COMMUNITY NOISE REPORT SUMMER HILL (II) 2003 - 2009

By Johann Heinrich[#1] & Philip S. Lingard [#2]

ABSTRACT

This study is part of ongoing community aircraft noise monitoring being carried out by a Summer Hill resident (JH) . The location is opposite a large primary school in Moonbie Street. Aircraft noise levels have been monitored using a computerised data logger since 2002. The previous paper in this series[#3] reported sound level data recorded between mid 2002 and December 2005. This paper reports the maximum recorded sound levels (LA max) for jet aircraft noise events from 2002 to 30 June 2009, inclusive. Three and a half years on we can confirm the continuing high level of average noise , caused by indecently low-flying by large noisy jet aircraft and flight track concentration across this one location.

The data logger captures more than 60% of airport jet departures from Runway 34L at this one address, amounting to more than 14,000 departures per annum from 2004 to 2005. Time-of-departure verification against Airservices Australia data confirmed this percentage concentration. For the entire seven years from 2002-2009 the average maximum noise level (LA max) was 75 $dB(A)_s$ $\pm$ 5.6 (Standard Deviation). In 2002-2003 the proportion of departures exceeding 80 dB(A) was between 47 and 55%. However, the proportion exceeding 80 dB(A) declined from 45% in 2004 to 14% of total in the first half of 2009. From 2002 through 2005 more than 80% of noise events exceeded 75 dB(A). This percentage declined to around 46% in the three years from 2007 to 2009 . The computed Australian Noise Exposure Index (***ANEI*** -365 days) for the entire period averaged 20 dB(A) $\pm$ 0.9 and over 22 $\pm$ 1 dB(A) by operational period . The Energy and Time Averaged Equivalent noise level ***LA_{eq}*** was 53 dB(A) $\pm$ 15 on a whole of year basis, and over 55 dB(A) by operational period. Such values were not predicted for the Summer Hill - Ashfield area by Sydney Airport's Master Plans (2023 or 2029) until after 2023.

Such ***ANEI*** are considered only ***"conditionally acceptable"*** for home building approvals near an airport by Australian Standard AS 2021-2000; and the ***LA_{eq}*** unsuitable for residences adjacent to noisy industrial sites according to NSW EPA ***"Industrial Noise Policy Guidelines (2000)"*** for suburban areas. Such noise averages are considered excessive and potentially harmful to important aspects of human health and welfare according to World Health Organisation-commissioned report in 1995. The herein reported maximum decibel ***(LA_{max}***) results confirm the general event noise levels obtained by Airservices Australia in their Environment Branch [EB] Summer Hill Report No. 1360 (2003), excepting that our ***LA_{eq}*** and ANEI are greater.

For clarity we mention that reported sound levels (LAmax) are in A-weighted “Slow” -averaged decibels [$dB(A)_s$] as required for aircraft monitoring by Australian Standard (AS2021). This measure for aircraft peak noise is about 3 -4 dB *less* than common for both peak and continuous monitoring of general environmental noise. On paper this makes a typical recorded aircraft noise appear *much quieter* than it really is. It is also noted that the A-weighting significantly attenuates low sound frequencies (< 160 Hz). It is such lower frequencies that can cause significant disturbance for people with hearing disorders such as Tinnitus and Menier’s condition, and is also implicated in building vibration-induced damage.

Whilst we can report marginal gains since 2005 , the outcomes are not overly commendable. The onus for further improvement is on Airservices Australia, whose refusal to implement the promised ***LTOP***[#4] appears behind the problem. Remedial action is needed through both intelligent air traffic control , and the full ***LTOP*** implementation promised in 1996. In particular Airservices must devise better noise abatement departure protocols (NADPs) than the minimalist ICAO-"A" (now NADP 2) and low-level minimum fuel consumption (MFCDP)[#5] takeoffs practised now. There should also be significantly increased use of over-water modes.

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2 P. S. Lingard has been a resident of Ashfield for 39 years

3 Community Noise Report Summer Hill , Preliminary , Dec. 2005 [SACF Doc. 2006/028]

4 *Long Term Operating Plan for Sydney (Kingsford Smith) Airport*, Airservices Australia Dec. 1996 .

5 MFCDP = “Minimum Fuel Consumption Departure Protocol”

In 2006 one of us (PSL) demonstrated proposed departure procedures using steeper initial climbs to potentially reduce ground noise at Summer Hill by from 10-20 dB(A) for B747's (IMC) [#6]. The US FAA's INM[#7] computer model was used for this. Such steep takeoffs from Runway 34L are presently inhibited by a potentially dangerous ceiling of overflying arrivals (heading south at 6000 ft across Summer Hill) which would not exist had LTOP been implemented with its original offshore ("high & wide") arrivals component. Figures 1 [(a) & (b)] illustrate the inherently dangerous arrival ceiling (square data points) over Ashfield and Summer Hill.

FIGURE 1 (a) THE ARRIVAL CEILING OVER SUMMER HILL:

Image by P. Lingard by digital reconstruction. Airservices Data of Figs 7 & 10 of EB Report 1360 2003 [ibid. 9] .

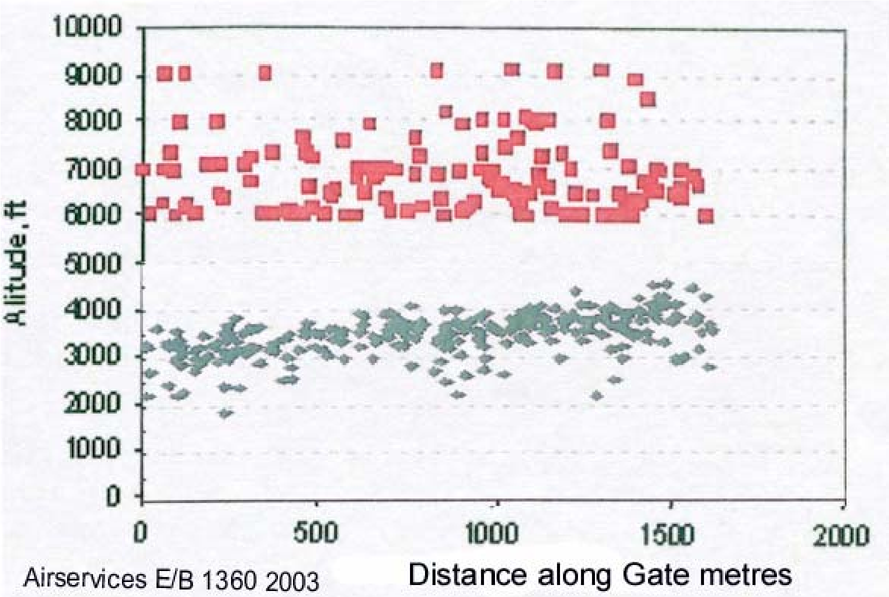
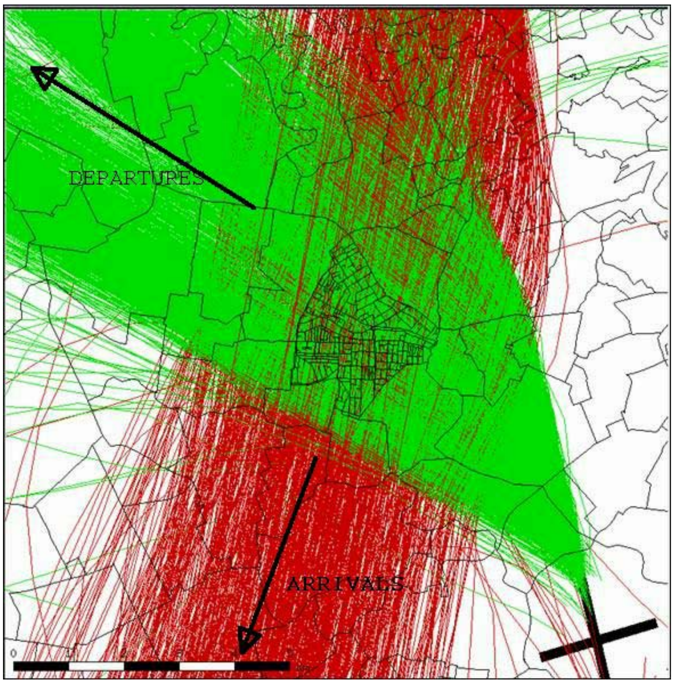


FIGURE 1 (b) PLAN VIEW OF CROSSING FLIGHT PATHS IN (a) :

Image annotated by P. Lingard from Airservices Flight Track Data 13/2/2003 to 17/5/2003 06:00 - 23:00. Supplied for Research and Private Study by NEU by M. Chipman resulting from TNIP enquiry to D. Southgate of DOTRS . 1 August 2005 .



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6 *SUPPORTING DATA FOR SACF NOISE ABATEMENT DEPARTURE PROTOCOL [NADP] DISCUSSION By P.S. Lingard [SACF Doc 2007- 022].* - presented to SACF and LTOP's Implementation & Monitoring Committee

7 INM = Integrated Noise Model (Computer Software produced by the US FAA).

1. INTRODUCTION

Since 4 December 1997 the Summer Hill and Ashfield communities have borne the brunt of northerly directed takeoffs, mainly jet departures, from Runway 34L at Sydney Airport. The frequency of noise complaints from Summer Hill was early denounced by former Transport Minister Mark Vaile MP as the community"rorting the complaints line" [#8]. In the late '90's it was also viewed somewhat sceptically by the government's Sydney Airport Community Forum (SACF), which more recently expressed consternation that several hundred complaints per fortnight could emanate from as few as , apparently, sometimes only 3-4 telephones. Led by a former IMC Chairman (an Airservices employee) a witch-hunt atmosphere prevailed at SACF through 2003-2005 whereby complainants became suspected of something almost akin to a criminal conspiracy, and Federal magistrate court prosecutions were commenced if certain injudicious words were used when addressing staff of the noise complaints line (NEU).

During early 2003 Airservices Australia Environment Branch conducted a 3 month aircraft noise monitoring study at a home in Henson Street, Summer Hill (ASA EB Report No. 1360, Sept. 2003[#9]). That study was the very first extended noise monitoring exercise carried out in the Ashfield area beyond the continuous monitoring by Airservices Australia Noise Monitoring Terminal at Croydon's PLC[#10] (NMT 15 , as to which see later) after five years of Pseudo - LTOP operation.

The Airservices study reported Boeing 747 jet aircraft noise levels averaging 80 dB(A) +/- 4 (SD) at the Henson Street residence. Importantly it also confirmed resident observations that the reason for the high noise levels was the very depressed altitude flying being undertaken by jet aircraft across the subject area, the heaviest departing jets being observed as low as 1200 -1600 ft at 7 - 10 km from take-off roll. This is caused by the arrival ceiling,

The validity of the high noise levels documented in the 2003 Airservices Study were at first considered sceptically by the government SACF. The reported noise levels seemed more like those previously found at Sydenham and Tempe than for points 7-10km from takeoff roll, leading to the question why?

Airservices Australia environment branch staff duly assured the government SACF that the data were reliable and sound. Late in 2003 Airservices own data from EB Report No. 1360 were successfully used to convince one federal magistrate that an admittedly abusive complainant , was himself responding to abuse from Airservices Australia. Before the 1996 election , the people of Lowe (which includes parts of Ashfield) were promised by former Prime Minister John Howard that they would receive *no more* aircraft noise with the then proposed LTOP[#11] than they received before . The latter was in fact precisely nil! Yet even today , after 12 years and ever rising impacts , this paper shows that matters have been made worse , not merely held in status quo, by the LTOP implementation.

Only two official noise monitoring exercises had been conducted in Ashfield at Henson and Alt Streets (Airservices EB Reports No. 1360 and 1485) . However, monitoring requested by a Unit Block in Chandos Street , through former Ashfield Mayor [Rae Jones] was aborted in 2006 for unsubstantiated reasons. Yet further afield monitoring was being regularly carried out in areas more traditionally exposed to aircraft noise along the old pre- 1997 flightpaths (eg. Lane Cove, Kurnell) , whilst newly LTOP-noise-affected areas (such as Ashfield) were being ignored, despite the Environment Minister's 1996 instruction for such monitoring to occur[#12] .

Noise Monitoring at Presbyterian Ladies' College, Croydon (NMT No. 15) , showed that the main flight tracks bifurcate predominantly to either side of the Croydon monitor , rather than directly over it: See Appendix "D". Hence one may reasonably conclude that the data from NMT 15 is atypical and understates the aircraft noise impact for PLC and surrounding neighbourhoods.

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8 Vaile Press Release, April 1998

9 Airservices Australia Environment Branch report No. 1360 , ***"Short Term Study into Aircraft Noise and Flightpaths"***, February to May 2003, Summer Hill.

10 Presbyterian Ladies College.

11 SMH 9/2/1996

12 Minister Robert Hill - Media Release 88/97, 24 July 1997.

Apart from the above-mentioned studies, this Community Noise Report and the preceding Preliminary Report of December 2005, are the only community attempts , to the authors knowledge , to quantify "LTOP" - related aircraft noise at specific homes in the inner north west.

