SNC·LAVALIN

2016 Noise Exposure Contours

Billy Bishop Toronto City Airport

Transport Canada

Environment & Geoscience

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SNC·LAVALIN

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March 25, 2019

Mrs. Vera Haslett
TRANSPORT CANADA
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By email: Vera.Haslett@tc.gc.ca

Subject: Final Report
2016 Noise Exposure Contours – Billy Bishop Toronto City Airport
O/Ref.: 652291-SLAC-RP01-00

Dear Mrs. Haslett,

We are pleased to submit ten hard copies along with a MS Word copy of our final report following the realization of the abovementioned mandate. You will also receive by email a PDF version.

Please do not hesitate to contact us should you have any question or need additional information.

Best regards,

Jacques Savard, M.Sc.
Deputy Director, Acoustics and vibration
Environment & Geoscience
Infrastructure

/dg

Encl.

2016 Noise Exposure Contours

Billy Bishop Toronto City Airport

Final Report

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O/Document : 652291-SLAC-RP01-00

March 2019

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Executive Summary

The noise exposure contours for Billy Bishop Toronto City Airport (the Airport) have been computed in accordance with Transport Canada's methodology for NEF (Noise Exposure Forecast). The surface area within contours was also compiled.

The Tripartite Agreement (Agreement) imposes a limit on the expansion of the NEF contours. Sections 14 and 27 of the Agreement require that the actual 28 NEF contour does not expand beyond the official 25 NEF contour for 1990, except between points "X" and "Y". If the actual 28 NEF contour does expand beyond the official 25 NEF contour for 1990, aircraft movements have to be controlled in such a way to bring back the actual 28 NEF contour within the official 25 NEF contour for 1990.

The analysis shows that the 28 NEF Contour for 2016, with helicopters included in the calculation, does not expand beyond the official 25 NEF Contour for 1990 and remains well within the limit set by the Tripartite Agreement for the expansion of the NEF contour.

When helicopters are excluded from the calculation, the NEF contours shrink slightly, achieving an even better compliance with the limit set in the Tripartite Agreement.

Table i Surface area inside 2016 noise contours

NEF	Surface area (km^2)	
	With helicopters	Without helicopters
35 +	0.47	0.44
30 - 35	0.56	0.49
28 - 30	0.47	0.44
25 - 28	1.29	1.23
Total	**2.79**	**2.60**

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1 Introduction

This document presents the noise contours for the year 2016 for the Airport.

Environmental noise or community noise, including airport activities, is not regulated by Canada's government. Nevertheless Transport Canada has developed a methodology for assessing the perceived noise in the vicinity of airports. This method is established across Canada and is used for this study. The interpretation of the results produced will be used to establish the magnitude (intensity of noise) and extent (surface area) of areas affected by airport noise.

2 Methodology

2.1 Metrics and parameters

The representation of noise generated by airport operations has been normalized by Transport Canada using NEF or "Noise Exposure Forecast" contours. The NEF methodology is not by itself a forecast, but a noise calculation based either on a forecast of future movements or on actual movements. The noise contours for 2016, presented in this report, have been produced using the NEF methodology on the basis of actual movements data from Transport Canada. The original data is provided to Transport Canada by Nav Canada, the country's civil air navigation services provider, for all airports where Nav Canada operates a control tower.

The index provided by the noise contours is used to show the public areas affected by airport noise. This single number rating is easy to interpret, but nevertheless, requires a complex evaluation process. It takes into account, for each movement of the whole year, the type of aircrafts, the runway use, the flight path, the flight distance, and the period of day. Note that the night period is defined from 10 pm to 7 am.

Flight distances and departure flight path directions have been determined according to geographic coordinates of destination airports; themselves drawn from Transport Canada database and specialized publications.

The "Air Traffic Designators" entitled TP 143 published by Transport Canada, specialized databases published by aeronautical sector companies, as well as internal corporate databases, have been used to determine the aircraft characteristics.

2.2 Method of calculation

NEF-Calc 2.0.6.1 software was used to produce the noise contours. It has been developed by the National Research Council for Transport Canada. Nef-Calc 2.0.6.1 processes operation-related data from airports and calculates noise levels for the receptor grid. Noise exposure contours are then drawn for the whole study area.

The software does not include sound data for the aircraft DASH-8 Q400. Noise and performance data of DASH-8-300 was used as surrogate. This hypothesis may have a major impact on the noise contours, especially considering that DASH-8 Q400 is the most represented aircraft in terms of the annual number of movements with 47% of all 2016 movements.

The NEF methodology developed by Transport Canada uses the parameter "Peak Planning Day", which will be used to calculate the noise contours. The number of movements of the Peak Planning Day is estimated by averaging the seven busiest days of the three busiest months of the year. The detailed calculation of the Peak Planning Day is presented in Section 3.1.1. The calculated noise contours are representative of a near to worst case 24-hour period.

3 Noise contours

3.1 Calculation assumptions

The database of aircraft movements from Transport Canada for the Airport for 2016 was used to calculate the Peak Planning Day. The composition of the fleet and the average annual runway use have also been computed from the Transport Canada database.

3.1.1 Calculation of peak planning day

Tables 1 and 2 below present the results of the calculation of the Peak Planning Day for itinerant and local movements for 2016 for the Airport.

The number of movements of the Peak Planning Day is found to be 353 for itinerant movements and 191 for local movements. In comparison, the averages for 2016 are 260 itinerant movements and 83 local movements per day.

The number of circuits is half the number of local movements. A movement is either an arrival or a departure; overflights are excluded from the calculation. Overflights are flights transiting in the control zone of the control tower, going to another destination without landing at the airport. Since they have no real operation at the airport, they are excluded from the calculations. Local movements show much more daily variability than itinerant movements.

The calculation of the noise contours has been made for 353 itinerant movements and 191 local movements (96 circuits), with a total of 544 aircraft movements.

Helicopters accounted for 8,191 movements in 2016, of which 2,234 were runway operations, mostly Ornge flights using AgustaWestland AW139 helicopters, and 5,957 were helipad operations, mostly Heli Tours with Robinson R44 helicopters.

Excluding helicopter movements, the number of movements of the Peak Planning Day is found to be 310 for itinerant movements, and 191 for local movements. In comparison, the averages for 2016 are 238 itinerant movements, and 83 local movements per day.

