



Aerodrom Ljubljana

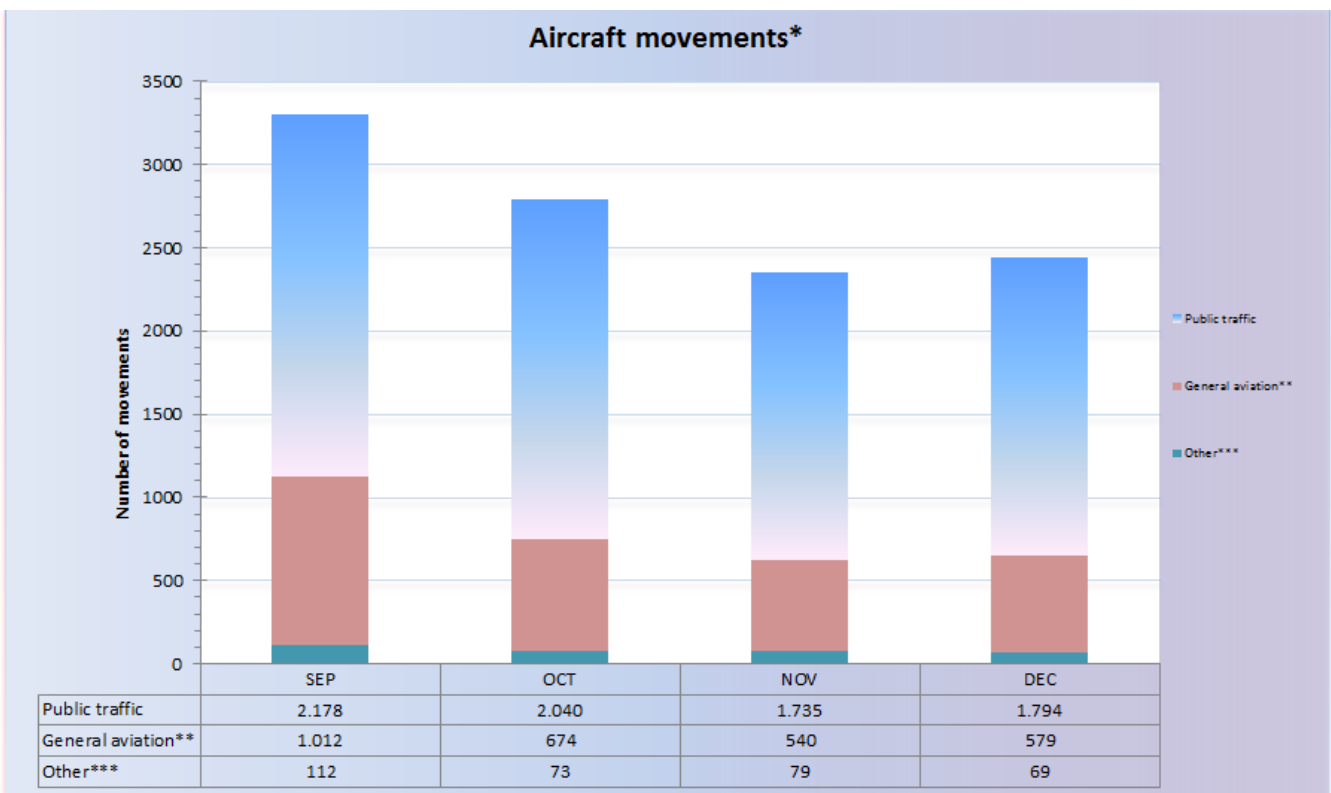
REPORT ON NOISE MEASUREMENTS

for the period SEPTEMBER - DECEMBER 2016

1. TRAFFIC FIGURES - aircraft movements

Information on aircraft movements in the third four months show a slight increase, compared to the same time period last year. There were 10.885 aircraft movements, which is 2,2% more compared to the same time period last year. The data are:

- 3.302 aircraft movements in September, which is 3,7% more compared to the same time period last year,
- 2.787 aircraft movements in October, which is 0,4% more compared to the same time period last year,
- 2.354 aircraft movements in November, which is 10,4% less compared to the same time period last year,
- 2.442 aircraft movements in December, which is 18,0% 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)

Source: Aerodrom Ljubljana, d.o.o.