Those responsible in both government and Airservices Australia must understand that for many people annoyance from aircraft noise results not from mere dislike. It occurs because when exposed with regularity at the sound levels reported in the present report and Environment Branch Report No. 1360, some people can actually feel pain, with resulting physiological and psychological harm [#13]. Far from such complainants being "nutters" , as contemptuously described by one former Airservices employee at the Government's SACF, they may in fact be being harmed by Airservices continued pursuit of its more -than half-aborted LTOP. It will be submitted that continuation of abusive noise without proper environmental controls amounts to a form of bureaucratic persecution.

This paper reports ongoing noise monitoring being carried by one such resident (JH) , both by way of community service, and as a means of substantiating the tinnitus-related pain , Menier's dizziness and progressive hearing loss being incurred through remaining in the home his family love and bought well before it became affected by aircraft noise. Faxed reports containing his weekly sound level data (LA max) are sent regularly to Airservices Australia, politicians and the SACF Chair , but without response.

Co-author (PSL) [#14], a SACF Proxy for the Mayor of Ashfield for the two year period 2006- 2007, has assisted JH in presenting the present data in the interests of hopefully securing more just and equitable aircraft noise outcomes for similarly placed people in Summer Hill and the inner west generally, and to bring to public notice the likely health detriments resulting from continuation of present practices . The fact is that up to 15 % of normal people suffer from conditions like Tinnitus and Meniers without in any way being considered mentally ill, as implied in epithets such as "nutter".

It is suggested that all such affected people should complain loudly both to Airservices Australia and the responsible government Minister, and collectively seek compensation in the form of noise insulation at government expense .

2. METHODS:

The noise monitor employed is an always-on device situated in a Personal Computer with a commercially-available data-logging module (Picotech® [#15], DrDAQ® data acquisition unit) , as frequently used in education. The DrDAQ ® unit records sound pressure changes in A-weighted decibels from an electret microphone at regular intervals onto a computer hard disk (< 1 second between readings , max collection rate 15000/sec). The system is sensitive to changes in sound pressure level of 1 dB(A), and as supplied is accurate to 5 dB(A). The range of sound pressure level to which the unit is sensitive is 55 - 100 dB(A). The frequency bandwidth of the microphone would be typical for an electret, ie. nominally 50 - 15000 Hz Also monitored is ambient temperature, and sound frequency. The computer clock is synchronised with a web-based atomic clock standard. A typical output trace from the recording system is shown as Table 1 in Appendix "A".

The microphone is located outside , in the open, at a height of 930mm above a grassed surface using a shielded extension cable (Soundlink type SHW-1207) . The unit is built into a weather-proof PVC housing, with a foam plug to prevent water penetration and wind effects. It is situated behind the subject residence at Moonbie Street in Summer Hill , which is across the road from a State Primary School . Mostly the machine is attended, and auditory confirmation of the fact of an aircraft noise event is possible. However, such detailed attendance is not mandatory . Although the residence is near to a main road (The Old Canterbury Road) and a residential feeder (Junction Road), the buildings are solid pre-federation-period , stone and double brick bungalows, in a generally quiet residential area.

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13 "Community Noise", Berglund , B. & Lindvall, T. (1995) , Karolinska Institute, Sweden, Archives Centre Sensory Res. 2(1), 1-195, Figure 4, para. 7.1.2.2, Report to WHO.

14 Philip S. Lingard has a professional background in Physics (B.Sc Hons., C.Phys IOP, UK) , Biophysics and Engineering Bio-Fluid Mechanics (Ph.D., MIE Aust), and also possesses legal qualifications. He is Secretary of SACF Inc., & North West Residents Airport Group , P.O. Box 104 Summer Hill, NSW 2130, Tel/Fax: (02) 97989606

15 www.picotech.com; www.drdaq.com; See "Silicon Chip" article July 2000, Peter Smith

It is possible to manually scrutinise the record to determine whether an event sound profile is in fact consistent with that of an aircraft - from its recorded frequency spectrum and the time course of its amplitude characteristic . It is a relatively simple matter , by inspection , to eliminate extraneous noise events such as motor vehicles, dog barks , whistles and the like . At the end of each day , or at some later time, the maximum recorded sound level (LA max) is noted down against the time of the recording, and a day-file for each series of events created.

The noise monitor only operates when the subject family is in residence. Therefore there are intermittant periods of up to 30 days most years when data are unavailable (See Table 5).

Calibration:
The noise monitor is subjected at least once daily to random calibration tones at 1000 Hz using an industrial noise calibrator (Testo® model IEC 942/90 Class 2 ; Farnell Order code 892-889) with an output of 94dB(A). The calibrator is placed a prescribed distance from the microphone, following the manufacturer's instructions for calibration, when the sound pressure level read by the datalogger can be adjusted if necessary (See trace).

A typical day trace showing the manually -extracted LA max [#16] levels is reproduced in Table 2 of Appendix "A". Monitoring occurs continuously throughout the year, excepting for periods when the monitor owner's family takes annual vacation. (See Table 5).

Due to the method of measurement employed in aircraft noise assessment for building siting and construction (AS2021-2000), the maximum absolute - or instantaneous sound level (LA max) accepted for aircraft noise assessment is around 3 dB(A) more than that considered acceptable for Industrial and other environmental noise. This is due to the “Slow” (1 second) - integration constant chosen by the aviation industry for use in aircraft noise analysis, which *“smooths the peaks”* from an aircraft noise trace, in a manner which the human ear does not.

It was not initially known what averaging system (if any) was employed by the “DrDAQ® ” for signal processing. However, later research showed that it was performing on the “Fast” side, with a time constant around 0.13 seconds. There is no in-built adjustment for the time constant. It also happens there is a minor issue with the A-scale frequency weighting of the DrDAQ®.

Following the initial report tabled at Government SACF on 16 December 2005 [***”COMMUNITY NOISE REPORT SUMMER HILL 2002-2005” -Preliminary***] Airservices Australia helpfully sent out an Environment Branch technical expert (Dr. Ian McLeod) who spent some time with the authors on 11 April 2006 comparing the output from the Pico-tech DrDAQ® with a Class I Breuhl and Kerr sound level meter for typical flyovers.

The second author made simultaneous comparative measurements with an independent moving coil -type sound level meter (Yu-Fong) which , although uncalibrated , gave remarkably similar readings to the Breuhl and Kerr. The results of this testing are reported from two reports in Appendix “B” .

During testing it appeared that the DrDAQ® was reading in the range from 3 - 8 dB(A) too high. Dr McLeod pointed out that if the DrDAQ® was not averaging the sound level input using a 1 second interval, then peak noise levels would be high compared with Airservices measurements with Class I or II A-weighted instruments set to use a “Slow” (S) - based (1 second) averaging filter. This is the requirement for aircraft noise-based sound level measurement of AS2021-2000. Dr McLeod advised that this would normally produce an error on the high side of around 3 dB(A) were the DrDAQ® meter found to be integrating “Fast” .

[16] LA max = maximum sound level in dB(A)

On-site comparisons by one of us (PL) revealed an average difference of around 5.5 dB(A). However, the absolute readings for a constant sound level input from the Testo calibrator agreed for both the DrDAQ® , the Bruell and Kerr and Yu Fong instruments.

A correction has therefore since been applied to all the original (2002 through 2005) data, and also to all more recently-collected data reducing the DrDAQ ® -measured values of LA max for aircraft overflights by 5.5 dB(A). The Tables of Results (below) show this as the "corrected" result. Further investigations are continuing which it is hoped will enable this simple sound level monitor to integrate the outputs on-line using an "S" -scaled filter.

Data Verification:
To authenticate that the noise being recorded is actually from aircraft overhead, the frequencies of data collection for each day of recording have been compared with ***Sydney Airport Community Forum's*** (Government SACF) regular fortnightly ***"Sydney Airport Briefing Notes"*** published on the Government SACF website .

The number of monitored noise events at Summer Hill are compared with officially-reported daily north-west departures from Runway 34L and listed as percentages in Table 4 A.

For the period from 2002 to December 2005, the times of the originally measured overflights have also been compared for coincidence with the Airservices-Produced official takeoff times for all aircraft departing northwest, and the results of this appear in Table 4 B.

Data Analysis
The LA max values in A-weighted decibels are tabulated in chronological order according to the format used by the Department of Transport's "TNIP" software for N70 analysis [#17], and processed in spreadsheet format (Using 32 bit Lotus -123) to produce mean, standard deviation, ***Australian Noise Exposure Index*** (ANEI) and the ***Equivalent Energy-Averaged Noise Exposure*** for each year (LAeq).
The methods for achieving this were described in Appendix "K" to **SACF Inc's *"The Way Forward for Aircraft Noise Sharing at Sydney (Kingsford-Smith) Airport"*** [#18] , and generally follow standard acoustical practice. The formula for ANEI employed is the one published in Australia Standard AS2021 -2000, "Acoustics - Aircraft noise intrusion- Building siting and construction" , p. 45 for the Australian Noise Exposure Forecast (ANEF).

For a single location subject to noise impacts from a variety of flight paths all of which pass more or less directly overhead, the ANEF formula [used here to obtain ANEI] , can be reduced to :

$$ANEI = 10 \times \log \sum_{i=1}^{N} 10\left\{\frac{ANEI_i}{10}\right\} \qquad ....1.$$

where i is the i'th event and :

$$\boldsymbol{ANEI}_i = EPNdB_i + 10 \log_{10} [N_d + 4 N_n] - 88 \qquad ....2.$$

where N_d and N_n are the number of events observed during "day" and "night" , respectively, and

$EPNdB_i$ is the "effective perceived noise level in decibels" of an individual event.

For practical purposes EPNdB may be obtained from the maximum event noise in A-weighted decibels (LA max) by adding a constant which is around 13 [#19] , ie:

$$EPNdB_i \text{ [in dB(A)]} = LA\ max_i \text{ [in dB(A)]} + 13 \qquad ....3.$$

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17 Microsoft, csv format , NMT,DATE,TIME,AC_TYPE,OPERATION,LAMAX

18 ***"The Way Forward for Aircraft Noise Sharing at Sydney (Kingsford-Smith) Airport",*** P.S. Lingard et al ., SACF Inc, PO Box 104 Summer Hill, NSW 2130, 2003; ISBN 0-9751843-4-2 (pbk); 0-9751843-5-0 (pdf) .

19 See NAL Report 88 , *"Aircraft noise in Australia: A survey of community reaction"* , Feb 1982, National Acoustics Laboratories, Australia, Table 8.1 , p. 128.

The ANEI is thus computed for the entire period of recorded events, and the summation in equation (1) averaged for a single "representative" day.

Thus, for monitoring representative of a whole year (365 days) the summation would be divided by 365. For a lesser period, the lesser number of days would be employed.

The Australian Standard (AS2021-2000) now provides that for Australian Defence Department airports , where aircraft activity typically occurs in bursts of a few days or during weekdays only, then averaging will be carried out for the lesser time than a whole year (AS2021 para A2.4) . This results in a larger effective ANEI (or ANEF) for the reduced period, than if it were to be calculated for a year. It is considered to better reflect the degree of community annoyance than the annually averaged data used for civilian airports.

Although this method is expressed in AS 2021 to apply to Defence Department airports, where usage is subject to the on and off requirements of exercise periods, we submit that it ought also to apply to residential areas of Sydney, not on established ***"Flight Tracks"*** , which are subject to variable , but heavy activity from Sydney Airport. Both methods (whole year and "reduced year") are therefore compared in the results shown here.

3. RESULTS:

Full data files are obtainable on CDROM or similar disc upon request from the authors. These files provide the full raw LA max data from which the results have been calculated (See files 200xnois.txt, where x is the number of the year).

3.1 Average Noise in A-weighted Decibels :

An overall average of 12248 noise events/annum was recorded from 2002 through 30 June 2009 - See Table 1 . The Table provides the average noise and standard deviations for each of the years for which data are available.

TABLE 1 Maximum Average Event noise (LA max) in dB(A):

YEAR	AVE LAmax dB(A) recorded #	AVE LAmax dB(A) corrected	SD	MIN LA max corrected	MAX LA max corrected	NUMBER OF EVENT DATA
2002*	80.4	74.9	6.2	46.5	95.9	9,670
2003	79.8	74.3	4.9	52.3	95.2	11,441
2004	79.1	73.6	4.6	56.4	92.3	14,081
2005	79.9	74.4	5.2	52.1	92.3	14,662
2006	80.8	75.3	5.5	60.3	94.5	13,219
2007	81.0	75.5	5.6	58.9	94.4	12,214
2008	80.0	74.5	5.4	56.5	95.5	11,078
2009*	79.2	73.7	5.6	59.6	92.7	5,810

* Part Year only
\# Recorded data

3.2 Australian Noise Exposure Index & LA eq:

Table 2 lists the calculated Australian Noise Exposure Index levels (ANEI) and the Equivalent Energy Averaged Noise Exposure , LA eq (dB(A) , calculated for each partial annual period , first assuming the data represents a full year record, and second for a period limited by the recorded number of days.