Table 1 Peak planning day with helicopters

Itinerant		Local	
Date	Movements	Date	Movements
August 26	382	August 03	228
August 19	357	August 17	196
August 04	351	August 20	184
August 12	348	August 09	180
August 07	347	August 10	174
August 14	332	August 14	162
August 27	324	August 31	162
July 17	367	April 23	262
July 29	365	April 14	248
July 22	357	April 16	228
July 10	350	April 05	220
July 20	344	April 17	206
July 24	343	April 15	192
July 15	341	April 20	188
June 10	397	September 12	208
June 17	382	September 22	178
June 18	348	September 25	172
June 09	348	September 09	164
June 30	347	September 07	160
June 24	346	September 11	156
June 19	338	September 06	148

Table 2 Peak planning day without helicopters

Itinerant		Local	
Date	**Movements**	**Date**	**Movements**
August 04	322	August 03	228
August 26	315	August 17	196
August 19	306	August 20	184
August 09	305	August 09	180
August 08	304	August 10	174
August 29	296	August 14	162
August 03	295	August 31	162
July 29	310	April 23	262
July 20	309	April 14	248
July 28	308	April 16	228
July 26	306	April 05	220
July 21	304	April 17	206
July 17	302	April 15	192
July 19	299	April 20	188
June 10	355	September 12	208
June 17	332	September 22	178
June 14	325	September 25	172
June 01	312	September 09	164
June 09	310	September 07	160
June 24	296	September 11	156
June 13	295	September 16	148

3.1.2 Fleet composition and runway use

The data on the composition of the fleet of all operations at the Airport in 2016 is presented in Appendix A, including helicopters. The document TP-143 – Air Traffic Designators from Transport Canada is the primary source of information for the identification of aircraft types. Other sources, such as Transport Canada's aircraft registration database and commercial databases, have also been used.

Figure 1 illustrates the configuration of runways, taken from the Canada Air Pilot. Figures 2 and 3 summarize the composition of fleet and runway use for the airport in 2016, compiled from the itinerant movements database from Transport Canada. Detailed data is presented in Appendix B.

The total number of movements in 2016 was 125,543, divided into 95,311 itinerant movements and 30,232 local movements.

Figure 1 Runway identification

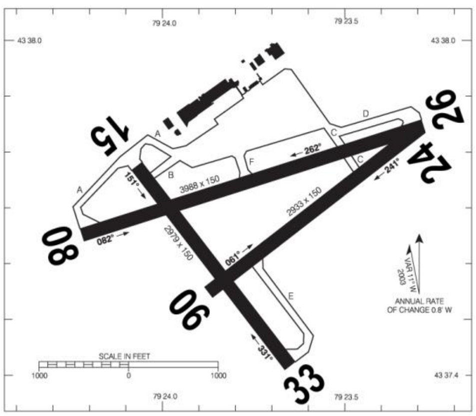
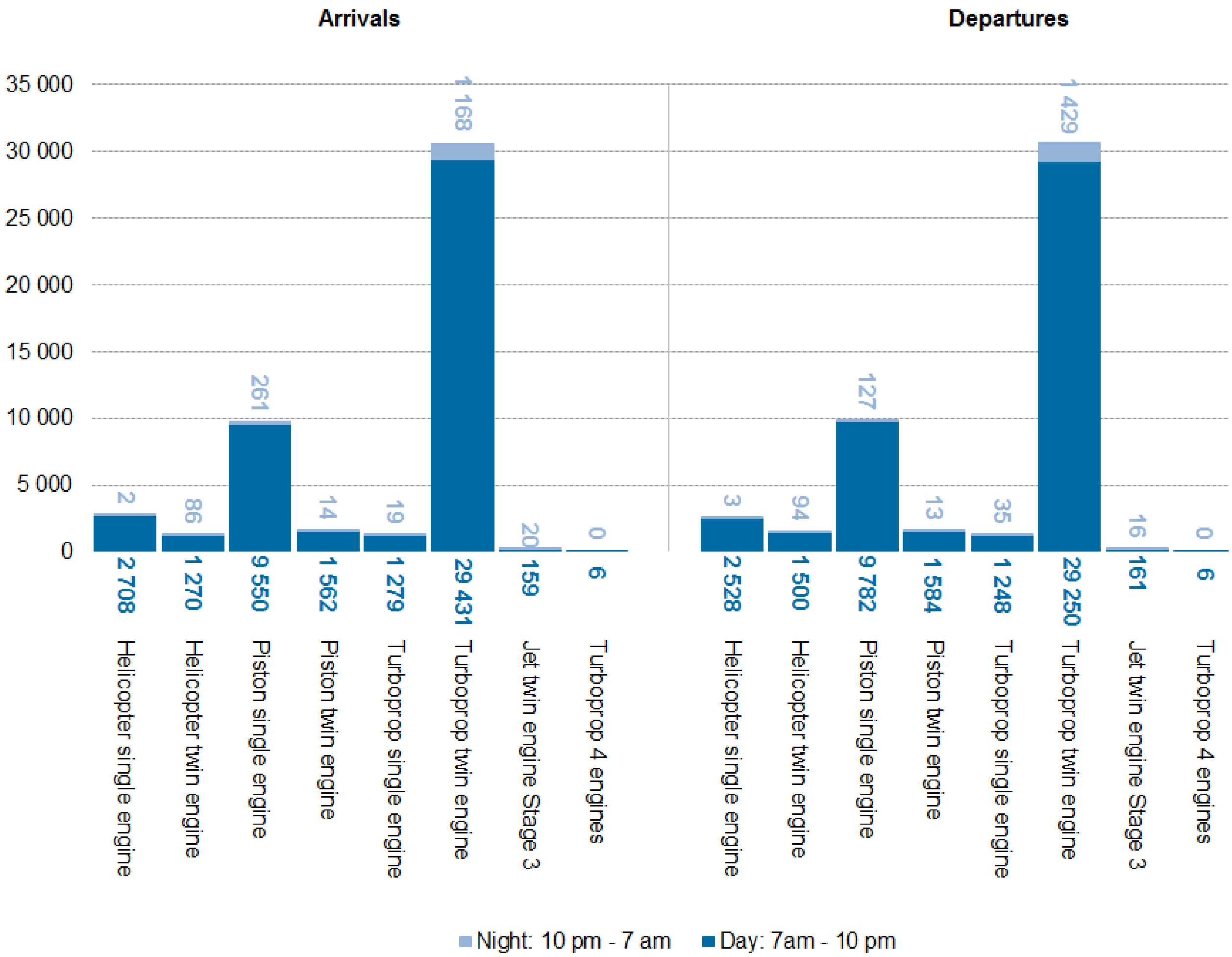


