

CHRISTCHURCH INTERNATIONAL AIRPORT



2009 AIRCRAFT OPERATIONS NOISE MONITORING REPORT

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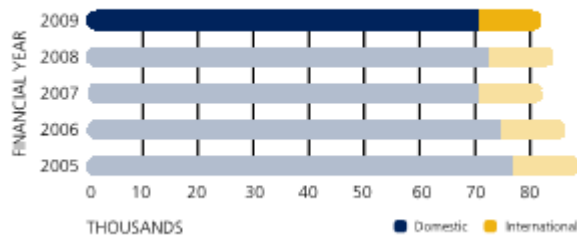
1.0 INTRODUCTION

1.1 General

This Noise Monitoring Report is required to be prepared on an annual basis by Rule 1.2.4.2 in Part 11 of the Christchurch City Plan. The purpose of the report is to present the annual calculated noise contours which have been prepared to demonstrate compliance with the City Plan noise standard for aircraft operations at the Airport. This report is for the 2009 calendar year.

Christchurch International Airport is the main gateway to the South Island with current aircraft movements of between 80,000 to 90,000 per annum.

Aircraft Movements



The total number of commercial movements for the 2009 calendar year was 80,006. A summary of the movement data input to the INM computer model for producing the 2009 Aircraft Noise Contours is provided in section 2.1 of this report.

1.2 Noise Performance Standards – Aircraft Operations

The Christchurch City Plan refers to airport noise in a number of locations. Rule 11-1.3.5 refers to the Airport's requirement to not exceed L_{dn} 65 dBA outside the airport noise contour shown in the Plan as detailed below.

"1.3.5 Aircraft Noise

Critical Standard

CIAL shall manage the Christchurch International Airport so that the noise from aircraft operations does not exceed L_{dn} 65 dBA outside the L_{dn} 65 dBA airport noise contour shown in Appendix 3 to Part II.

Noise from aircraft operations shall be based on noise data from the Integrated Noise Model (INM) and records of actual aircraft operations at CIA. The noise level shall be calculated over the busiest three month period of the year.

Aircraft operations means:

- *the landing and take off of aircraft at CIA*

- *aircraft flying along any flight path associated with a landing or take off at CIA*

The following activities are excluded from the definition of Aircraft Operations:

- *aircraft operating in an emergency for medical or national/civil defence reasons*
- *air shows*
- *military operations not associated with the Antarctic programme*
- *aircraft using the airport as an alternative to a scheduled airport elsewhere*
- *aircraft taxiing*
- *aircraft engine testing.*

Exceedance by up to 1 dBA of the noise limit is permitted provided CIAL demonstrates at the request of, and to the satisfaction of, the Council that any such exceedance is due to atypical weather patterns.”

Rule 11 – 1.2.4.2 lays out the airport’s obligation to provide annual calculations of the aircraft noise levels and the results of noise measurements where necessary.

“1.2.4.2 Aircraft noise monitoring

CIAL shall annually provide to the Council’s Environmental Services Manager the result of calculations based upon monitored aircraft movements for the preceding year and the known noise characteristics of those aircraft. These calculations will be performed by a person with appropriate qualifications and experience in airport noise modelling and acoustic assessments. The provided result shall be verified by noise measurements and shall be in the form of a 65 dBA L_{dn} contour representing the noise created by aircraft operations over that year (other than movements of a kind excluded in the Aircraft Noise Rule 1.3.5) superimposed upon a copy of the plan forming Appendix 3 to Part II of this Plan. The measurement of aircraft sound exposure and the resultant derivation of a 65 dBA L_{dn} shall be in accordance with NZS 6805:1992.”

2.0 ANNUAL AIRCRAFT NOISE CONTOURS

To ensure compliance is adequately assessed, 2009 Annual Aircraft Noise Contours (AANC) have been calculated using two different methods as follows:

- Average daily movements based on the busiest three months overall. This typically coincides with the busiest three months on the main runway (i.e. Runways 02 and 20);
- Average daily movements based on the busiest three months on Runway 29 (northwest runway);

The purpose of calculating noise contours for the busiest three months on Runway 29 is to assess compliance for the period of time when the north-west winds are prevalent and aircraft utilise Runway 29 more than usual.