TABLE 2 Calculated ANEI and LA_{eq} for stated conditions

YEAR [record days]	ANEI (365days) recorded	ANEI (record days) recorded	ANEI (365days) corrected	ANEI (record days) corrected	LA eq (365 days) recorded	LA eq (record days) recorded	LA eq (365 days) corrected	LA eq (record days) corrected
2002 [158]	25.2	28.8	**19.7**	**23.3**	20.2	23.8	**14.7**	**18.3**
2003 [221]	25.1	27.2	**19.6**	**21.7**	63.4	65.5	**57.9**	**60.0**
2004 [251]	24.3	25.9	**18.8**	**20.4**	63.0	64.6	**57.5**	**59.1**
2005 [248]	25.7	27.5	**20.2**	**22.0**	64.5	66.3	**59.0**	**60.8**
2006 [265]	27.0	28.4	**21.5**	**22.9**	65.5	66.9	**60.0**	**61.4**
2007 [227]	26.9	28.9	**21.4**	**23.4**	65.5	67.5	**60.0**	**62.0**
2008 [201]	25.4	27.9	**19.9**	**22.4**	63.9	66.5	**58.4**	**61.0**
2009 [115]	24.4	26.6	**18.9**	**21.1**	60.2	65.3	**54.7**	**59.9**

3.3 Numbers of Departures Exceeding Given Noise Thresholds:

Table 3 provides the percentage noise levels for each year falling into each of 7 threshold categories according to decibel (dB(A) level. The table also shows the number of flights per "noise-affected day" for the subject site in each year .

3.4 Data Verification:

3.4.1 Verification in Comparison with Airservices SACF Briefing Notes

Table 4A compares the aircraft noise event numbers as a monthly percentage of the ***"Sydney Airport Briefing Note"*** -provided northwest departures per day from runway 34 Left.

However, as the early “Briefing Note” data was not always found to be reliable[#20] , it seemed wise to verify the data by direct comparison of event times with official departure times for all aircraft detected in the monitored periods. Airservices Australia was initially unwilling to provide this data except at significant cost. However, after publication and discussion of the initial report in Government SACF in 2006 , and representations made in SACF by the then Proxy for the Mayor of Ashfield , the required departure time data was supplied by Airservices Australia . This occurred after behind-the-scenes encouragement from then Senator Marise Payne (Chair of Government SACF from 2002 through Nov. 2007).

3.4.2 Verification by Coincidence Testing of Noise Events against Takeoff Times:

Table 4A (below) compared the recorded data by percentage of takeoffs detected at the sound level meter against reported total and jet aircraft takeoffs from Runway 34L.

As noted above, it seemed wise to compare the times of the DrDAQ ® recorded noise events against the actual departure times for jet aircraft . Table 4B (below) shows the sound level - noise event data for 2002 to 2005 compared with Airservices Australia's listed takeoff times for Runway 34L , obtained from Official Departure Time Statistics, compared on a quarterly basis.

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[20] For example, the data for one fortnight in October 2002 were originally those for July 2002

TABLE 3 Numbers , Percentage and Number /day of Events greater than stated dB(A) level:

YEAR	**>65**	**>70**	**>75**	**>80**	**>85**	**>90 dB(A)**
2002 Total 158 DAYS	**9,536**	**9,246**	**7,871**	**5,329**	**1,962**	**526**
Percent 02 >	98.61%	95.62%	81.4%	55.11%	20.29%	5.44%
No. per day-02	60	59	50	34	12	3
2003 Total 221 DAYS	**11,425**	**11,300**	**9,478**	**5,418**	**1,432**	**339**
Percent 03>	99.86%	98.77%	82.84%	47.36%	12.52%	2.96%
No per day-03	52	51	43	25	6	2
2004 Total 251 DAYS	**14,051**	**13,874**	**11,276**	**5,704**	**1,426**	**75**
Percent 04 >	99.79%	98.53%	80.08%	40.51%	10.13%	0.53%
No. per day-04	56	55	45	23	6	0
2005 Total 248 DAYS	**14,279**	**11,565**	**6,519**	**2,182**	**331**	**8**
Percent 05 >	100.00%	80.99%	45.65%	15.28%	2.32%	0.06%
No. per day-05	58	47	26	9	1	0
2006 Total 265 DAYS	**13,001**	**10,747**	**6,576**	**2,636**	**661**	**65**
Percent 06 >	100.00%	82.66%	50.58%	20.28%	5.08%	0.50%
No. per day-06	49	41	25	10	2	0
2007 Total 227 DAYS	**10,806**	**8,684**	**4,973**	**1,608**	**428**	**34**
Percent 07 >	100.00%	80.36%	46.02%	14.88%	3.96%	0.31%
No. per day-07	54	43	25	8	2	0
2008 Total 201 DAYS	**10,806**	**8,684**	**4,973**	**1,608**	**428**	**34**
Percent 08 >	100.00%	80.36%	46.02%	14.88%	3.96%	0.31%
No. per day-08	54	43	25	8	2	0
2009 Total 115 DAYS to end June	**5,473**	**4,188**	**2,500**	**730**	**110**	**4**
Percent 09 >	100.00%	76.52%	45.68%	13.34%	2.01%	0.07%
No. per day-09	49	38	23	7	1	0
YEAR	**>65**	**>70**	**>75**	**>80**	**>85**	**>90 dB(A)**
AVERAGES %>	99.8%	86.7%	59.8%	22.7%	7.5	1.3%
AVERAGES #/Day	54	47	33	15	4	< 1

In Table 4B , for a departure time to be accepted as *"coincident"* for inclusion in the statistics the subject departure must have occurred not more than 90 and not less than 9 seconds before the recorded noise event.

Table 4B confirms the findings reported in Table 4A which were obtained by comparison of numbers of overflights with Runway End takeoffs published in Airservices Sydney Airport Briefing Notes. It shows that 61% of aircraft monitored at this Summer Hill location are jets recorded and verified as having departed Runway 34L at the stated time. It also shows that no “false positive” events were recorded (cf. 3.4.3 below).

***TABLE 4A Data Verification by Month showing Percent Detected Flyovers*:**

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN ALL A/Craft	MEAN JETS ONLY
2002*	29%	26%	NA	5%	NA	NA	63%	61%	60%	70%	63%	71%	**65%**	**108% ##**
2003	50%	NA	52%	48%	46%	46%	45%	51%	47%	42%	49%	34%	**46%**	**77%**
2004	43%	40%	47%	51%	53%	51%	48%	50%	48%	37%	44%	39%	**46%**	**77%**
2005	57%	51%	56%	57%	54%	56%	56%	51%	52%	50%	49%	55%	**54%**	**89%**
2,006	82%	78%	83%	68%	75%	76%	78%	82%	79%	84%	77%	79%	**49%**	**82%**
2,007	78%	98%	55%	84%	79%	82%	33%	40%	75%	41%	62%	26%	**36%**	**60%**
2,008	79%	82%	57%	44%	37%	69%	38%	75%	65%	73%	75%	41%	**36%**	**61%**
2,009#	75	68	0	77%	68%	64%							**49%**	**81%**

** Note 1 2002 Data Year Incomplete*
 # Note 2 2009 data is for half year to June 30.
Note 3 : Airservices Data shown for Years 2006-9 is for Jets only . For 2002 - 2005 data was originally provided only for total departures - with 60% of them being Jets.

TABLE 4 B Data Verification by Coincidence Testing -Percent of Takeoffs Captured:

YEAR		QTR 1	QTR 2	QTR 3	QTR 4	MEAN
2002	*% COINCIDENCE*				48.86%	
	FALSE POSITIVES				< 0	
2003	*% COINCIDENCE*	28.34%	70.16%	73.58%	65.28%	
	FALSE POSITIVES	< 0	< 0	< 0	< 0	
2004	*% COINCIDENCE*	56.60%	74.39%	70.28%	60.94%	
	FALSE POSITIVES	< 0	< 0	< 0	< 0	
2005	*% COINCIDENCE*	46.33%	78.03%	68.09%	55.85%	
	FALSE POSITIVES	< 0	< 0	< 0	< 0	**61%**

3.4.3 False Positive Detections:

During the monitor establishment period (2002 -2003) it appeared on a number of occasions that aircraft were being recorded by the monitor on days when aircraft were not taking off from Runway 34 Left, and across the inner west (Table 5).

Table 5 (below) lists the numbers of days and aircraft involved in what appeared to be *false positive* aircraft noise events recorded by the monitor ,when originally compared with the SACF ***Briefing Notes*** from 2002 to 2005.

Subsequent replacement of some earlier “Briefing Notes” by Airservices monthly “Operational Statistics” has eliminated many of these and no false positives were found with the data supplied for departure coincidence analysis . All detected noise events coincided with a jet aircraft departure from Runway 34L.

However, Airservices Australia could assist by conducting more extended professional noise monitoring across the northwest, but attempts to obtain such monitoring for other requested locations have proven subject to bureaucratic interference and obfuscation.

TABLE 5 Apparent "False Positive" Events Statistics:

YEAR	FALSE POSITIVE DAYS (Total days)	"FALSE-POSITIVE" FLIGHT NUMBERS VS. (TOTAL OPS) & as %	NON-OPERATIONAL DAYS (commissioning or vacation related)
2002[#1]	18 (158)	1085 (9670) = 11.2%	92
2003	9 (221)	506 (11441) = 4.4%	49
2004	7 (251)	37 (14081) = 0.26%	9
2005	4 (215)	12 (13268) = 0.09%	43

[1] Monitoring Equipment was being commissioned during 2002 & early 2003

4. CONCLUSIONS FROM RESULTS:

The following should be considered in light of the fact that a sound level of 70 dB(A) [recorded with a "Fast" integration constant of 0.125 seconds] is the commonly accepted maximum sound level [LAmax] permissible for power tools and similar noisy objects used domestically , and that this level is some 3-4 dB(A) more than any 70 dB(A) maximum recorded with the "Slow" [1 second integration] by the Standard (AS2021) used in aircraft monitoring work . All the following refers to sound level data obtained by a measure appropriate for aircraft noise measurement, i.e. Equivalent to a "Slow" -integrated measure.

4.1. Between 2002 and 2004 in excess of 40% of all jet aircraft crossing over the subject location exceeded an LA max of 80 dB(A).

4.2. Between 2005 and 2007 between 15% and 21% of all jet aircraft passing over the subject location exceeded an LA max of 80 dB(A)

4.3. Between 2002 and the end of 2004 more than 80% of all jet aircraft produced a maximum sound level over 75 dB(A) and over 90% exceeded 70 dB(A). From 2005 to-date over 45% of all jet aircraft produced maximum sound levels over 75 dB(A); and over 75% of jet aircraft in the first half of 2009 generated more than 70 dB(A) .

4.4. The number of jet aircraft noise events per operational day exceeding 70 dB(A) [N(70)] has fallen from nearly 60 in 2002 to around 40 per day in the first half of 2009.

4.5. The number of jet aircraft noise events per day exceeding 80 dB(A) has declined from 34 in 2002 to under 10 in the last two years

4.6. The calculated ANEI , whether based on a 365 day year, or the number of record days, is often in the only "*Conditionally Acceptable*" band for residential building construction according to the Australian Standard AS2021-2000 , Table 2.1 . This home should therefore be provided with substantial Noise Insulation at the industry's expense.

4.7 Comparison with Airservices Australia Sydney Airport Operational Statistics / Briefing Notes for all years shows that from 60 to 90 % of jet aircraft and /or 50% of all aircraft departing Runway 34L overflew the subject location in Summer Hill. For the entire period 61% of aircraft monitored at this Summer Hill location were jets verified as having departed Runway 34L at the stated time. There is thus a significant concentration of departing flight tracks immediately above this property. It is submitted that this is grossly unfair and essentially discriminatory. It is also largely avoidable, and continues to reflect the apparent disregard shown by ***Airservices Australia*** and the airlines for the residential interests overflown.

4.8 Detailed Departure Coincidence testing confirmed the previously reported flight track concentration findings in Table 4.

4.9 Although there was some reduction of flight-track concentration from 2003 to 2007, further increases in concentration have occurred during 2009 to-date, capturings rising from ~60% in 2008 to around 80% in the first half of 2009 .

5. DISCUSSION OF RESULTS:

The data recorded varied from 9670 overflights in 2002 (a partial year) climbing to over 14000 in 2004 and 2005. The annualised average from 2002 - 2009 (1st half) is 12248. Despite some flight path spreading across the inner north west , an average of 61% of reported jet takeoff events are captured by this single monitor . Since publication of the Preliminary report in 2005 this concentration was confirmed by Takeoff-Time Coincidence testing carried out for the period from 2003 to 2005 [See Table 4B]. Due to essential operator absences for leave etc., the resulting energy and time-averaged values are likely underestimate the maximum exposure.