Figure 2 Summary of fleet composition



The movements during the night (10 pm to 7 am) accounted for 3.2% of total movements in 2016. For the calculation of noise contours, using the methodology of Transport Canada, each night-time movement is equivalent to 16.67 daytime movements. The 4,021 night-time movements recorded in 2016 are equivalent to 67,017 daytime movements. The night-time movements represent an important contribution to the noise contours.

Overall, twin-engine turboprops (mostly DASH-8) are the most frequent aircraft at the Airport with 51% of all movements. The DASH-8 Q400 alone accounts for 47% of all movements of 2016. They are followed by single engine piston aircraft with 43% of operations.

Figure 3 illustrates the summary of runway use and Table 2 presents the runway use by aircraft types.

Figure 3 Summary of runway use

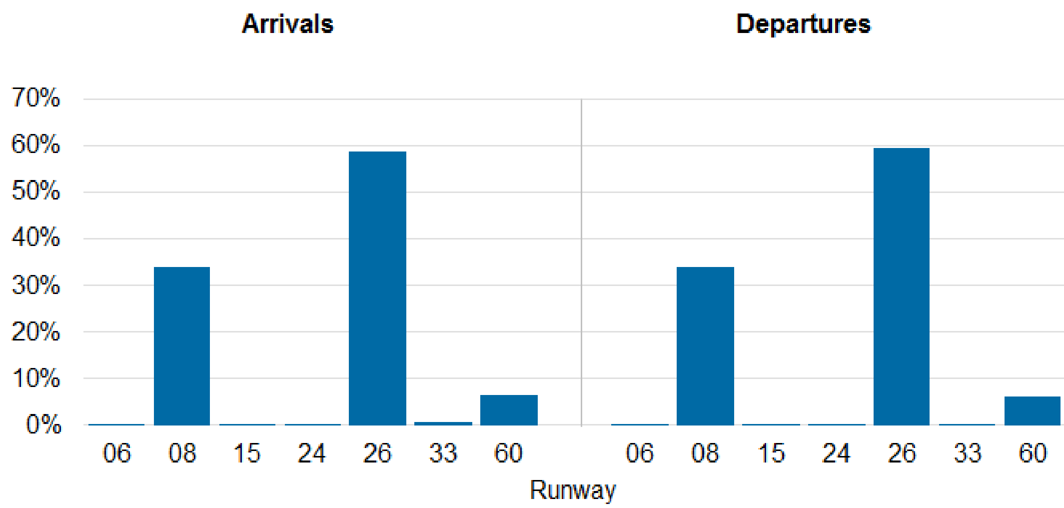


Table 3 Runway use by aircraft category

Runway	Global		Jets		Pistons		Turboprops	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
06	59	3	0	0	59	3	0	0
	0.1%	0.01%	0%	0%	0.4%	0.02%	0%	0%
08	16,094	16,264	77	75	4,339	4,398	11,678	11,791
	34%	34%	43%	42%	31%	32%	35%	35%
15	31	40	0	0	0	30	31	10
	0.1%	0.1%	0%	0%	0%	0.2%	0.1%	0.03%
24	153	167	0	0	145	164	8	3
	0.3%	0.3%	0%	0%	1%	1%	0.02%	0.01%
26	27,924	28,329	102	102	6,610	6,891	21,212	21,336
	59%	59%	57%	58%	47%	50%	64%	63%
33	262	28	0	0	236	27	26	1
	1%	0.1%	0%	0%	2%	0.2%	0.1%	0.003%
60	3,012	2,945	0	0	2,580	2,400	432	545
	6%	6%	0%	0%	18%	17%	1%	2%
Total	**47,535**	**47,776**	**179**	**177**	**13,969**	**13,913**	**33,387**	**33,686**
	100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 4 indicates aircraft used in the represented categories defined in the calculation. Aircraft with a small number of movements in 2016 is not shown in this table; they can be found in detail in Appendix A.

Table 4 Aircraft categories

Aircraft categories	Aircraft types
Helicopter single engine	Robinson R44, etc.
Helicopter twin engine	AgustaWestland AW139, etc.
Piston single engine	Cessna series 150/152/172/182/206, Piper PA-28, Cirrus SR22, Diamond DA40, etc.
Piston twin engine	Piper PA-27/30/34, etc.
Turboprop single engine	Pilatus PC-12, Cessna 208, etc.
Turboprop twin engine	Dash 8, Mitsubishi MU-2, Beech 200/350, Jetstream 31, etc.
Jet twin engine Stage 3	Dassault Falcon 10, etc.

3.1.3 Flight paths

Flight paths for departures, arrivals and circuits have been modelled from information gathered from the Canada Air Pilot, the Canada Flight Supplement and Porter Airlines.

Departure flight paths:

› Runways 06 and 08: right turn at 1.9 DME, heading 141
› Runway 15: right turn at 650’ ASL, heading 201
› Runways 24, 26 and 33: left turn at 650’ ASL, heading 201

Approach slopes:

› Runways 06, 08, 15, 24 and 33: 3.5°
› Runway 26: 3.5° (visual) or 4.8° (instrument)

Runways 24, 26, and 33 have left hand circuits while runways 06, 08, and 15 have right hand circuits.

3.2 Results

Figure 4 illustrates the Airport's noise contours for 2016 actual movements including helicopters, along with the 1990 NEF contours. The 1990 NEF contours were prepared in April 1978 by the Canadian Air Transport Administration of the Ministry of Transport for the Canada Mortgage and Housing Corporation. The noise contours without helicopters are shown on Figure 5.