A diagram of the Christchurch Airport runway system is included as Appendix A for reference.

2.1 INM Inputs

The 2009 annual contours have been calculated using the INM version 6.0c which is the same version used to prepare the existing City Plan airport noise boundaries.

A record of the aircraft activity for 2009 has been provided by CIAL in the form of monthly movements by aircraft type, operation, runway and time of day. This data is recorded by Airways Corporation and includes all movements of aircraft that are fitted with a transponder. As some general aviation aircraft do not have transponders, not all general aviation movements are accounted for. Noise from these light aircraft does not contribute significantly to the overall noise exposure and hence would not affect the location of the 65 dBA Ldn noise contour. The effect of general aviation aircraft on the overall noise exposure and compliance with the noise limit is discussed further in Appendix C.

MDA has analysed the movement data and determined that the busiest three consecutive months were September, October, November. The busiest three months for Runway 29 were October, November and December.

The annualised total movements for both modelled scenarios are shown in Table 1 as well as a breakdown of the annualised day and night time movements. The number of night time movements is relevant as night time activity is treated as ten decibels louder than day time activity when calculating L_{dn} . A breakdown of the average daily aircraft movements by aircraft type and runway for each of the modelled scenarios is included as Appendix B.

Table 1 – Summary of Modelled Aircraft Movements

	Busiest 3 Months	Busiest 3 Months RW 29
Annualised Total Movements	86,468	85,466
Annualised Day Time Movements	74,752	73290
Annualised Night Time Movements	11,716	12,176

The aircraft movement data provided by CIAL does not contain explicit runway usage data, rather the runway is defined as either the main runway (02/20) or the crosswind runway (11/29). Therefore runway splits have been applied based on historical vector usage statistics as follows:

Main Runway: RWY 02 – 64 %
 RWY 20 – 36 %

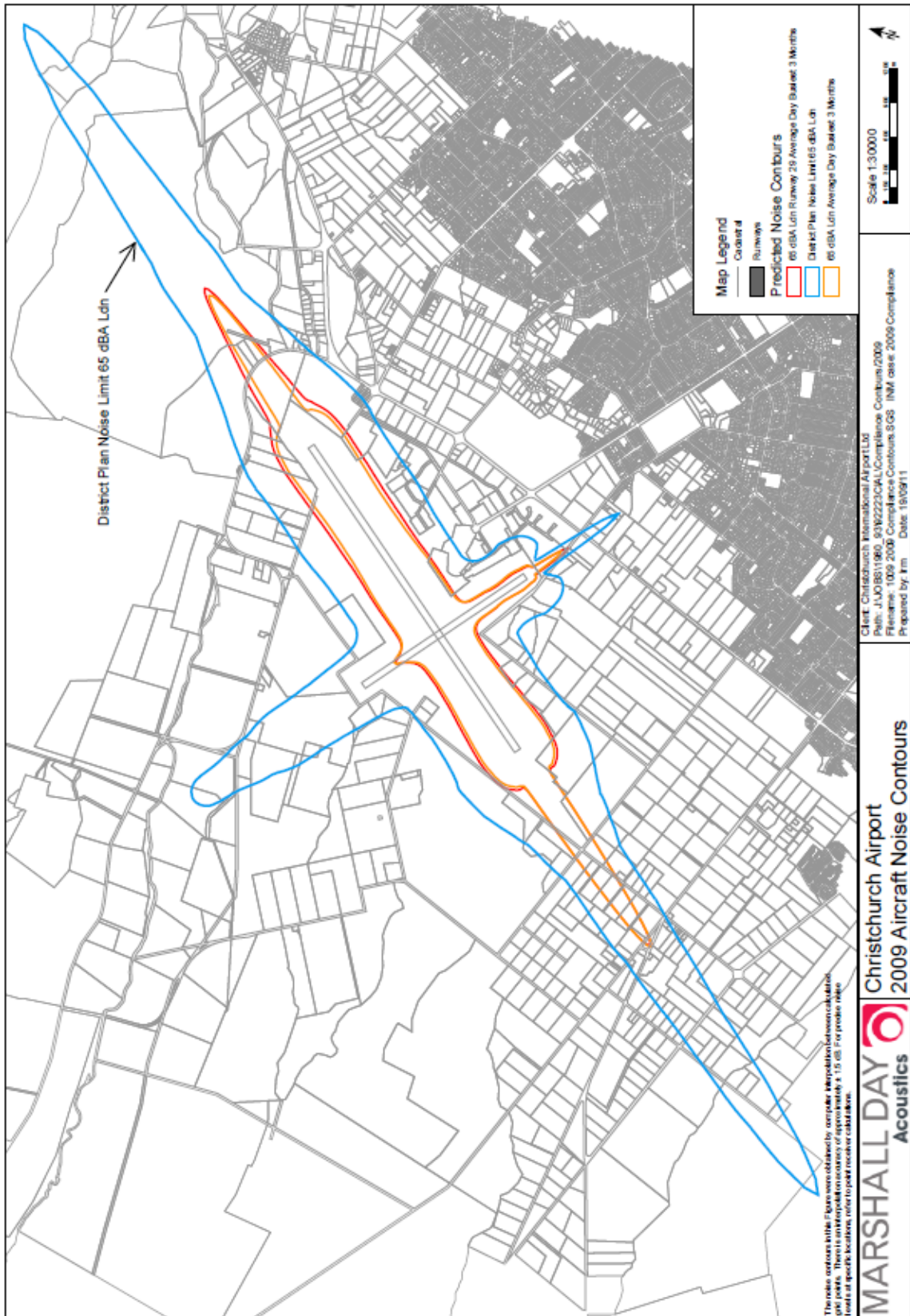
Crosswind Runway: RWY 11 – 0 %
 RWY 29 – 100 %