5.1 Maximum Sound Level in dB(A) (LA max)

Average LA max data in dB(A) were listed in Table 1 and the percentages exceeding given decibel thresholds are shown in Table 3.

Table 1 shows that the annual average LA max values for each monitored period are 80 dB(A) [uncorrected] , and 75dB(A) [corrected] . This figure is the average for all jet aircraft , including the B747, which was the noisiest aircraft for the period. The range of variation was 46 -96 dB(A) -corrected. The very high average sound level value of 75 dB(A) is 8 decibels above the operating level permissible for power tools under State regulations using “Fast” integrated monitoring . It is an approximately 17-fold greater intensity than the 63 dB(A) - level which just allows intelligible speech communication between persons standing a "decent distance" apart of around 500 mm.

Similar high average levels were reported for B747 class jet aircraft in the Airservices Australia Henson Street Environment Branch (EB) report No. 1360 of July 2003 (EBR 1360). EBR 1360 reported a 93 day monitoring exercise at a point 0.5 km from the present location on Henson Street, Summer Hill. That report showed that B747 class jets were flying in a configuration such that the resulting ground noise level was 80 +/- 4 (SD) dB(A) .

The present data thus confirm and extend the data found by Airservices Australia showing that unacceptable levels occur throughout the year with Runway 34L in use for departures [i.e. LTOP Mode 9]. From 2002 - 2004 more than 40% of all measured events were over 80dB(A) , being 55%, 47% and 41%, respectively .

Table 3 shows that more than 80% of noise events were greater than 75 dB(A) in those years. While between 2005 and 2009 the above percentages have reduced to 16% and 47% , for 80 dB(A) and 75 dB(A) , respectively, there is still much room for improvement .

Actual Indoor Design Level values recommended in Australian Standard AS2021 -2000 for houses, home units and flats are listed in Table 6, below :

TABLE 6: Australian Standard AS 2021-2000 Indoor Design Levels:

INDOOR DESIGN SOUND LEVELS -Houses, home units, flats [#1]	Level dB(A)
Sleeping areas, dedicated lounges	50
Other habitable spaces	55
Bathrooms, toilets, laundries	60
DOTRS Government Designated maxima [#2]	60

[1] AS 2021-2000 Table 3.3

[1] Southgate et al , Expanding Ways to Describe and Assess Aircraft Noise, March 2000

The data reveal a high proportion noise events which would exceed by 25 dB(A) the indoor design level of 50 dB(A) recommended by AS2021 for sleeping areas in houses, home units and flats[#21] . For the case of *"other habitable spaces"* , where people might be expected to be in conversation, speaking on the phone to conduct business, or perhaps watching television or listening to the radio, the recommended level is 55 dB(A), a large 20 dB(A) below the average for the aircraft noise events in this residential area. If outside levels exceed those which , given the insulation standard of a building , would produce indoor levels greater than the Table 6 recommendations, then by AS2021 the home should be provided with additional insulation.

The average dwelling construction standard in Summer Hill is historically sturdy, ie double and/or cavity brick. But even with such insulation a maximum of 20 dB(A) would be taken off the outdoor level of 75 dB(A) , with all the windows and doors fast shut . Whilst reducing the indoor level to 55 dB(A), this is still unacceptable for sleeping areas . In homes of less substantial construction (e.g. weatherboard) the reduction would be much less.

With windows open (normal for summer in Sydney) , the *indoor average* level for homes below this flight path would be 65 dB(A) or more. This does not satisfy the requirements of the AS2021, and here we only consider the "average" aircraft noise event of 75dB(A). With 50% of events producing more than 75 dB(A) (up to at least 96dB(A)) , a resident in this position has just cause to complain, and feel discriminated against by Airservices Australia.

Both 1996 LTOP Reports[#22] (in which the "***fair share noise plan***" was proposed after construction of the "third runway") , and a more recent Department of Transport document [#23], emphasise the desirability of restricting external aircraft noise to at most 70 dB(A) at ground level. This was ostensibly because it is the outside sound level , with doors and windows open, that "normal" home insulation will reduce to *"the indoor design sound level"* . The latter document (Expanding Ways) wrongly states the "design level" is 60 dB(A). Table 6 shows in fact that for sleeping areas the design level is 50 dB(A), with "other habitable spaces" set at 55 dB(A).

In Table 3 it was shown that at this location 87% of values are above or equal to 70 dB(A) , with 28% of values more than 80 dB(A) . Anyone interested in providing "***real solutions***" , must therefore ask why insufficient has been done by Airservices Australia to address this problem, given the 2003 Airservices Report at Henson Street (EBR 1360) , and the Preliminary edition of this report tabled in 2006. These Summer Hill locations are at least 7 km from the most distant takeoff roll position for Northwest departures from Runway 34L. Why then is the distribution of noise Summer Hill more like that expected near a location only 1-2 km from takeoff roll , such as Sydenham?

5.2 AS2021 Standard for "Light General Aviation Airports"

For each decibel grouping Table 3 lists the number of flights per day above given decibel thresholds . For example , in 2009 to 30 June (there were an average of 23 departures per operational day exceeding 75 dB(A)). AS2021-2000, in Appendix D , deals with building site acceptability for *"light general aviation aerodromes"* without an ANEF chart [#24] . It states that more than 20 flights per day of 75 dB(A) or greater is only *"conditionally acceptable"*, and that the same number at the level of 85dB(A) is deemed *"unacceptable,"* for a building site without aircraft noise insulation (AS 2021 Table D1).

Whilst it may be provocative to moot the "general aviation standard" for an area close to Sydney Airport, the intermittent nature of flight track usage suggests such treatment is apt. Also the fact that there was no ANEF for the LTOP at Sydney Airport until March 2004 fits the Appendix D designation. Surely what is good enough for people around a light GA airport should be good enough for the citizens of Sydney , provided the curfew is retained?

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21 AS2021 Table 3.3

22 "The Long Term Operating Plan for Sydney (Kingsford-Smith) Airport, Airservices Australia & SACF, Dec. 1996.

23 *"Expanding Ways to Describe and Assess Aircraft Noise"* D. Southgate et al ., March 2000.

24 Sydney had no ANEF for 5 years from the implementation of LTOP in 1997!

5.3 Calculated ANEI for the Summer Hill Residential Location (Table 2)

The ANEI parameter (the "Australian Noise Exposure Index") is employed for monitoring progress towards the achievement of forecast noise impact *"targets"* predicted by an "Australian Noise Exposure Forecast" (ANEF) for an airport. One method used by Airservices Australia is to compute data using the Integrated Noise (computer) Model (INM) developed by the US Federal Aviation Administration (US FAA). This model starts by assuming flight track profiles (distance , altitude etc) for each aircraft . It presumes that Airservices Australia knows exactly where each aircraft is in three dimensions at all points along its path , and especially its local altitude .

During the 2001 PRM trial[#25] an Airservices consultant (Ambidji) showed that Airservices did not then know , to within better than 0.5 - 1 km , where aircraft under its control were headed. This was especially problematic if the flight path was curvilinear. The Ambidji findings confirmed the oft-experienced consternation of residents who , upon requesting information for a low-flying aircraft seen flying right above their roof, received a track asserting that it was actually several blocks away! Naturally the responsible officer at the NEU [#26], if challenged would claim that it was the resident who was hallucinating, not the reverse! This situation can still arise, even after implementation of Web-Track [#27] , for which lateral positioning errors have been observed .

ANEI can be obtained most directly from actual measurement of repeated aircraft noise impacts on the ground. AS2021-2000 (See Methods, Section 2) provides the means to calculate ANEI from ground measurements of the maximum aircraft noise. It uses the actual sound levels which , after all, is what people experience from day to day . It avoids assumptions about aircraft location , because the aircraft noise is actually measured. Table 2 compares both calendar year averaged and operational day based ANEI for each monitored year using the in Equations 1 to 3, above (Section 2) .

Reference to AS2021 (See Table 7, below) then shows whether the aircraft noise at the location is satisfactory. One finds that above 20 ANEF represents a site which is only ***"conditionally acceptable"*** for

TABLE 7 BUILDING SITE ACCEPTABILITY ACCORDING TO AS2021-2000

BUILDING TYPE /ANEF-ANEI	ACCEPTABLE	CONDITIONAL	UNACCEPTABLE
House, home unit or flat	< 20 ANEF	20-25 ANEF	> 25 ANEF
School, University	< 20 ANEF	20-25 ANEF	> 25 ANEF
Hospital , Nursing Home	< 20 ANEF	20-25 ANEF	> 25 ANEF
Hotel, motel, hostel	< 25 ANEF	25-30 ANEF	> 30 ANEF
Public Building	< 20 ANEF	20-30 ANEF	> 30 ANEF

a house, home unit or flat[#28] . The now corrected ANEI values for this Moonbie Street address (assuming a 365 day year) appear to be borderline “conditionally acceptable” but slightly over 20 dB(A).

This finding must be viewed in light of recent Sydney Airport Master Plan (2024 & 2029) noise level forecasts, which predicted the 20 ANEF contour would not come closer than Lewisham by year 2023! Representing the ANEI in terms of the actual number of days of affectation , as recommended by the Defence Department , which uses the Standard (see AS2021, para. A2.4) for its airports where overflying is only intermittent , the ANEI average is 22 dB(A) [#29] , no longer borderline and only “conditionally acceptable” . This approach is consistent with the intermittent use of the various LTOP Modes , which overfly different areas dependent on the prevailing wind.

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25 "Sydney (Precision Runway Monitor) PRM Trial Aviation Report", The Ambidji Group Pty Ltd , April 2001.

26 NEU- Noise Enquiry Unit

27 Web-Track - The Lochard on-line aircraft tracking system implemented in 2008 by Airservices Australia to allow resident monitoring of flights around Sydney Airport - Unreported personal observations.

28 The range of options is "acceptable" , "unacceptable" or "conditionally acceptable".

29 The value reported for the Airservices tested site in 2003 (BE Report No. 1360) was ANEI = 17dB(A), which was stated to be "acceptable" for the residential useas being reported as being less than 20.

Were the ANEI to reach 25 dB(A) the Standard would rate the location as unacceptable. It would then require home noise insulation. For ANEI's above 30 dB(A) (about 1600 70 dB overflight per day) , then a home might qualify for the formerly available Commonwealth subsidised noise insulation, but not otherwise . This is despite the fact that both the Commonwealth Environment Department and the NSW EPA, once recommended noise insulation (or cessation of the noise) for values of ANEI above 20 dB(A). We must also bear in mind that just across the road, is a large State primary school, where children's classes are reported to suffer from interruption at frequent intervals.

The above ANEI are greater than those in Airservices Australia official Summer Hill study of early 2003 (EB Report No. 1360) which quoted an ANEI = 16.7 over 93 days . The first fifteen days of the period (13/2/2003 - 17/5/2003) then monitored by Airservices Australia are missing from our study. However the ANEI computed from our data at Moonbie Street for the 78 remaining days of the same period is 23.04 dB(A). Airservices apparently use a "rule of thumb" for deriving ANEI from LA max (subtracting 35 from the LA eq [#30]) . The reason for the different ANEI is unclear as the average maximum sound levels were similar. However, the difference might be explained by the ca. 0.5 km separation of the two locations in Summer Hill, or if Airservices data were mistakenly computed assuming a full year's data was available (i.e. 365 instead of 93 days), then our ANEI estimate (16.3) agrees with theirs (16.7), though the mathematics makes no sense.

5.4 Energy Averaged Equivalent Noise Level , LA eq

Table 2 also listed the calculated LA eq for (a) a full year and (b) the recorded operational days. The calculated values for the now corrected data are between (a) 53 and (b) 55 dB(A). For perspective, these data the New South Wales Government , EPA- prescribed noise guidelines for Suburban areas near industrial sites [#31](See Table 8 , below) recommend that an industrial activity should not be permitted at a site adjacent or within earshot of a suburban residential area if the LA eq levels exceed the following:

TABLE 8 NSW INDUSTRIAL NOISE GUIDELINES:

NSW EPA Table 2.1	LA eq ACCEPTABLE	LA eq MAXIMUM
DAY	55	60
EVENING	45	50
NIGHT	40	45

Evidently the impact of aircraft activity at the subject site produces energy averaged noise levels exceeding these acceptability guidelines for evening and night , were the flying machine replaced by noisy machinery in a hypothetical overhead industrial site. If the practice of flying aircraft overhead is not a State *"industrial"* type of activity (airlines are proud to belong to "the aviation industry") , making it notionally subject to the Table 8 (State) restrictions, then perhaps Legislative consideration should be given to making it so.