The Agreement imposes a limit on the expansion of NEF contours. Section 27 of the Agreement requires that the actual 28 NEF contour does not expand beyond the official 25 NEF contour for 1990, except between points "X" and "Y". If the actual 28 NEF contour does expand beyond the official 25 NEF contour for 1990, aircraft movements have to be controlled in such a way to bring back the actual 28 NEF contour within the official 25 NEF contour for 1990.

The analysis shows that the 28 NEF Contour for 2016, with helicopters included in the calculation, does not expand beyond the official 25 NEF Contour for 1990 and remains well within the limit set by the Tripartite Agreement for the expansion of the NEF contour.

When helicopters are excluded from the calculation, the NEF contours shrink slightly, achieving an even better compliance with the limit set in the Tripartite Agreement.

Figure 4 NEF contours with helicopters

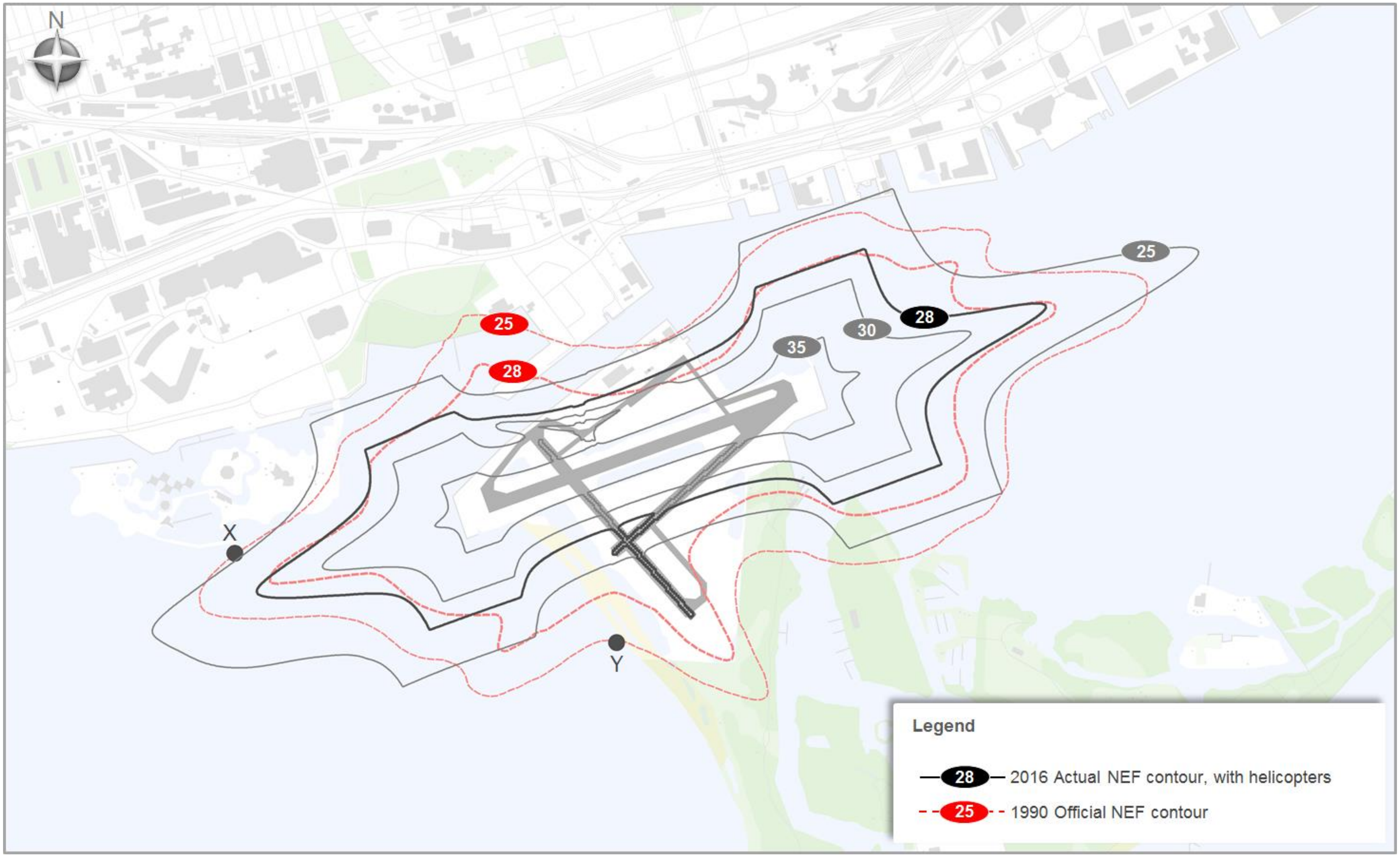


Figure 5 NEF contours without helicopters

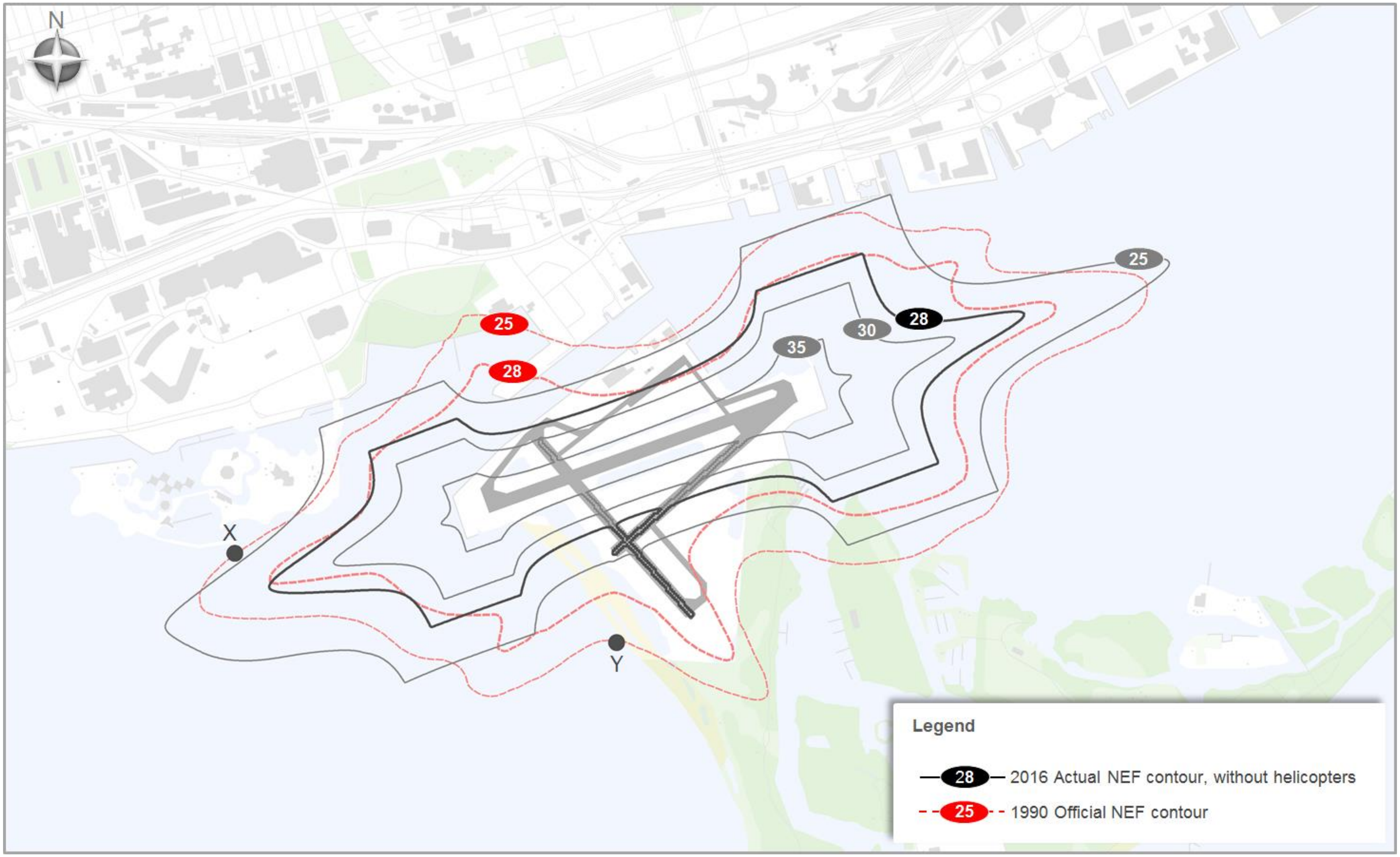


Table 5 shows the surface area within the contours in 2016. It is the total surface area in each range of NEF values.

Table 5 Surface area (km^2)

NEF	Surface area (km^2)	
	With helicopters	Without helicopters
35 +	0.47	0.44
30 - 35	0.56	0.49
28 - 30	0.47	0.44
25 - 28	1.29	1.23
Total	**2.79**	**2.61**

4 Conclusion

The 2016 noise exposure contours for the Airport have been computed in accordance with Transport Canada methodology. The surface area within contours was also compiled. These contours cover a total area of 2.79 square kilometers if helicopters are included in the calculation, and 2.61 square kilometers if helicopters are excluded. NEF 28 contour covers an area of 1.50 square kilometers if helicopters are included in the calculation, and 1.38 square kilometers if helicopters are excluded.

The 28 NEF contours for 2016, with and without helicopters, do not expand beyond the official 25 NEF contour for 1990, the limit set by the Agreement for the expansion of the NEF contour.

5 Bibliography

INTERNATIONAL CIVIL AVIATION ORGANIZATION, Standards and Recommended Practices, Protection of the Environment, Annex 16 to the convention relative to international civil aviation, Volume 1, “Aircraft Noise”, second edition, 1988.

