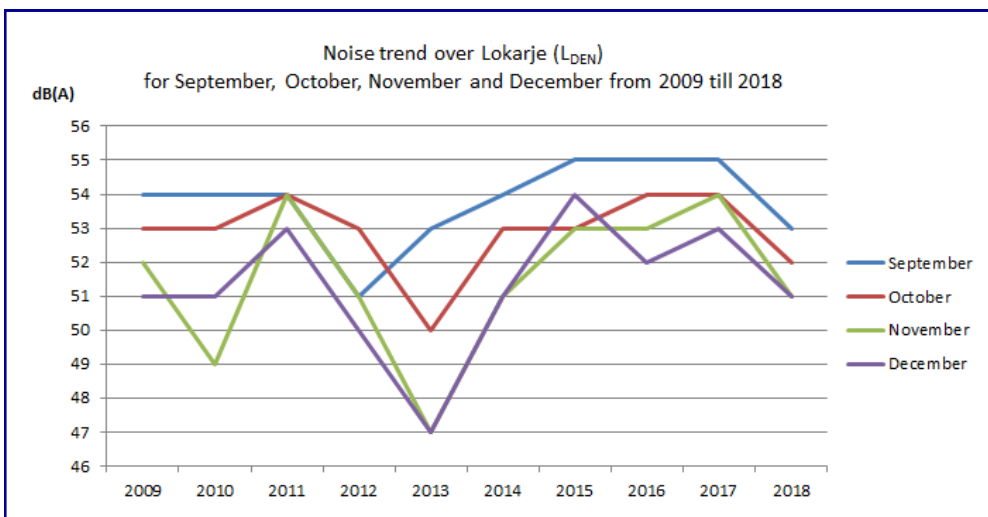
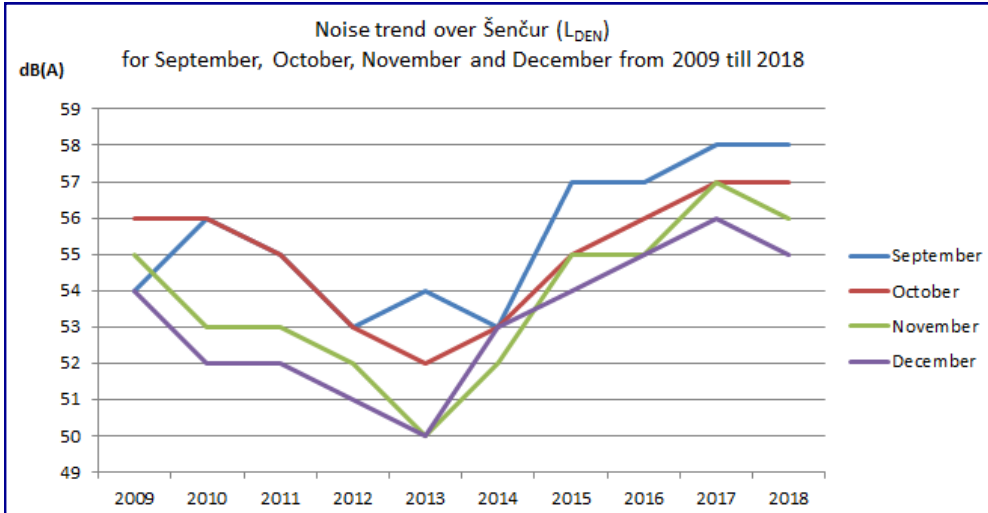
Šenčur I. overflight measurements			
Aircraft type	arrival (ARR) depart. (DEP)	Date and time of the event	Current noise level EPNL in dB(A)
Antonov AN-12	DEP	<b>21.12.2018 14:30</b> duration of the event 34 seconds	108
Antonov AN-12	DEP	<b>28.9.2018 8:43</b> duration of the event 26 seconds	107
Canadair CRJ 900	DEP	<b>26.12.2018 12:13</b> duration of the event 42 seconds	104
Canadair CRJ 700	DEP	<b>31.10.2018 12:27</b> duration of the event 38 seconds	102
Antonov AN-12	DEP	<b>5.11.2018 15:14</b> duration of the event 25 seconds	102
Boeing 737-800	DEP	<b>13.9.2018 11:17</b> duration of the event 22 seconds	100
Boeing 737-400	DEP	<b>27.10.2018 23:03</b> duration of the event 59 seconds	100
Boeing 737-800	DEP	<b>29.10.2018 9:21</b> duration of the event 32 seconds	100
Airbus A321	DEP	<b>15.9.2018 10:41</b> duration of the event 39 seconds	100
DHC-8-400 Dash 8Q	ARR	<b>24.9.2018 13:10</b> duration of the event 24 seconds	99

Lokarje overflight measurements			
Aircraft type	arrival (ARR) depart. (DEP)	Date and time of the event	Current noise level EPNL in dB(A)
Antonov AN-12	DEP	<b>26.10.2018 8:13</b> duration of the event 31 seconds	99
Boeing 737-800	DEP	<b>1.9.2018 22:16</b> duration of the event 38 seconds	94
Airbus A319	DEP	<b>22.9.2018 12:48</b> duration of the event 33 seconds	94
Airbus A319	DEP	<b>3.9.2018 7:19</b> duration of the event 33 seconds	93
Boeing 737	DEP	<b>14.9.2018 21:11</b> duration of the event 48 seconds	93
Airbus A321	DEP	<b>29.10.2018 20:28</b> duration of the event 41 seconds	93
Canadair CRJ 900	ARR	<b>24.11.2018 11:09</b> duration of the event 20 seconds	93
Airbus A319	DEP	<b>28.10.2018 20:10</b> duration of the event 32 seconds	93
Boeing 737-800	DEP	<b>22.9.2018 22:33</b> duration of the event 43 seconds	93
Boeing 737-800	DEP	<b>8.9.2018 22:18</b> duration of the event 39 seconds	93

Source: ZVD Institute of Occupational Safety d.o.o.  
Fraport Slovenija, d.o.o.

## 4. ANALYSIS - the loudest aircrafts and noise trend

The trend of noise changes over Šenčur and Lokarje from 2009 to 2018:



Source: ZVD Institute of Occupational Safety d.o.o.  
Fraport Slovenija, d.o.o.