5.5 Data Verification:

To support our contention that the recorded data were aircraft related, the noise event numbers were compared with the total Runway 34L departure numbers reported in the SACF bimonthly ***"Sydney Airport Briefing Notes"*** for the recording periods (Table 4A) . This was to avoid the accusation of extraneous noise inclusion. Were extraneous data included , recorded events would likely exceed the official departure numbers. Table 4A showed that in all cases the total numbers of events per month are significantly fewer than the total officially notified departures from Runway 34L.

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30 Statement of Mr. Leigh Kenna, SACF 10/3/2006 . No technical justification was provided for this "rule of thumb".

31 New South Wales Industrial Noise Policy, ISBN 0 7313 2715 2, January 2000, Table 2.1 Amenity Criteria.

The annual average of Airservices Operational Statistics for all aircraft in the second last column show that between 36 and 60% of total departures operations were "captured" by the noise monitor. This represents between 60 and 90% of jet aircraft operations from 2003 - 2009 . This is not an excessive proportion, as any local observer on a busy day could attest.

Whilst there is some track spreading , as recommended by the LTOP Reports [#32], there is a marked local concentration of jet flight tracks over the monitored property . This must be investigated and eliminated . One may also ask why these aircraft , this far from take-off roll, are flying so low , as low flying is the only explanation for the very high noise levels being produced [See also later ***-Suggestions for Improved Operations***] .

Table 5 showed that initially there were some apparently "false-positive" recordings, when it appears from the SACF ***Briefing Notes*** [#33] no aircraft flew, yet were recorded by the Summer Hill monitor . Checking the data against the Airservices-supplied actual takeoff times, using time coincidence analysis, it was found that the apparent "false positives" were entirely due to errors in the early versions of the airport Briefing Notes . Also in some wind conditions it was observed that aircraft flying close to the subject property on one side were not detected by the microphone. Thus while there were originally a few false-positives there were also missing values.

Fuller verification of the 2002-2005 data using the time-coincidence analysis (Table 4B) showed that there were actually no false positive records at all times and that the aircraft responsible for the recorded noise events constituted an average 61% of actual takeoffs from Sydney Airport's Runway 34L. Use of Airservices later , revised "Operational Statistics" , has eliminated the false positive phenomenon.

It is submitted that the combined incident verification process carried out by the authors firmly establishes there is a significant case to answer for Airservices Australia in terms of addressing the cause of aircraft noise concentration in this sector of Summer Hill.

6 SUGGESTIONS FOR ENVIRONMENT IMPROVEMENT OVER THE NORTHWEST:

The following suggestions are submitted to aid reduction of aircraft noise and flight track concentration across all suburbs, not only Summer Hill:

6.1 Eliminate The Departure Ceiling:

The Departure Ceiling was earlier referred to (see Abstract) as a key problem and shown in Figure 1 (Page 2). A key improvement would be to eliminate this simultaneous overflying of departures by arrivals across the north west , west and east. This would enable raising the takeoff ceiling permitting normal progression to cruising altitude with consequent long-range fuel savings for the airlines. Possibly the single major cause of the above problem is that the ***original 1996 LTOP*** was never fully implemented as designed.

The overflight problem is amply illustrated from the Environment Branch Henson Street report No. 1360 for the period from 14/10/2002 - 14/4/2003, referred to earlier. The relevant figures are reproduced herewith as Appendix "C". Figure 7 shows all jet arrivals onto 34 Left, while Figure 10 shows all jet departures from 34 Left in the same period.

The effective *altitude ceiling* created by the arrivals overflying the simultaneously departing jets is evident from these figures and Figure 1. The ceiling is roughly 6000 feet, while the departing jets are constrained to fly below the separation requirement (1000 ft below) , ie well under at most 5000ft (See upper right hand panel on both figures). The low-fly zone created in practice extends westward all the way from Summer Hill to Parramatta and beyond.

[32] The Long Term Operating Plan for Sydney (Kingsford Smith) Airport , Dec 1996, Airservices Australia, DOT
[33] Now "Operational Statistics.

In order to be absolutely certain of minimising collision risk , pilots will prefer to reduce their takeoff altitude even more to maximise separation and reduced opportunities for collision. This explains why, at Summer Hill, departing jets conduct extremely slow climbs at altitudes of between 1500 and 2500 ft. It is therefore not surprising that they make so much noise .

It is for this reason that jet departures over Ashfield, and for a much greater distances further out (as far as Parramatta and Winston Hills [#34]), must fly so obscenely low. Given clear skies ahead, pilots would naturally attempt to gain altitude fast in order to minimise fuel consumption for the trip.

In contrast, instead of crossing over the inner west, the arrivals from the north and west should now be proceeding out to the east from Barren-joey Head across the upper northwest beyond the northern outskirts of Sydney, then offshore down the coast [See Appendix E] . Only thus can low-altitude cross-overs be avoided in the inner west and beyond.

The originally described mainly offshore ***"High and Wide"*** arrival procedures were abandoned by Airservices Australia , despite these being promised-to-be fully achievable and safe in its 1996 blueprint. This is first admitted in a 2003 document [#35] , not unveiled to SACF until June 2006. The excuse for deleting offshore arrivals was a highly questionable claim that the airline track mileage would , across-the-board, be some 15% greater than for the previously existing (pre-1996, cross-city, low level) crossing arrival tracks.

Even if only partly true, the elevation of "track mileage" , to a decision criterion , above Sydney's human environment made a highly questionable excuse for abandoning LTOP. This decision has left residents of the North West, West and East impacted by extremely low-flying , noisy departing aircraft with dangerously criss-crossing overhead arriving aircraft, producing a significantly noisier and polluted environment closest to where most people live and work.

The Long Term Operating Plan was designed with much expert input to enable continued airport operation within its environmental limitations following the 1994 Third Runway Debacle. It should never have been so lightly tampered with.

The justification of 15% increased track-miles claimed by Airservices Australia appears to have been based on unlikely extreme scenarios (e.g. 100% arrivals from south and west with 15 knot southerly or easterly winds). Proper time-averaging of arrival mode usage for historic distributions of aircraft approach directions from 1998 to 2005 demonstrates that variable, but much smaller increases , with possible reductions (dependent on air traffic mix) rather apply [# 36] .

Conceding that, it can be easily shown from Airservices own data, that those arrivals having the most environmentally damaging effect on northwesterly and easterly takeoffs (Runways 16L & R approaches from the north) , could be rerouted offshore without ***ANY*** cost in track-mileage [See ibid [35], Table in Para. 3.2, at p. 15]. The Figure in the 1996 LTOP (Summary) Report [Page 62] for Mode 9 operations shows the intended plan , were LTOP implemented by the book [See reproduction in APPENDIX E] .

It thus appears that LTOP implementation appears to have been executed by an organisation not fully committed to the process. Despite the dubiously revolutionary idea of "noise sharing", almost zero practical accommodation was made to minimise noise over the ***newly affected departure areas*** . Certainly the noise was never confined to over-water , industrial and non-residential areas as ordained.

Instead the objective was reduced to minimising aircraft track miles, with deafening consequences for homes under the western , north-western and eastern residential corridors . To mitigate these negative effects the former (pre-1996, pre-LTOP) north-wind arrival routes criss-crossing Sydney Airport must be relocated to create sufficient airspace overhead the departure tracks and enable westerly , north-westerly

[34] Personal Communication by Telco - Ian McLeod (ASA Environment Branch) to Philip Lingard Nov. 2003.

[35] "*IMPLEMENTATION OF THE SYDNEY LONG TERM OPERATING PLAN (LTOP H&W) HIGH AND WIDE FLIGHT PATHS (LTOP H&W RECOMMENDATION 2) FIRST REPORT OF TASK FORCE 2* " FEBRUARY 2003 [SACF Doc2006- 046] .

[36] P.S. Lingard, unreported calculations submitted to the IMC, Sept. 2007 (Details avilable on request).

and north-easterly takeoffs to reach noise-critical-altitude (ca 6000 ft) quickly after takeoff and minimise noise.

Better still the originally planned "high and wide" offshore arrival paths to runways 16L & R in LTOP Mode 9 should be reinstated, which as shown [Ref. Ibid 35, Para 3.2 , p. 15] DO NOT INCREASE TRACK MILEAGE !

Such tracking was environmentally essential to achieving LTOP in both the 1996 LTOP Reports, and the LTOP Proponent's Statement . The documents clearly project that in northerly winds there would be widely spread offshore jet arrival routes, both up and down the coast , which would clear the airspace over both inner and outer west, and eliminate the overflying of departing jets by arrivals crossing the Inner West (predominantly Summer Hill and Bondi Junction) as seen in Figure 1. This would allow aircraft to maximise height while decreasing ground noise levels for the inner environs such as the north - west, -east and west.

Instead of departing jets from Runway 34L flying at 1500-3000 feet all the way to Parramatta and beyond "The Hills", both the LTOP Reports and the Proponent Statement predicted altitudes (for B747's) of 6500 ft at Wetherill Park and Baulkham Hills in the west and northwest; and that B767's would be at 6000 ft upon reaching Gladesville! Why doesn't Airservices Australia properly implement these promised and essential environmentally significant aspects of the LTOP?

If none of the above is possible then the date for transfer of heavy jet movements from Kingsford Smith Airport to a judiciously chosen out-of-basin airport , suitably linked to multiple cities with 21st Century Very High Speed Rail should be brought forward to a point well before 2020 .

6.2 Implement "ICAO-A" (or Better) Noise Abatement Takeoffs over the North West:

The original LTOP foreshadowed the introduction of the former ICAO [#37] -A-style Noise Abatement Departure Protocols (***NADP***s) where appropriate, with urgent attention to be given to improved abatement takeoff profiles . In due course and, after consultation with SACF, ICAO - A was duly mandated for all takeoffs over residential areas by Transport Minister Vaile in August 1998[#38].

ICAO-A required initial steepest possible ascents to not less than 1500 feet prior to adjusting engine thrust and turning onto course direction. It has since been replaced by ICAO with a new Noise Abatement Departure protocol called NADP 2, but the principles remain the same. Indeed some overseas airports employ much steeper and prolonged initial climb outs in order to gain altitude so as to minimise noise over residential areas. And the principle was actually enshrined in Airservices own ***Noise Abatement Procedures*** (NADPs) in DAP -East[39] , but the standard instrument departure (SID) instructions for Sydney Airport (north) contradict the NADPs , breaching the Minister's August 1998 and subsequent NADP directions. In 1999 and 2007 at the request of Government SACF , first Mr. Anderson and then Mr. Vaile again emphasised the need to improve Noise Abatement Departure Protocols . Airservices Australia should be asked why did it never implement Ministers Anderson and Vaile's three directions to implement and improve NADPs? The currently employed noisy , polluting "Low profile (low altitude) low-fuel consumption takeoff protocols" are conducted for the benefit of airlines only, not for residents, and are unsatisfactory for noise abatement.

6.3 Implement Better-than-ICAO Noise Abatement Departure Protocols (NADPs):

The ICAO - A / NADP-2 protocols were always compromised at Sydney by misconceived airline (mainly Qantas) fuel cost concerns, hence the main , but misconceived , resistance to fuller LTOP implementation.

Unfortunately, ICAO-A itself does not achieve fantastic noise reductions. Better NADPs can be devised, however as demonstrated to SACF by one of us[#40] in 2006-7 . These involve much steeper takeoffs than existing after takeoff roll, with a quick climb to around 4000 feet. To accommodate the above-described

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37 ICAO- International Civil Aviation Organisation

38 Press Release T159/98, 28/8/1998

39 Airservices Departure and Arrival Procedures-East

40 P.S. Lingard

"ceiling effect" (if still present) , it was shown that subsequent levelling out with reduced thrust would reduce ground noise for B747 -type aircraft by 10- 20 dB(A) for distances further than 3 to 5 km from takeoff [#41]. A typical takeoff profile set and noise-distance relationship produced using the US Federal Aviation Administrations "Integrated Noise Model" (INM Version 6.2) is shown in Appendix F (Figures 1 & 2). We submit that the benefits for residents under the flight paths appear self-evident, and at least worth trialling.

6.4 Employ More Effective Aerial Fanning after Takeoff:

This should be self-evident, but there seems to be very little ability in the Airservices establishment to respond innovatively to such suggestions. Perhaps there had been when LTOP was being proposed in 1996. When LTOP was introduced the government mandated that existing flight corridors would be abolished, and concentrations of movements across particular areas should be avoided so that noise could not only be minimised, but also "fairly-shared."

Concentrating nearly 50% of all (and 60% of jet) departures at low altitude over a single residential locus of Summer Hill or anywhere is not "fair sharing". Better Noise Abatement Departure Protocols, with consequently greater vertical latitude for aircraft to manoeuvre , would facilitate implementing Tower-based time-sequenced, computer-directed bearing trajectories with more widely dispersed departure paths.