TRANSPORT CANADA, Aviation Group, “NEF micro computer system user manual”, June 1990, TP 6907.

TRANSPORT CANADA, “Land Use Planning in the Vicinity of Airports”, 8th edition, 2006, TP 1247.

TRANSPORT CANADA, “Air Traffic Designators”, TP 143, 2009.

FAA, U.S. Department of transportation, Advisory Circular, “Noise Levels for U.S. Certificated and Foreign Aircraft”, 2001.

Appendix A

Fleet composition

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
A109	L	2	T	R		3 000	AGUSTA	A-109, Power	AS350	134
A119	L	2	T	R		2 700	AGUSTA	Augusta A119 Koala	AS350	14
A139	M	2	T	R		6 400	AGUSTAWESTLAND	AW-139	AS332	2,622
AA1	L	1	P	F		1 000	AMERICAN	AA-1 Yankee, Trainer, Tr2	GASEPF	1
AA5	L	1	P	F		1 000	AMERICAN	AA-5 Traveler	GASEPF	32
AC11	L	1	P	R		2 000	ROCKWELL	112, 114 Commander, Alpine Commander	RWCM14	15
AEST	L	2	P	R		3 000	PIPER	PA-60, Aerostar	PA60	7
AS50	L	1	T	F		3 000	AEROSPATIALE	AS-350/550 Ecureuil, Astar, SuperStar, Fennec	AS350	15
AS55	L	2	T	F		3 000	AEROSPATIALE	Twin Star	AS350	13
B06	L	1	T	F		2 000	BELL	206A/B/L, 406, LongRanger (CH-139 JetRanger)	AS350	142
B190	M	2	T	R		8 000	BEECH	1900 Airliner (C-12J)	BEC190	8
B222	L	2	T	R		4 000	BELL	222	AS350	4
B350	M	2	T	R		6 000	BEECH	B300 Super King Air 350	DHC6	337
B407	L	1	T	F		3 000	BELL	407	AS350	23
B427	L	2	T	F		3 000	BELL	427	AS350	2
B429	L	2	T	F		3 175	BELL	GlobalRanger	AS350	24
B430	L	2	T	R		5 000	BELL	430	AS350	25
B738	M	2	J	R	3	77 000	BOEING	737-800	737800	1
BE10	L	2	T	R		6 000	BEECH	100 King Air (U-21F)	BEC100	134
BE18	L	2	P	R		4 000	BEECH AIRCRAFT CORP.	Expeditor	BEC18	19
BE20	L	2	T	R		6 000	BEECH	200, 1300 Super King Air, Commuter (C-12A)	BEC200	305
BE23	L	1	P	F		2 000	BEECH	23 Musketeer, Sundowner	GASEPF	12
BE24	L	1	P	R		2 000	BEECH AIRCRAFT CORP.	Sierra	GASEPF	14
BE30	M	2	T	R		7 000	BEECH	300 Super King Air	BEC300	104
BE33	L	1	P	R		2 000	BEECH	33 Bonanza (E-24)	BEC33	34
BE35	L	1	P	R		2 000	BEECH	35 Bonanza	GASEPV	288
BE36	L	1	P	R		2 000	BEECH	36 Bonanza	GASEPV	84
BE55	L	2	P	R		3 000	BEECH	55 Baron (T-42)	BEC55	8
BE58	L	2	P	R		3 000	BEECH	58 Baron	BEC58	52
BE60	L	2	P	R		4 000	BEECH	60 Duke	BEC60	10
BE76	L	2	P	R		2 000	BEECH	76 Duchess	BEC76	4