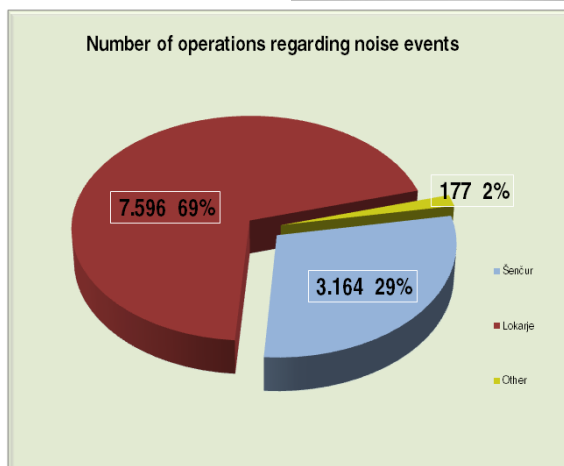
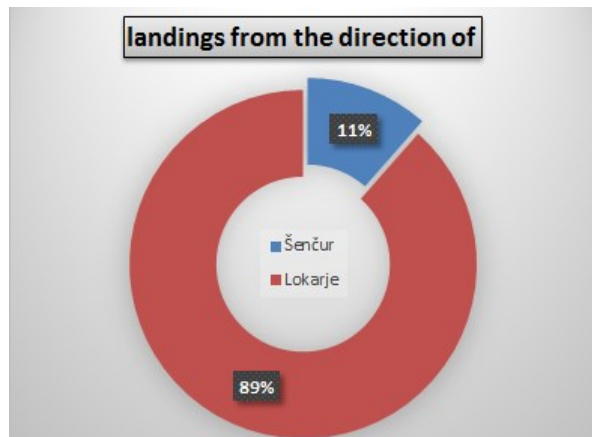
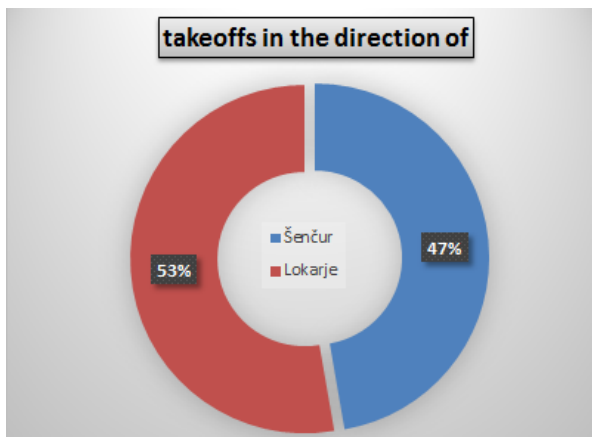
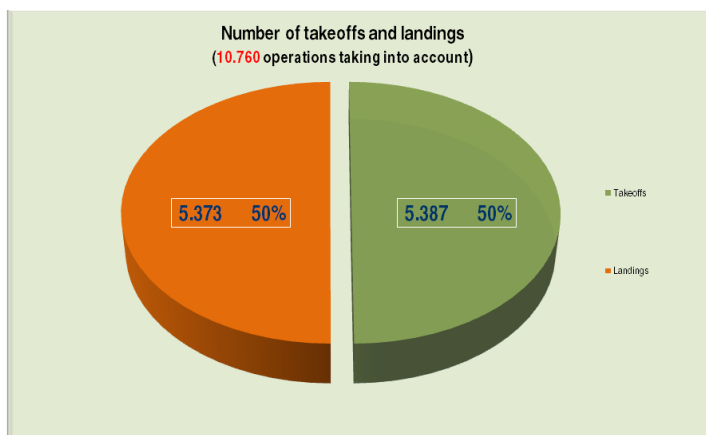
2. NOISE POLLUTION SOURCE DATA - measuring terminals' data

Measuring terminals have taken 10.760 operations* (5.387 takeoffs and 5.373 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 47% and the share of landings from the direction of Šenčur was 11%; also in the direction of Lokarje 53% and from the direction of Lokarje 89%.

Including the overflights, the measuring terminals have taken 10.937 operations into account, of which 3.164 (29%) operations are the takeoffs and landings in/from the direction of Šenčur and 7.596 (69%) 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 177 (2%).

* Note: 1.1% of operations is not included due to uncertainty of data – the impact on the result of noise is negligible < 0,05 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 third 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 _D	L _E	L _N	L _{DEN}	L _D	L _E	L _N	L _{DEN}	L _D	L _E	L _N	L _{DEN}	L _D	L _E	L _N	L _{DEN}	L _D	L _E	L _N	L _{DEN}
1 Šenčur I.	55	55	46	57	55	54	45	56	54	52	46	55	53	52	46	55	58	53	48	58
2 Lokarje	52	52	46	55	51	52	45	54	51	50	43	53	50	50	42	52	58	53	48	58
3 Kranj	53	48	47	55	53	51	44	54	52	50	44	53	51	49	44	53	58	53	48	58
4 Šenčur II.	55	54	45	56	54	53	45	55	54	53	47	56	53	52	46	55	58	53	48	58

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

The table shows the daily calculated noise indicators:

- **Indicator L_d** in dB(A) shows the daily noise load, due to the air traffic. The day time lasts between 6⁰⁰ and 18⁰⁰. 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_e** in dB(A) shows noise load, similar to the L_d indicator, but at evening time that lasts between 18⁰⁰ and 22⁰⁰. 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_n** in dB(A) describes the night time that lasts between 22⁰⁰ and 06⁰⁰. 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_{den}** 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. 105/2005, 34/2008, 109/2009 in 62/2010). 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.