6.5 Increase The Use of Botany Bay Modes :

Modes such as Simultaneous Opposite Direction Parallel Runways Operations (SODPROPs) can be shown to accommodate as much as 75% of normal Sydney Traffic if artificial restrictions were not placed upon them For example it has been shown that if a "noise abatement" down-wind condition is applied the use of SODPROPs could be increased. This downwind condition must be applied for noise abatement purposes, permitting preferential takeoffs and landings over the Bay in northerly winds, but not in both directions.

With a 5 knot Noise Abatement northerly downwind setting, SODPROPs could be available an average of 82% of the time assuming prevailing Sydney Weather and Traffic conditions over the 50 years to 1996 [See Ref. [17] ibid Chapt 6 Table 6.3.5, p. 83]. With a 10 knot downwind condition applied , SODPROPs availability increases. Takeoffs to the south from Runway 16R or left do not need to pass over Cronulla using the Deena (16R) and the Botany Heads (16L) SIDs. The Deena SID is presently unavailable for night traffic , and airport investment is needed to provide suitable guidance systems to make the DEENA SID available at all hours.

6.6 Mitigate the Human Harm and Medical Implications:

While proposing that the use of the takeoff profiles depicted in Appendix F (See above) may be beneficial for some. For others, it is the very low-frequency sounds (which are not quantified by the A -scale weighting used in aircraft noise monitoring) that may be the biggest nuisance. This appears particularly true in the presence of physiological abnormalities of the human cochlear. It is known that around 10% of people suffer one or both of either Tinnitus or Menier's [#42] condition, which the above improvements may not assist. Whether suitably designed urban noise barriers and /or home insulation can provide a satisfactory remedy for some such people in the face of inexorable airport expansion seems unlikely. Also, some people who have hitherto accepted noise insulation in high ANEF areas , partly through government subsidy, together with the required total air-conditioning , have reported finding living with the consequent restrictions life-style crippling clastrophooic and unsatisfactory. The provision of residential noise insulation by the airport owners and profit centres should be at least made available to sufferers at no cost.

6.7 Mandate Provision of Home Noise Barriers and Insulation:

The pre-2008 government abandoned the airport noise levy from 1 July 2007 . Why this occurred is mysterious given forecast increases in residential noise affectation of up to an additional 20,000 people and 5000 dwellings at the greater than 25 dB(A) ANEF level in the 2023 Airport Master Plan [#43] ? The

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[41] *SUPPORTING DATA FOR SACF NOISE ABATEMENT DEPARTURE PROTOCOL [NADP] DISCUSSION By P.S. Lingard [SACF Doc 2007- 022].*

[42] "*Triumph over Tinnitus*" (2001) , Rafaele Joudry, Sound Therapy International Pty Ltd ISBN 0 957924-60-7, p.4ff

[43] ***CRITIQUE OF SYDNEY AIRPORT CORPORATION LTD'S "PRELIMINARY DRAFT MASTER PLAN 2009"***

lack of any legislative provision in the Airports Act for equitably distributing the legal liability for human environment mitigation by providing noise insulation and other compensation with continued airport growth is inexplicable . Even more inexplicable is the government's apparent abrogation of any responsibility for future aircraft noise mitigation!

6.8 Eliminate Loopholes and Contradictions in the Airports Act and Airservices Act:

The Legislative and Regulatory contradictions in the Airports Act which make Airport Corporations liable to explain in their "Master Plans" how they will mitigate harm from aviation operations (Airports Act S. 71) , yet leave the responsibility to Airservices Australia (Airservices Act S. 9(2)) for directing aircraft to fly in a manner so as to "minimise harm to the environment" , without either corporate entity being able to direct the other, beggars belief. This situation is a recipe for a completely unworkable aviation environmental regulatory framework which is open to the ultimate abuse, because both airports and Airservices gain pecuniary benefit from continually increasing airline traffic flow.

A more permanent Regulatory and /or Planning solution is urgently needed to avoid ongoing harm and crippling nuisance for many people. Shifting heavy jet aircraft to out-of city airports in non-sensitive areas, as exemplified by the Dulles Airport for Washington DC and Baltimore Md in the USA appears the best answer both for the airlines (which could then operate 24 hours a day) , and international airport users whose movements to and from the airport are currently crippled by inadequate State roads infrastructure. Coupling an out-of-basin airport with several cities (e.g.. Sydney/Wollongong/Goulburn Canberra) using linking very high speed rail transport would seem a far-sighted way to go.

6.9 Need to Provide for Low Frequency Sound-Induced Damage to Shaking Buildings:

In addition to aircraft noise annoying many residents and harming others , the low frequency sound components of the jet engine noise spectrum are known to cause building vibration and to shake windows and doors. It is not the province of this paper to recite evidence for this but it seems futile to measure aircraft noise impacts using the A-weighted decibel system which ignores low-frequency (LF) sound , when building structures are mainly disturbed by very low frequency noise which travels through or along the ground. It is known, for example that LF noise has been investigated by certain governments interested in its use as a weapon both to cause building damage and induce disorientation in human beings . It is submitted that a future Australian Standard on building siting and construction related to aircraft noise should provide a section dealing with building damage caused by vibration from low-flying jet aircraft.

6.10 Council Liability for Negligent Specification of Dwelling Approvals in Aircraft Noise Areas:

In *Port Stephens Council v Booth & Ors* [2005] NSWCA 323 , the New South Wales Court of Appeal affirmed a judgment finding a local council liable for damages and the retrospective cost of noise insulation in dwellings it approved without forewarning applicants that the area was affected by aircraft noise at the 20 dB(A) and above ANEF -Level . This occurred in connection with dwellings affected by aviation operations from a nearby military airport with intermittent movements. This should make incumbent Councils consider requiring an appropriate level of noise insulation in approvals of *new dwellings* and extensions constructed nearby in the vicinity of airports .

7. CONCLUSIONS :

1. This paper updates a Preliminary Report of similar name from December 2005 and presents corrected , continuing and expanded data from 2006 to end-June 2009 . It describes a significant , but only a small part , of the aviation noise problem across the inner north.

2. The Report demonstrates there is a focussed concentration of around 60% of all low-flying jet departures from Runway 34L across one residence in Summer Hill. The resulting noise impacts on this (formerly quiet) location and a primary school amounting to an average maximum sound level of 75 dB(A - "S" -averaged) +/- 4-6 (SD) [Range 53 - 93 dB(A)] are unacceptable, and must be rectified forthwith. The ANEI associated with these impacts are above 20 dB(A) in the AS 2021 -specified only "conditionally acceptable" band.

3. That the same problem was reported 6 Years ago by Airservices Environment Branch (Report 1360) for nearby Henson Street, but nothing done, is an indictment of Airservices Australia and its Government SACF /IMC Committees, not to mention the new (post-December 2007) Government and its officers, who should know the problem well. Both Prime Minister Rudd and Transport Minister Albanese have made a political issue of aircraft noise for the attention of their electorates in Brisbane and Sydney , respectively .

4. At this location, both the calculated Australian Noise Exposure Index (ANEI) at around 22; and the Time and Energy Averaged Equivalent Sound Pressure Level (LA eq) form 53 to 55 , are in the only ***"conditionally acceptable"*** range for houses, home units and flats by the criteria of Australian Standard AS2021-2000 and are considered ***unacceptable*** for locations near industrial sites according to NSW Government Industrial Noise Guidelines (2000) , respectively.

   This finding contradicts the ANEFs produced by Sydney Airport Corporation in its "Master Plans 2024 & 2029" for Sydney Airport that the 20 ANEI level will not be reached at Ashfield until either 2023 or 2028 (They cannot decide which) !

5. The above should make the incumbent Ashfield Council consider requiring an appropriate level of noise insulation for *new dwellings and modificatioins* constructed in the vicinity of the referenced and similar homes on pain of being required to compensate relevant future owners for failing to warn of adverse environmental impacts with ANEF greater than 20 dB(A) : Port Stephens Council v Booth & Ors [2005] NSWCA 323 . Existing exposed homes should be provided with necessary insulation either voluntarily by Government, the Airport Corporation or Airservices Australia so as to mitigate the involuntarily-suffered public harm already in progress.

6. Local Councils need to be more cautious in approving new or additional building specifications without taking account of the likelihood of existing or future aircraft noise impacts at the 20 ANEF level.

7. Without such insulation treatment both the maximum and the range of exposure in (2) and (4) above are likely to cause foreseeable harm (sometimes lasting) to regularly exposed susceptible individuals whether directly or at the initially subliminal level.

8. The resulting proportion of noise events exceeding 80 dB(A) of close to 22% is manifestly unacceptable and breaches Airservices own environment guidelines for all areas but those very close to runway threshold immediately following takeoff. More than 60% of actual noise events are greater than 75 dB(A).

9. The number of noise events per day greater than 75 dB(A) (ie 23/day) fails even the test for ***"conditional acceptability"*** for building construction requirement of AS2021 -2000 for even a *light general aviation* aerodrome without ANEF. This means that new homes in this area would require some noise insulation, whilst existing homes continue without.

10. Nearly all noise events at this location produce conditions in adjacent homes which would be

likely to prevent conversation (i.e. > 63 dB(A)) around three times per hour on an annual averaged basis. During actual operational days the peak impact is between 3-4 times per hour on average, and can be much higher at particular times of day.

11. For those with normal hearing and sensitivity, the frequency of interruption by such noise levels can be an annoyance which is disturbing , but for people with certain auditory abnormalities such as hyper-acusis (including Tinnitus and Meniers Syndrome) they can be either painful or physically and/or psychologically harmful. This is an environmentally induced public health issue that needs urgent addressing because the issue is wider than hearing defects and includes learning disorders for children, productivity losses for working adults , with psychological and cardiovascular implications for all [#44] .

12. Why since the tabling of Airservices Australia, Environment Branch Report No. 1360 late in 2003, and the Preliminary version of this Community Noise Report in 2006 has insufficient been done to address these issues?

13. It is submitted that there is a significant case for Airservices Australia to be ordered to remove the cause of aircraft noise concentration and the frequency of high noise levels in this sector of Summer Hill and the wider north west . The onus is now on Airservices Australia, the author of the "***Long Term Operating Plan for Sydney (Kingsford Smith) Airport***" - ie LTOP (aka ***"The Fair Share Noise Plan"***) to effectively begin monitoring actual noise levels in the inner west. Prediction from assumed flight trajectories is not monitoring.

14. Airservices Australia should also take meaningful remedial action through intelligent air traffic control and to properly implement the LTOP with offshore arrival routes as promised. In particular it should implement noise abatement departure protocols which are preferably better than the former ICAO-"A" (now NADP2) as directed twice by the Transport Minister in 1998 and 2007, as shown to be possible by Lingard[#45] .

15. Standards Australia needs encouraging to revise the Standard AS 2021-2000 (Aircraft Noise and Building Siting and Construction) to (1) Bring it into line with State Noise Regulatory Systems which employ the “Fast” -time averaged maximum sound level metric (LA max) which is known to register high levels sound than the “Slow” -time averaged system used in Aircraft Noise monitoring in Australia; and (2) Consider creating a Standard also covering Building Damage cause by low frequency aircraft noise components not covered by AS 2021 due its adoption of the A-weighted decibel system.

16. Citizens , Governments and Councils need to be aware that the system of sound level measurement used in Aircraft Noise monitoring involves the “Slow”- integrated A-weighted decibel methodology which makes the maximum monitored impact some 3 - 4 dB(A) less than the standard used in general environmental monitoring which records the “Fast” - integrated signal.

17. It is submitted that continuation of abusive noise without proper environmental controls amounts to a form of bureaucratic persecution. It is suggested that all similarly affected people , especially those with relevant hearing difficulties , should complain loudly both to Airservices Australia and the responsible government Minister, and collectively seek compensation in the form of noise insulation at government or aviation industry expense.

18. A more permanent Regulatory solution is urgently needed to avoid ongoing harm and crippling nuisance for many people. Shifting heavy jet aircraft to an out-of-city airport outside the Sydney Basin area seems the best answer both for the airlines and international airport users (whether passenger or freight) whose movements to and from

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[44] See WHO report, Berglund et al. ibid

[45] *“SUPPORTING DATA FOR SACF NOISE ABATEMENT DEPARTURE PROTOCOL [NADP] DISCUSSION* By P.S. Lingard [SACF Doc 2007- 022].

the airport are currently crippled by inadequate State roads infrastructure. Coupling such an airport with several cities (e.g.. Sydney/Wollongong/Goulburn Canberra) linked by very high speed rail seems a far-sighted path to take.

19. Finally the data collection work described was accomplished mainly by one hard-working and public -spirited citizen trying to protect both his own and his neighbours rights to quiet enjoyment, ie. Mr. Johann Heinrich . The onus now rests on Airservices Australia to find an effective noise minimisation solution for the evident problem - no buts! Airservices Australia , as beneficiaries of the current noise regime together with Sydney Airport and the Airlines should therefore offer noise insulation to all homes and individuals similarly affected. The promise of John Howard in his 1996 pre-election statements prior to the introduction of LTOP that no would one would receive more aircraft noise than they had before LTOP (which was nil) should be honoured by those charged with implementation of the now aborted LTOP plan.