In the model, aircraft movements have been distributed across flight tracks which were developed in 2007 during a review of the airport noise boundaries. It is noted that for the purpose of modelling the location of the 65 dBA L_{dn} contour, the flight track details beyond 4 km from the runway are irrelevant as the contour does not extend further than this. Therefore the approach taken is considered to be valid and appropriate.

2.2 Calculated Contours

The two calculated 65 dBA L_{dn} contours for 2009 activity, as described above, are shown in Figure 1 below compared with the Operative City Plan 65 dBA L_{dn} contour. Both sets of 2009 contours comply comfortably with the City Plan limit.

Figure 1 Noise from Aircraft Operations 2009 Compared with City Plan Limit



3.0 CONCLUSION

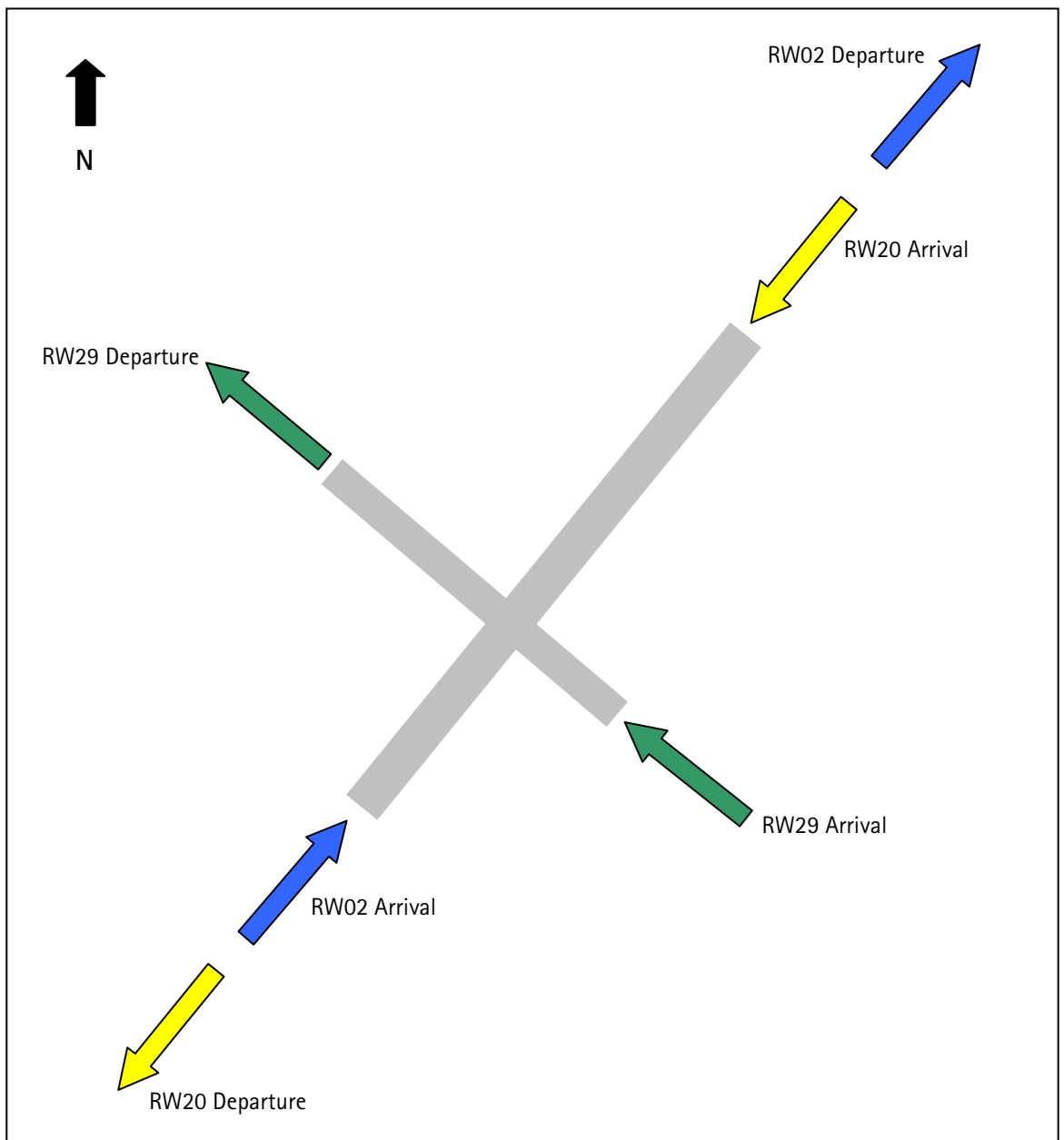
Noise contours have been calculated to establish whether noise from aircraft operations at Christchurch International Airport during 2009 complied with the Christchurch City Plan 65 dBA L_{dn} limit. Two sets of contours were calculated in order to assess compliance for the busiest three months overall as well as the busiest three months on the northwest runway (Runway 29). The noise modelling for both busy periods shows that noise from aircraft operations in 2009 comfortably complied with the 65 dBA L_{dn} limit.

APPENDIX A CHRISTCHURCH AIRPORT RUNWAY VECTORS

Runway 02 refers to operations using the main runway with a heading of 20 degrees from true north i.e. arrivals from the south west landing in a north easterly direction and departures towards the north east.

Runway 20 refers to operations using the main runway with a heading of 200 degrees from true north i.e. arrivals from the north east landing in a south westerly direction and departures towards the south west.

Runway 29 refers to operations using the crosswind runway with a heading of 290 degrees from true north i.e. arrivals from the south east landing in a north westerly direction and departures towards the north west.



APPENDIX B AIRCRAFT MOVEMENTS FOR ANNUAL CONTOUR SCENARIOS

Aircraft Activity for Busiest Three Months 2009 (Sep – Nov)