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
BE77	L	1	P	F		1 000	BEECH AIRCRAFT CORP	Beech Aircraft Skipper	GASEPF	4
BE9L	L	2	T	R		5 000	BEECH	90, A90-E90 King Air (T-44, VC-6)	BEC90	56
BE9T	L	2	T	R		5 000	BEECH	F-90 King Air	BEC9F	42
BL17	L	1	P	R		2 000	BELLANCA	17 Viking, Super Viking, Turbo Viking	BL26	11
BL8	L	1	P	F		2 000	BELLANCA	8 Decathlon, Scout	GASEPF	7
C150	L	1	P	F		1 000	CESSNA	150, A150, Commuter, Aerobat	CNA150	10,645
C152	L	1	P	F		1 000	CESSNA	152, A152, Aerobat	CNA152	812
C170	L	1	P	F		1 000	CESSNA	170	CNA170	1
C172	L	1	P	F		2 000	CESSNA	172, P172, R172, Skyhawk, Cutlass (T-41)	CNA172	29,280
C175	L	1	P	F		2 000	CESSNA	175, Skylark	GASEPV	4
C177	L	1	P	F		2 000	CESSNA	177, Cardinal	CNA177	23
C180	L	1	P	F		2 000	CESSNA	180, Skywagon 180 (U-17C)	CNA180	59
C182	L	1	P	F		2 000	CESSNA	182, Skylane	CNA182	3,001
C185	L	1	P	F		2 000	CESSNA	185, A185 Skywagon, Skywagon 185 (U-17A/B)	CNA185	70
C195	L	1	P	F		2 000	CESSNA AIRCRAFT CO.	Cessna 195	GASEPV	10
C206	L	1	P	F		2 000	CESSNA	206, P206, T206, TP206, (Turbo) Super Skywagon	CNA206	1,104
C208	L	1	T	F		4 000	CESSNA	208 Caravan 1, (Super)Cargomaster (C-98, U-27)	CNA208	737
C210	L	1	P	R		2 000	CESSNA	210, T210, (Turbo)Centurion	CNA210	24
C310	L	2	P	R		3 000	CESSNA	310, T310 (U-3, L-27)	CNA310	110
C335	L	2	P	R		3 000	CESSNA	335	CNA335	2
C337	L	2	P	R		2 000	CESSNA AIRCRAFT CO.	Cessna Skymaster	CNA337	12
C340	L	2	P	R		3 000	CESSNA	340	CNA340	52
C404	L	2	P	R		4 000	CESSNA	404 Titan	CNA404	4
C414	L	2	P	R		3 000	CESSNA	414, Chancellor	CNA414	41
C421	L	2	P	R		4 000	CESSNA	421, Golden Eagle, Executive Commuter	CNA421	65
C425	L	2	T	R		4 000	CESSNA AIRCRAFT CO.	Corsair	CNA425	2
C441	L	2	T	R		5 000	CESSNA	441 Conquest, Conquest 2	CNA441	45
C510	L	2	J	R	3	6 000	CESSNA AIRCRAFT CO.	Citation Mustang	CNA500	1
C550	M	2	J	R	3	7 000	CESSNA	550, S550, 552 Citation 2/S2/Bravo (T-47, U-20)	CNA550	63

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
C560	M	2	J	R	3	8 000	CESSNA	560 Citation 5	CNA560	10
C72R	L	1	P	R		2 000	CESSNA	172RG Cutlass RG	GASEPV	18
C77R	L	1	P	R		2 000	CESSNA	177RG Cardinal RG	CNA17B	74
C82R	L	1	P	R		2 000	CESSNA	R182, TR182 (Turbo)Skylane RG	CNA182	29
CH60	L	1	P	F		700	ZENAIR	CH-600/601 Zodiac, Super Zodiac	GASEPV	2
CH7A	L	1	P	F		2 000	CHAMPION	7EC/ECA/FC/JC Citabria, Traveler, Tri-Con, Tri-Traveler	GASEPF	6
CL60	M	2	J	R	3	15 000	CANADAIR	CL-600/601/604 Challenger (CC-144)	CL600	1
COL3	L	1	P	F		1 500	Lancair	LC40-550FG	BEC58P	12
COL4	L	1	P	F		1 633	CESSNA AIRCRAFT CO.	400 Corvalis TT	BEC58P	104
DA40	L	1	P	F		1 800	DIAMOND AIRCRAFT IND INC	DA 40	GASEPF	164
DA42	L	2	P	R		1 700	DIAMOND	DA42	GASEPV	297
DH2T	L	1	T	F		3 000	DE HAVILLAND AIRCRAFT	Turbo Beaver	CNA441	38
DH3T	L	1	T	R		4 000	DE HAVILLAND AIRCRAFT	Otter Turbo	CNA441	1
DH8A	M	2	T	R		16 000	DE HAVILLAND	DHC-8-100 Dash 8 (E-9, CT-142, CC-142)	DHC8	13
DH8C	M	2	T	R		20 000	DE HAVILLAND	DHC-8-300 Dash 8	DHC830	4
DH8D	M	2	T	R		26 000	DE HAVILLAND	DHC-8-400 Dash 8	DHC830	59,462
DHC2	L	1	P	F		3 000	DE HAVILLAND	DHC-2 Mk1 Beaver (U-6, L-20)	DHC2	6
DHC7	M	4	T	R		20 000	DE HAVILLAND AIRCRAFT	Dash 7	DHC7	11
DV20	L	1	P	F		1 000	DIAMOND	DA-20/22, DV-20 Katana, Speed Katana	GASEPF	68
E50P	L	2	J	R	3	5 000	Embraer	Phenom 100	CNA501	26
EC20	L	1	T	F		2 000	EUROCOPTER	EC-120 Colibri	AS350	21
EC30	L	1	T	F		2 400	EUROCOPTER	EC130B4	AS350	8
EUPA	L	1	P	F		600	Europa (kit)	Monowheel	GASEPF	6
EVSS	L	1	P	F		600	AEROTECHNIC	Sportstar	GASEPF	4
EXPR	L	1	P	F		1 400	AURIGA	Phoenix	GASEPF	24
FA10	M	2	J	R	3	9 000	DASSAULT	Falcon 10, Mystere 10	FAL10	252
G115	L	1	P	R		2 000	GROB	G-115A/B/C/D/E, Bavarian (Heron, Tutor)	GASEPF	8
GA7	L	2	P	R		2 000	GRUMMAN CORP.	Cougar	GA7	6
GB6T	L	1	T	A		2 000	BERNIER	G-bair 6T (dérivé de CNA206)	CNA206	51