EXPLANATORY NOTE:
The instrumentation and data collection work for this paper was carried out by Johann Heinrich. The data processing and written organisation were the responsibility of Philip Lingard.

ACKNOWLEDGMENT :
The use of illustrations provided by Airservices Australia in its 1996 LTOP proposal Reports and images by distribution from its Noise Enquiry Unit and Environment Branch are gratefully acknowledged. The assistance of former Senator Marise Payne (Chair of SACF from 2002 - 2007) in procuring Airservices cooperation with the provision of jet departure time data for the coincidence testing was appreciated.

E

APPENDIX "A"

Table 1 - Typical partial output trace from the recording system

Date	Time	Sound	Frequency	Int Temp	Light	Ext Temp	
m/dd/yy		dBA	Hz	°C	Level	°C	
8/12/02	07:29:58	55.0	150	19.0	0.8	18.4	
8/12/02	07:29:59	55.0	86	19.0	0.8	18.4	
8/12/02	07:30:00	55.0	86	19.0	0.8	18.4	
8/12/02	07:30:01	55.0	155	19.0	0.8	18.4	
8/12/02	07:30:02	62.0	155	19.0	0.8	18.4	
8/12/02	07:30:03	62.0	83	19.0	0.8	18.4	
8/12/02	07:30:04	63.0	83	19.0	0.8	18.4	
8/12/02	07:30:05	63.0	243	19.0	0.8	18.4	
8/12/02	07:30:06	62.0	243	19.0	0.8	18.4	
8/12/02	07:30:07	62.0	255	19.0	0.8	18.4	
8/12/02	07:30:08	62.0	255	19.0	0.8	18.4	
8/12/02	07:30:09	62.0	284	19.0	0.8	18.4	
8/12/02	07:30:10	64.5	284	19.0	0.8	18.4	
8/12/02	07:30:11	64.5	163	19.0	0.8	18.4	
8/12/02	07:30:12	67.0	163	19.0	0.8	18.4	
8/12/02	07:30:13	67.0	109	19.0	0.8	18.4	
8/12/02	07:30:14	75.0	109	19.0	0.8	18.4	
8/12/02	07:30:15	75.0	230	19.0	0.8	18.4	
8/12/02	07:30:16	76.6	230	19.0	0.8	18.4	
8/12/02	07:30:17	76.6	265	19.0	0.8	18.4	
8/12/02	07:30:18	79.8	265	19.0	0.8	18.4	
8/12/02	07:30:19	79.8	302	19.0	0.8	18.4	
8/12/02	**07:30:20**	**89.0**	**302**	**19.0**	**0.8**	**18.4**	**LA max**
8/12/02	**07:30:21**	**89.0**	**276**	**19.0**	**0.8**	**18.4**	**LA max**
8/12/02	07:30:22	86.3	276	19.0	0.8	18.4	
8/12/02	07:30:23	86.3	311	19.0	0.8	18.4	
8/12/02	07:30:24	85.0	311	19.0	0.8	18.4	
8/12/02	07:30:25	85.0	209	19.0	0.8	18.4	
8/12/02	07:30:26	88.0	209	19.0	0.8	18.4	
8/12/02	07:30:27	88.0	168	19.0	0.8	18.4	
8/12/02	07:30:28	76.6	168	19.0	0.8	18.4	
8/12/02	07:30:29	76.6	263	19.0	0.8	18.4	
8/12/02	07:30:30	81.0	263	19.0	0.8	18.4	
8/12/02	07:30:31	81.0	184	19.0	0.8	18.4	
8/12/02	07:30:32	83.9	184	19.0	0.8	18.4	
8/12/02	07:30:33	83.9	157	19.0	0.8	18.4	
8/12/02	07:30:34	78.7	157	19.0	0.8	18.4	
8/12/02	07:30:35	78.7	51	19.0	0.8	18.4	
8/12/02	07:30:36	79.2	51	19.0	0.8	18.4	
8/12/02	07:30:37	79.2	75	19.0	0.8	18.4	
8/12/02	07:30:38	74.7	75	19.0	0.8	18.4	
8/12/02	07:30:39	74.7	107	19.0	0.8	18.4	
8/12/02	07:30:40	74.1	107	19.0	0.8	18.4	
8/12/02	07:30:41	74.1	70	19.0	0.8	18.4	
8/12/02	07:30:42	73.2	70	19.0	0.8	18.4	
8/12/02	07:30:43	73.2	112	19.0	0.8	18.4	
8/12/02	07:30:44	64.9	112	19.0	0.8	18.4	
8/12/02	07:30:45	64.9	67	19.0	0.8	18.4	
8/12/02	07:30:46	71.2	67	19.0	0.8	18.4	
8/12/02	07:30:47	71.2	86	19.0	0.8	18.4	
8/12/02	07:30:48	73.3	86	19.0	0.8	18.4	
8/12/02	07:30:49	73.3	58	19.0	0.8	18.4	
8/12/02	07:30:50	69.5	58	19.0	0.8	18.4	
8/12/02	07:30:51	69.5	62	19.0	0.8	18.4	
8/12/02	07:30:52	66.9	62	19.0	0.8	18.4	
8/12/02	07:30:53	66.9	38	19.0	0.8	18.4	
8/12/02	07:30:54	62.0	38	19.0	0.8	18.4	
8/12/02	07:30:55	62.0	76	19.0	0.8	18.4	
8/12/02	07:30:56	55.0	76	19.0	0.8	18.4	
8/12/02	07:30:57	55.0	0	19.0	0.8	18.4	
8/12/02	07:30:58	55.0	0	19.0	0.8	18.4	
8/12/02	07:30:59	55.0	62	19.0	0.8	18.4	

APPENDIX "A"

Table 2 - Partial typical day trace showing the manually -extracted LA Max in dB(A)

11.11.04

TIME-LA max dBA

6.26.49-93.4
7.11.51-74.0
7.22.24-83.2
7.35.51-77.7
7.45.11-81.0
8.03.33-79.9
8.20.35-76.5
8.21.38-94.0 at 994 Hz CALIBRATION TEST
8.38.03-82.2
9.00.55-88.5
9.03.28-73.8
9.10.07-83.0
9.14.57-82.1
9.25.09-82.3
9.27.05-80.2
9.34.35-79.7
9.36.30-79.6
9.43.21-76.2
9.46.02-79.2
9.48.23-88.4
9.52.08-84.3
9.55.48-69.2
10.01.49-73.3
10.04.16-84.0
10.06.38-76.0
10.08.10-81.3
10.19.36-79.1
10.22.24-78.7
10.32.20-80.8
10.46.19-78.6
11.01.48-85.9
11.07.37-84.8
11.09.24-77.2
11.27.37-85.3
11.53.57-84.7
11.55.54-74.5
11.57.43-87.7
12.01.01-82.1
12.35.47-75.2
12.38.52-85.7
12.48.04-82.1
12.55.00-75.7
12.59.32-76.3
13.03.46-89.5
13.05.51-82.3
13.13.34-71.9
13.19.37-82.0
13.22.12-70.9
13.43.36-75.8
13.54.13-75.4
14.00.47-79.1
14.07.18-76.7
14.36.21-83.7

..........continues . See files 200xnois.txt for details, where x is the year number

APPENDIX "B" Sound Level Output Comparisons with Airservices Breull and Kerr

(a) Cf. Report "TECHNICAL ASSESSMENT OF COMMUNITY NOISE MONITOR AT SUMMER HILL SYDNEY", NSW May 2006 - By Dr. Ian McLeod , Aviation Environment Specialist Airservices Australia

It is noted that this report is marked "DRAFT" and was never given an official Airservies report number.

Metric	**Heinrich-Lingard 2005**	**AA (1360)**
Location	Moonbie Street	Henson Street
LAeq	64 dBA (1-year)	51.7dBA (83days)
N70	51.1 (events/day)	26.4 (events/day)
N80	24.5 (events/day)	4.4 (events/day)
N90	1.5 (events/day)	0.0 (events/day)
MEAN LAmax	79.8 dBA	76.8 dBA
Capture Rate (CNE/D34L)	50%	38% (69% for jets)

Quotation from Airservices Report (P. 3) :

"Test 2. The microphone to the noise logger was placed next to the microphone of the B&K, see Figure 3. This would guarantee both microphones being exposed to the same noise. Individual comparisons of the noise measured by each system from over-flying aircraft showed the logger to be between 5-6 dBA higher than the B&K analyser."

(b) Cf. Report : ***COMMUNITY REPORT ON AIRCRAFT NOISE MONITORING WITH AIRSERVICES AUSTRALIA""*** Date: 11 April 2006 (ACN0411), By Philip S. Lingard (SACF Proxy for Mayor of Ashfield 2005-7)

TABLE 1: SUMMARY RESULTS

(With Data items #7 & #11 removed because of nil comparison)

Item	ASA dB(A) Sampling Frequency 10Hz	ASA dB(A) 1 Hz	PSL(dB(A)		JH (dB(A)		1 Hz	10 Hz	
#1		72.90	71.00	(rand)	73.20	*Location A:*			
#2		74.20	75.00	(rand)	77.30	*Location A:*			
#3		71.60	72.00	(rand)	77.70	*Location A:*			
#4		69.40	71.00	(nr wall)	82.00	*Location A:*			
#5		69.50	74.00	(nr. clust)	75.00	*Location B:*			
#6		72.60	76.00	(nr. clust)	78.40	*Location B:*			
#8	80.40	77.80	79.00		82.50	*Location B:*			
#9	73.00	68.00	73.00		73.50	*Location B:*			
#10	75.00	65.00	67.00		70.70	*Location B:*			? Huge difference betw ASA results
#12	78.10	75.00	74.00		80.20	*Location C:*			
AVE #1- #12	**76.63**	**71.60**	**73.20**		**77.05**				
SD #1 - #12	**3.28**	**3.73**	**3.26**		**3.92**				
DIFF (JH - ASA)							**5.45**	**0.43**	
DIFF (JH - PSL)							**3.85**	**na**	
DIFF (PSL-ASA)							**1.60**	**-3.43**	

Conclusion: It is noted that Airservices comparison results in a similar error margin [5-6 dB(A)] to that of the current author (PL) . Therefore the present paper assumes the error of 5.5 dB(A) for all measurements.

APPENDIX "C"

The Departure Ceiling Over Summer Hill

*Figures 7 & 10 reproduced from Airservices Australia Environment Branch Rreport No. 1360 , "**Short Term Study into Aircraft Noise and Flightpaths**", February to May 2003, Summer Hill*

Figure 7 All jet arrivals onto 34 Left for the period from 14/10/2002 - 14/4/2003.

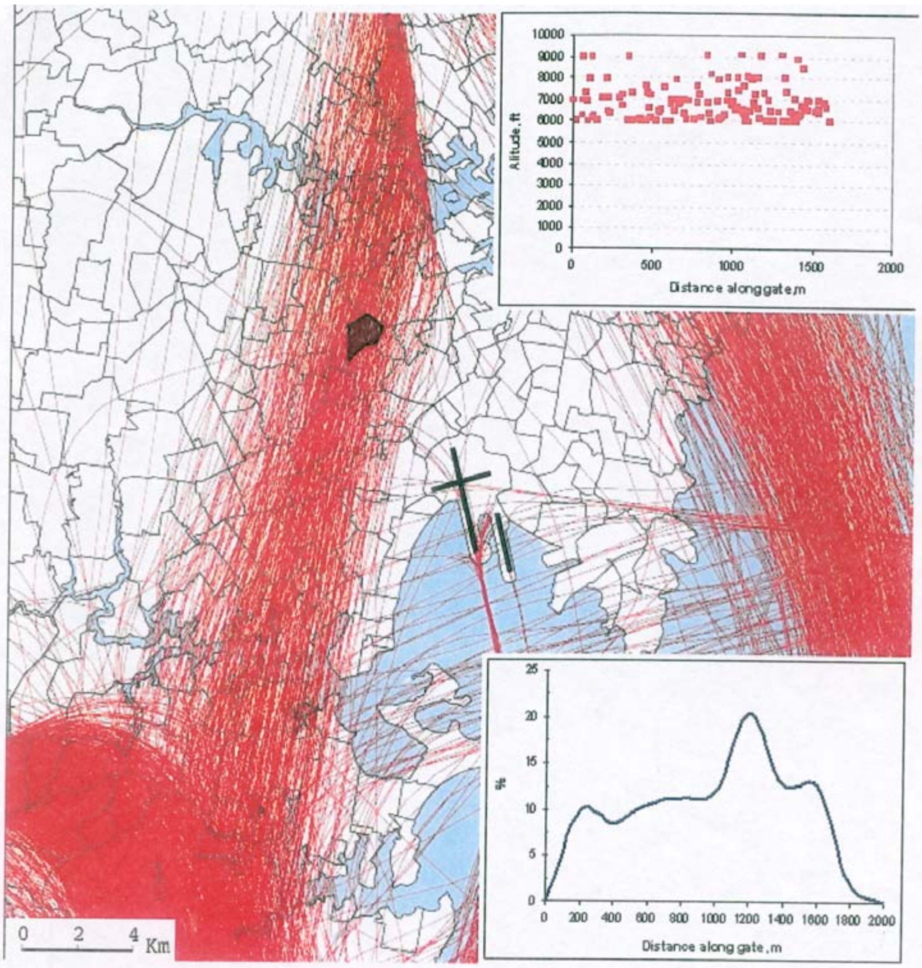

Figure 7 Track plots, height graph and distribution for Jet arrivals onto runway 34L which overfly the suburb of Summer Hill (shaded) for the sample periods 1-14/10/2002 and 1-14/4/2003.