	Aircraft	Runway 02		Runway 20		Runway 29	
		Day	Night	Day	Night	Day	Night
Scheduled Jets	B722	0.02	0.00	0.01	0.00	0.00	0.00
	B733	32.20	5.93	18.11	3.33	6.21	0.34
	B734	0.01	0.00	0.00	0.00	0.00	0.00
	B737	0.23	0.03	0.13	0.02	0.00	0.00
	B744	0.04	0.01	0.02	0.00	0.00	0.00
	B752	0.09	0.00	0.05	0.00	0.00	0.00
	B763	1.44	0.01	0.81	0.00	0.05	0.00
	B762	0.18	0.46	0.10	0.26	0.00	0.00
	B772	2.81	0.00	1.58	0.00	0.01	0.00
	A310	0.01	0.00	0.01	0.00	0.00	0.00
	A320	13.11	5.64	7.37	3.17	2.87	0.42
			50.14	12.07	28.20	6.79	9.14
Scheduled Turbo-Prop	ATR72	28.43	1.32	15.99	0.74	4.67	0.10
	B190	5.32	0.15	2.99	0.08	5.00	0.43
	DH8C	19.60	0.69	11.03	0.39	4.33	0.20
			53.35	2.16	30.01	1.21	14.00
Military	C130	0.37	0.02	0.21	0.01	0.04	0.01
	C17	0.46	0.01	0.26	0.00	0.01	0.00
	E6	0.01	0.00	0.00	0.00	0.00	0.00
			0.83	0.03	0.47	0.02	0.05
Other	BAE146	0.02	0.01	0.01	0.00	0.00	0.00
	BAEJ31	1.71	0.22	0.96	0.12	0.48	0.09
	BEC200	0.00	0.00	0.00	0.00	0.01	0.00
	BEC58P	4.97	0.11	2.79	0.06	0.92	0.04
	C5	0.01	0.01	0.00	0.00	0.00	0.00
	CL600	0.04	0.00	0.02	0.00	0.00	0.00
	CNA172	0.01	0.00	0.00	0.00	0.00	0.00
	CNA180	0.01	0.00	0.01	0.00	0.00	0.00
	CNA210	0.01	0.00	0.00	0.00	0.00	0.00
	CNA320	0.01	0.00	0.00	0.00	0.00	0.00
	CNA441	0.03	0.00	0.02	0.00	0.00	0.00
	CNA500	0.08	0.01	0.04	0.00	0.02	0.00
	CVR580	1.60	2.86	0.90	1.61	0.15	0.20
	DC3	0.06	0.00	0.03	0.00	0.01	0.00
	DHC6	0.01	0.00	0.01	0.00	0.00	0.00
	DHC8	0.00	0.00	0.00	0.00	0.02	0.00
	FK27	0.05	0.72	0.03	0.41	0.01	0.10
	GASEPF	0.13	0.01	0.07	0.00	0.03	0.00
	GASEPV	0.77	0.03	0.43	0.02	0.16	0.02
	GII	0.01	0.00	0.01	0.00	0.00	0.00
	GIIB	0.07	0.00	0.04	0.00	0.00	0.00
LEAR35	0.01	0.01	0.00	0.00	0.00	0.00	
PA24	0.01	0.00	0.00	0.00	0.00	0.00	
SA226	1.04	0.98	0.59	0.55	0.15	0.14	
		10.64	4.95	5.99	2.79	1.99	0.59
Total		114.95	19.21	64.66	10.80	25.19	2.09

Aircraft Activity for Busiest Three Months on Runway 29 2009 (Oct - Dec)