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
GLAS	L	1	P	F		1 088	STODDARD-HAMILTON	(INDICATIF SUPPRIMÉ EN 2005) Glasair	GASEPF	3
GLST	L	1	P	F		890	Glasair	Glastar	GASEPF	4
GYRO	L	1	P	F		500	AUTOGYRO	AutoGyro MT-03 / MTO sport	GASEPV	1
HUSK	L	1	P	F		1 000	CHRISTEN INDUSTRIES INC.	Model A-1 Huskey	GASEPV	8
J3	L	1	P	F		1 000	PIPER AIRCRAFT CORP.	Cub Trainer	GASEPF	1
JS31	M	2	T	R		7 000	BRITISH AEROSPACE	BAe-3100 Jetstream 31 (T.Mk.3)	BAEJ31	162
JS32	M	2	T	R		8 000	BRITISH AEROSPACE	BAe-3200 Jetsream Super 31	BAEJ31	1
KODI	M	1	T	F		3 290	Quest kodiak	kodiak aircraft	CNA20T	8
L188	M	4	T	R		55 000	LOCKHEED CORP.	Electra	L188	1
LA4	L	1	P	A		2 000	LAKE	LA-4/200, Buccaneer	LA42	72
LJ35	M	2	J	R	3	9 000	LEARJET	35, 36 (C-21, C-35, R-35, VU-35, RC-36, U-36)	LEAR35	2
LNC2	L	1	P	R		800	LANCAIR	Lancair 200/235/320/360	GASEPV	6
LNC4	L	1	P	R		2 000	LANCAIR	Lancair 4	GASEPV	2
M20P	L	1	P	R		2 000	MOONEY	M-20, M-20A-J/L/R (non-turbocharged)	M20J	126
M20T	L	1	P	R		2 000	MOONEY	M-20K/M, Bravo, Encore (turbocharged)	M20K	57
M7	L	1	P	F		2 000	MAULE	M-7-235, MT-7 Super Rocket, Star Rocket	GASEPF	6
MU2	L	2	T	R		5 000	MITSUBISHI	MU-2, Marquise, Solitaire (LR-1)	MU2	375
NAVI	L	1	P	R		2 000	ROCKWELL INT. CORP.	Navion	GASEPV	2
P180	L	2	T	R		6 000	PIAGGIO	P-180 Avanti	SD330	58
P210	L	1	P	R		2 000	CESSNA	P210 Pressurized Centurion	CNA206	65
P28A	L	1	P	F		2 000	PIPER	PA-28-140/150/160/180 Archer, Cadet, Cherokee	PA28CA	1,176
P28B	L	1	P	F		2 000	PIPER	PA-28-201T/235/236 Cherokee, Dakota	PA28CA	4
P28R	L	1	P	R		2 000	PIPER	PA-28R-180/200/201 Cherokee Arrow, Turbo Arrow	PA28CA	99
P28T	L	1	P	R		2 000	PIPER	PA-28RT Arrow 4, Turbo Arrow 4	PA28CA	10
P32R	L	1	P	R		2 000	PIPER	PA-32R Cherokee Lance, Saratoga SP, Turbo	GASEPV	10
P32T	L	1	P	R		2 000	PIPER AIRCRAFT CORP.	Lance 2/Turbo Lance 2	GASEPV	61
P46T	L	1	T	R		2 000	PIPER	PA-46T Malibu Meridian	PA46	76
P68	L	2	P	F		2 000	PARTENAVIA	P-68 Victor	GASEPV	4