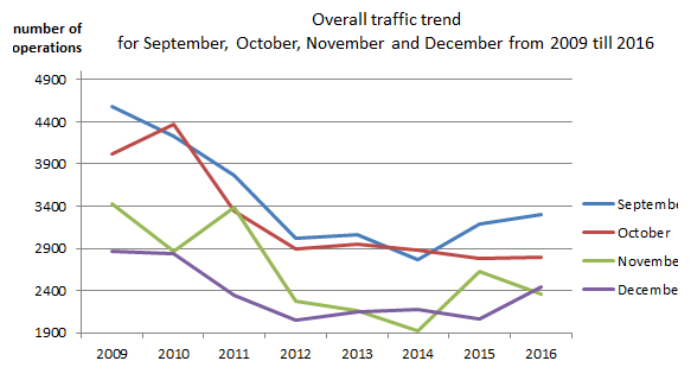
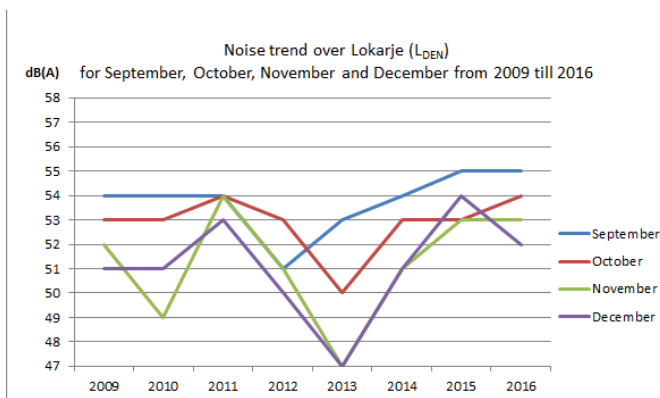
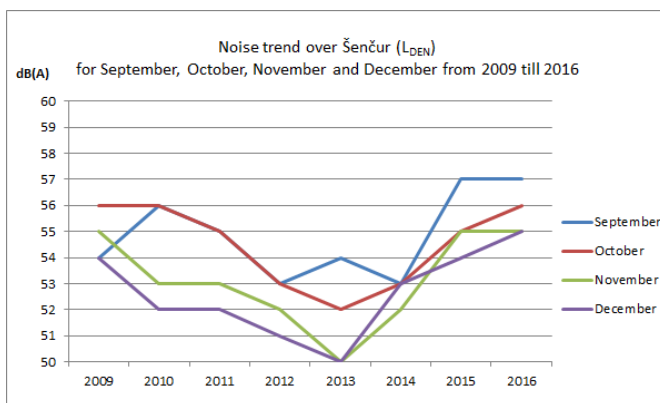
4. ANALYSIS - the loudest aircrafts and noise trend

The following events, in conjunction with takeoffs and landings, were the loudest in the third 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)
Airbus 319	ARR	9.9.2016 15:56 duration of the event 11 seconds	100
Airbus 319	ARR	7.9.2016 15:50 duration of the event 12 seconds	101
Airbus 320	ARR	3.9.2016 10:26 duration of the event 14 seconds	101
Boeing 737-800	DEP	21.10.2016 16:38 duration of the event 18 seconds	100
Airbus 319	DEP	16.9.2016 18:18 duration of the event 23 seconds	99
Airbus 319	DEP	18.11.2016 19:07 duration of the event 21 seconds	98
Airbus 319	DEP	17.11.2016 11:32 duration of the event 10 seconds	98
Canadair RJ-900	DEP	3.9.2016 11:52 duration of the event 15 seconds	98
Fokker F-100	DEP	16.9.2016 17:38 duration of the event 9 seconds	97
Airbus 319	DEP	20.12.2016 16:44 duration of the event 12 seconds	97

Lokarje overflight measurements			
Aircraft type	arrival (ARR) / depart. (DEP)	Date and time of the event	Current noise level EPNL in dB(A)
Airbus 319	ARR	3.9.2016 16:39 duration of the event 15 seconds	97
Bombardier CRJ700	ARR	15.12.2016 17:33 duration of the event 14 seconds	95
Boeing 737-800	DEP	20.9.2016 22:30 duration of the event 20 seconds	95
Airbus 320	ARR	3.11.2016 16:46 duration of the event 24 seconds	94
Airbus 319	DEP	15.10.2016 19:27 duration of the event 17 seconds	92
Boeing 737-400	DEP	7.11.2016 9:16 duration of the event 23 seconds	90
Canadair RJ-900	ARR	8.11.2016 17:24 duration of the event 10 seconds	90
Airbus 319	DEP	7.10.2016 8:56 duration of the event 10 seconds	90
Airbus 321	DEP	17.9.2016 19:41 duration of the event 20 seconds	90
Canadair RJ-900	ARR	24.10.2016 11:05 duration of the event 12 seconds	90

The trend of noise changes over Šenčur and Lokarje from 2009 to 2016:



Source: ZVD Institute of Occupational Safety d.o.o.
Aerodrom Ljubljana, d.o.o.