Aircraft	Runway 02		Runway 20		Runway 29	
	RW02D	RW02N	RW20D	RW20N	RW29D	RW29N
Scheduled Jets						
B722	0.02	0.00	0.01	0.00	0.00	0.00
B733	32.17	6.30	18.09	3.54	6.78	0.29
B734	0.01	0.00	0.00	0.00	0.00	0.00
B737	0.22	0.03	0.13	0.02	0.01	0.00
B744	0.03	0.00	0.02	0.00	0.00	0.00
B752	0.13	0.01	0.07	0.00	0.00	0.00
B763	1.43	0.01	0.80	0.00	0.03	0.00
B762	0.05	0.49	0.03	0.28	0.00	0.00
B772	2.98	0.00	1.68	0.00	0.01	0.00
A310	0.01	0.00	0.01	0.00	0.00	0.00
A320	12.95	5.60	7.29	3.15	3.03	0.39
A340	0.01	0.00	0.00	0.00	0.00	0.00
Total	50.00	12.43	28.13	6.99	9.87	0.68
Scheduled Turbo-Prop						
ATR72	28.10	1.70	15.80	0.96	5.27	0.14
B190	5.15	0.17	2.90	0.09	4.99	0.50
DH8C	17.21	0.81	9.68	0.46	4.92	0.30
Total	50.46	2.69	28.38	1.51	15.18	0.95
Military						
C130	0.40	0.03	0.23	0.02	0.09	0.01
C17	0.58	0.01	0.33	0.01	0.01	0.00
P3	0.01	0.01	0.01	0.00	0.00	0.00
E6	0.01	0.00	0.00	0.00	0.00	0.00
Total	1.01	0.05	0.57	0.03	0.10	0.01
Other						
BAE146	0.02	0.01	0.01	0.00	0.00	0.00
BAEJ31	1.47	0.24	0.83	0.13	0.32	0.10
BEC58P	4.27	0.12	2.40	0.07	0.79	0.00
C5	0.01	0.01	0.00	0.00	0.00	0.00
CL600	0.06	0.00	0.03	0.00	0.00	0.00
CNA180	0.01	0.00	0.01	0.00	0.00	0.00
CNA210	0.01	0.00	0.00	0.00	0.00	0.00
CNA320	0.01	0.00	0.00	0.00	0.00	0.00
CNA414	0.01	0.00	0.00	0.00	0.00	0.00
CNA500	0.09	0.01	0.05	0.01	0.05	0.00
CVR580	1.58	2.86	0.89	1.61	0.16	0.14
DC3	0.05	0.00	0.03	0.00	0.00	0.00
DHC6	0.01	0.00	0.00	0.00	0.00	0.00
DHC8	0.00	0.00	0.00	0.00	0.02	0.00
FK27	0.13	0.63	0.07	0.36	0.03	0.11
GASEPF	0.17	0.00	0.10	0.00	0.04	0.00
GASEPV	0.76	0.08	0.43	0.04	0.14	0.03
GII	0.01	0.00	0.01	0.00	0.00	0.00
GIIB	0.08	0.00	0.04	0.00	0.00	0.00
IA1125	0.02	0.00	0.01	0.00	0.01	0.00
LEAR35	0.02	0.01	0.01	0.00	0.00	0.00
PA24	0.02	0.00	0.01	0.00	0.00	0.00
SA226	1.04	0.89	0.59	0.50	0.14	0.07
Total	9.84	4.85	5.54	2.73	1.72	0.45
Total	111.31	20.01	62.61	11.26	26.87	2.09

APPENDIX C: THE EFFECT OF GENERAL AVIATION ACTIVITY ON THE NOISE CONTOURS

General Aviation (GA) aircraft are light piston powered propeller driven aircraft typically operated by small businesses, private operators and aero club members. There is a considerable number of GA aircraft operating from Christchurch Airport but the noise emission of a GA aircraft is significantly lower than a commercial jet. Neither the existing City Plan noise boundaries nor the recently developed 'Expert Panel' noise boundaries include GA activity in the modelling. The Expert Panel agreed that the contribution of GA aircraft to the Airport's noise contours was insignificant and therefore it was not necessary to include this activity in the modelling.

To validate this assertion, the noise contours for the busiest three months in 2008 were calculated both with and without GA activity. The actual aircraft type for each GA movement was not identified in the available records therefore the calculations were based on the noisier GA aircraft types operating at the airport. The inclusion of GA in the model resulted in an increase of approximately 0.1 dB in L_{dn} which is considered to be a negligible change. Due to the small contribution to overall noise from the GA aircraft, it is considered reasonable to exclude this activity from the INM calculations.

The effect that GA activity has on the noise contours in the future will depend on the ratio of GA movements to large commercial aircraft movements. To monitor any significant change in this ratio, the table below lists the annualised busiest three months of airport operations by aircraft category. Each year the table will be updated in order to develop a historical record and highlight any significant changes in GA activity ratios.

Annualised Busiest Three Months of Aircraft Movements by Aircraft Category

	Jet	Turbo-Prop	General Aviation
2008	47,000	40,000	30,000
2009	39,000	40,000	54,000

Note: Figures are rounded to the nearest 1000 movements and are not exact