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
PA12	L	1	P	F		1 000	PIPER AIRCRAFT CORP.	Super Cruiser	GASEPF	2
PA15	L	1	P	F		1 000	PIPER AIRCRAFT CORP.	Vagabond Trainer	PA17	1
PA18	L	1	P	F		1 000	PIPER	PA-18 Super Cub (L-18C, L-21, U-7)	PA18	2
PA20	L	1	P	F		1 000	PIPER AIRCRAFT CORP.	Pacer	PA22CO	2
PA23	L	2	P	R		2 000	PIPER	PA-23-150/160 Apache	PA23AZ	4
PA24	L	1	P	R		2 000	PIPER	PA-24 Comanche	PA24	92
PA25	L	1	P	F		2 000	PIPER AIRCRAFT CORP.	Pawnee	PA25	1
PA27	L	2	P	R		3 000	PIPER	PA-23-235/250 Aztec, Turbo Aztec (U-11)	PA23AZ	302
PA30	L	2	P	R		2 000	PIPER	PA-30/39 Twin Comanche, Turbo Twin Comanche	PA30	88
PA31	L	2	P	R		4 000	PIPER	PA-31/31P Navajo, Chieftain, Mojave, T-1020	PA31	997
PA32	L	1	P	F		2 000	PIPER	PA-32 Cherokee Six, Saratoga, Turbo Saratoga	GASEPV	63
PA34	L	2	P	R		3 000	PIPER	PA-34 Seneca	PA34	2,307
PA38	L	1	P	F		1 000	PIPER AIRCRAFT CORP.	Tomahawk	PA38	3
PA42	L	2	T	R		6 000	PIPER AIRCRAFT CORP.	Cheyenne 3/4	PA42	1
PA44	L	2	P	R		2 000	PIPER	PA-44 Seminole, Turbo Seminole	PA44	6
PA46	L	1	P	R		2 000	PIPER	PA-46 Malibu, Malibu Mirage	PA46	154
PAY1	L	2	T	R		5 000	PIPER	PA-31T1-500 Cheyenne 1	PA31T	12
PAY2	L	2	T	R		5 000	PIPER	PA-31T-620/T2-620 Cheyenne, Cheyenne 2	CNA441	12
PAY3	L	2	T	R		6 000	PIPER	PA-42-720 Cheyenne 3	CNA441	27
PAY4	L	2	T	R		6 000	PIPER AIRCRAFT CORP.	CHEYENNE 400	CNA441	2
PC12	L	1	T	R		5 000	PILATUS	PC-12, Eagle	CNA20T	1,574
PIVI	L	1	P	F		1 000	PIPISTEL	Virus SW	GASEPF	2
PTS2	L	1	P	F		1 000	CHRISTEN INDUSTRIES INC.	S-2 Special	GASEPF	7
PTSS	L	1	P	F		700	PITTS	Super Stinker	GASEPV	9
R22	L	1	P	F		1 000	ROBINSON	R-22	AS350	4
R44	L	1	P	F		2 000	ROBINSON	R-44 Astro	AS350	4,985
R66	L	1	T	F		1 225	Robinson	R66	AS350	29
RV4	L	1	P	F		680	VAN'S	RV-4	GASEPF	5
RV6	L	1	P	F		1 000	VAN'S	RV-6	GASEPF	29

Aircraft	D1*	D2*	D3*	D4*	Chap.	MTOW	Manufacturer	Model	Equivalent	Number
RV7	L	1	P	F		815	VAN'S	RV-7	GASEPV	20
RV8	L	1	P	F		815	VAN'S	RV-8	GASEPF	8
RV9	L	1	P	F		793	VAN'S	RV9/9A	GASEPF	4
S76	L	2	T	R		5 000	SIKORSKY	S-76, H-76, AUH-76, Spirit, Eagle (HE-24)	AS332	114
S92	M	2	T	F		12 000	SIKORSKY	S-92 Helibus	AS332	12
SONX	L	1	P	F		522	SONEX	Sonex	GASEPF	2
SR20	L	1	P	F		2 000	CIRRUS	SR-20	GASEPF	73
SR22	L	1	P	F		1 500	CIRRUS	SR22	GASEPF	413
SW3	M	2	T	R		6 000	FAIRCHILD SWEARINGEN	SA-226TB, SA-227TT Merlin 3	SAMER3	74
SW4	M	2	T	R		7 000	FAIRCHILD SWEARINGEN	Merlin 4C, Metro2/2A, Metro 3, Metro 3A, Expediter, Merlin 23, 4	SAMER4	42
T6	L	1	P	R		4 000	NORTH AMERICAN	T-6, AT-6, BC-1, SNJ, Texan, Harvard	GASEPF	6
TBM7	L	1	T	R		3 000	SOCATA	TBM-700	CNA441	74
TBM8	L	1	T	R		7 400	Socata	TBM850	CNA441	22
TOBA	L	1	P	F		2 000	AEROSPATIALE	Tobago	GASEPF	10
TRIN	L	1	P	R		2 000	SOCATA	TB-20/21 Trinidad	GASEPF	10
Z42	L	1	P	F		2 000	MORAVAN INC.	Zlin 42/142/242	GASEPV	37

*D1: Weight:
L – light
M – medium
H – heavy

*D2: Number of engine

*D3: Engine type:
P – pistons
T – turboprops
J – jets

*D4: Landing gear:
F – fixed
R – removable
A – amphibious

Appendix B

Summary of movements

Fleet summary

Aircraft	Arrivals			Departures			Total
	Day	Night	Total	Day	Night	Total	
Helicopter single engine	2,708	2	2,710	2,528	3	2,531	5,241
Helicopter twin engine	1,270	86	1,356	1,500	94	1,594	2,950
Piston single engine	9,550	261	9,811	9,782	127	9,909	19,720
Piston twin engine	1,562	14	1,576	1,584	13	1,597	3,173
Turboprop single engine	1,279	19	1,298	1,248	35	1,283	2,581
Turboprop twin engine	29,431	1,168	30,599	29,250	1,429	30,679	61,278
Jet twin engine Stage 3	159	20	179	161	16	177	356
Turboprop 4 engines	6	0	6	6	0	6	12
Total	**45,965**	**1,570**	**47,535**	**46,059**	**1,717**	**47,776**	**95,311**

- Day: 7 am - 10 pm
- Night: 10 pm - 7 am

Runway use - Arrivals

Aircraft	06		08		15		24		26		33		60	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Helicopter single engine			7		2				5				2,694	2
Helicopter twin engine			338	28	29				595	49	1		307	9
Piston single engine	59		3,638	116			135		5,506	145	212			
Piston twin engine			577	6			10		951	8	24			
Turboprop single engine			431	6			7		823	13	18			
Turboprop twin engine			10,462	404			1		18,961	764	7			
Turboprop 4 engines			4						2					
Jet twin engine Stage 3			70	7					89	13				
Total	**59**		**15,527**	**567**	**31**		**153**		**26,932**	**992**	**262**		**3,001**	**11**

Runway use - Departures

Aircraft	06		08		15		24		26		33		60	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Helicopter single engine			2						6				2,520	3
Helicopter twin engine			406	31	7				680	47	1		406	16
Piston single engine	3		3,769	60	29		150		5,804	67	27			
Piston twin engine			562	5	1		14		1,007	8				
Turboprop single engine			441	9	2		3		802	26				
Turboprop twin engine			10,395	505	1				18,854	924				
Turboprop 4 engines			4						2					
Jet twin engine Stage 3			69	6					92	10				
Total	**3**	**0**	**15,648**	**616**	**40**	**0**	**167**	**0**	**27,247**	**1,082**	**28**	**0**	**2,926**	**19**

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