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APPENDIX "C" Cont'd:

Figure 10 All jet departures from 34 Left in the same period.

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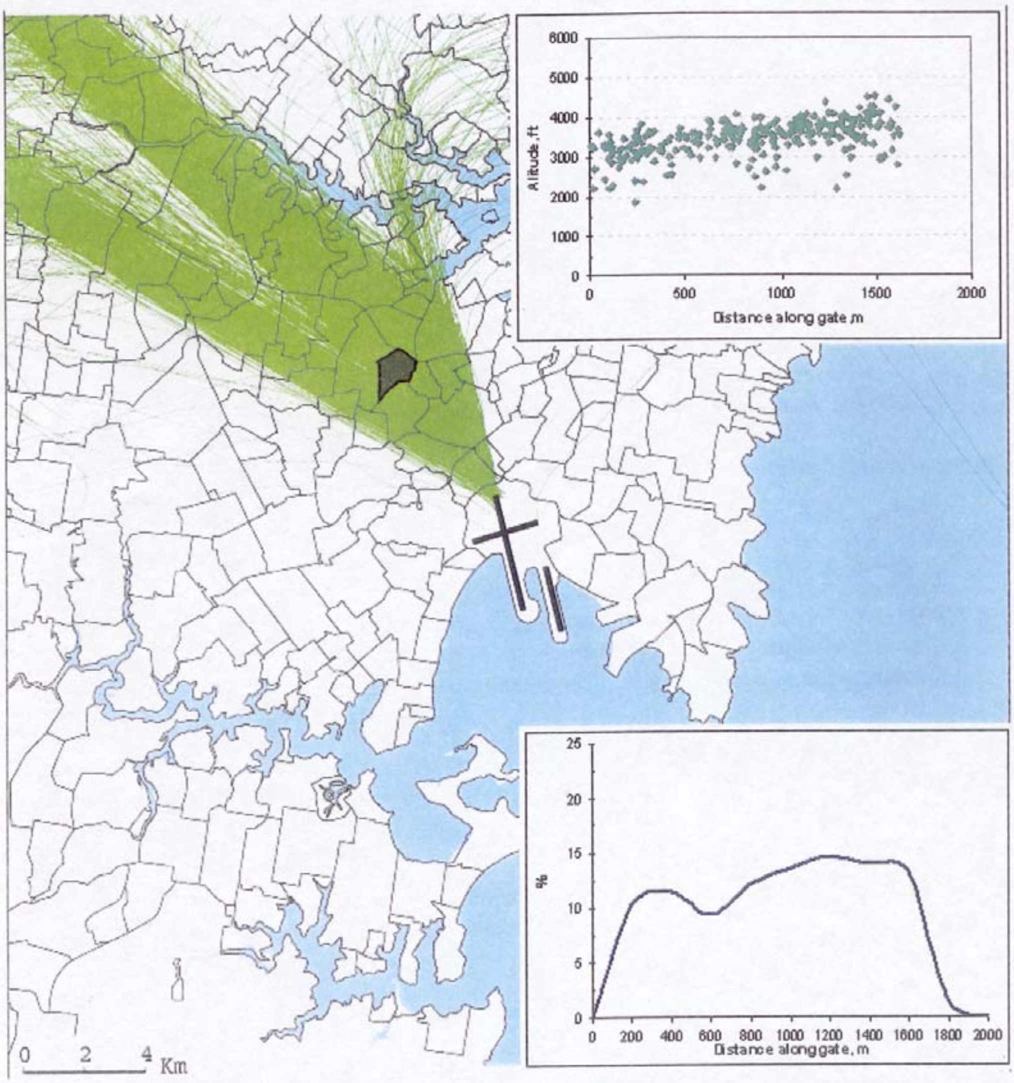

Figure 10 Track plots, height graph and distribution for Jet departures from runway 34L which overfly the suburb of Summer Hill (shaded) for the sample periods 1-14/10/2002 and 1-14/4/2003

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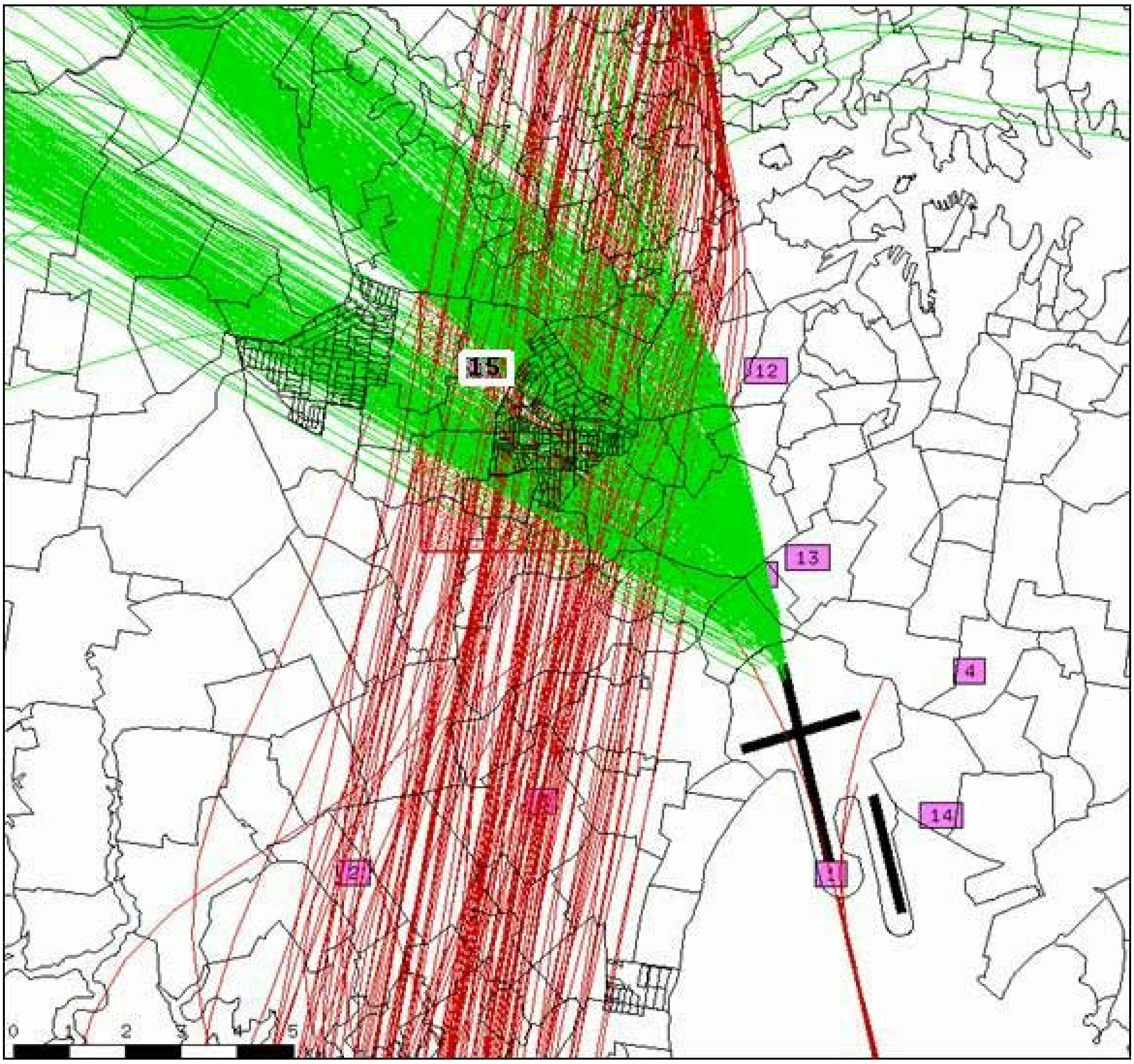
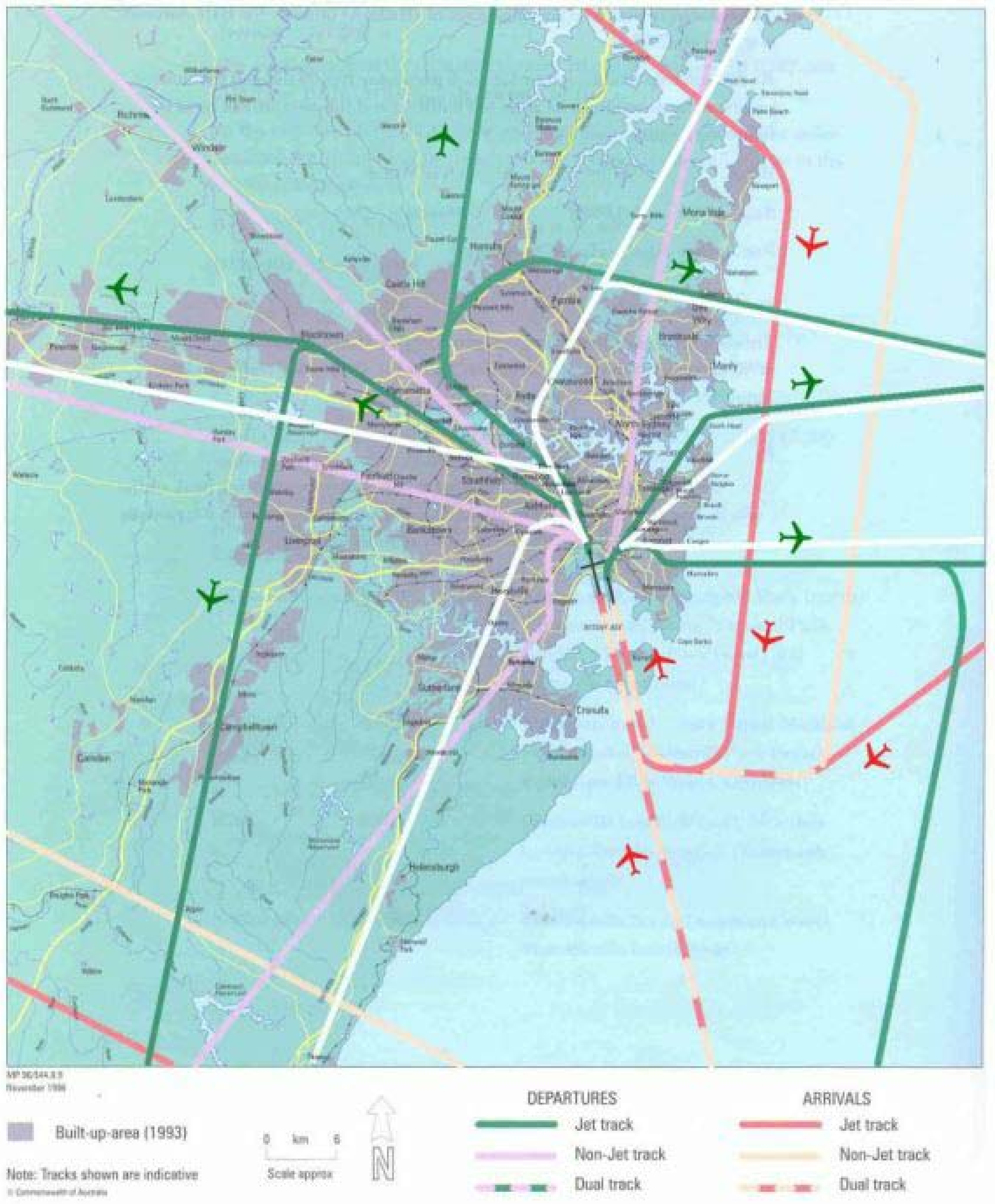
APPENDIX D AVOIDANCE OF NOISE MONITOR AT PLC DURING AIRSERVICES EB 1360 MONITORING (Feb. To May 2003) :

FIGURE 1 *Image modified from Airservices Australia Flight Track Data 3/6/2005 - 10/6/2005 06:00 - 23:00. Supplied by NEU in response to Email correspondence between P. Lingard & M. Chipman resulting from TNIP enquiry to D. Southgate of the then Department of Transport and Regional Services (DOTRS). For Research and Private Study by Community Groups .*



APPENDIX E REPRODUCTION OF ORIGINAL DESIGN FOR LTOP "MODE 9":

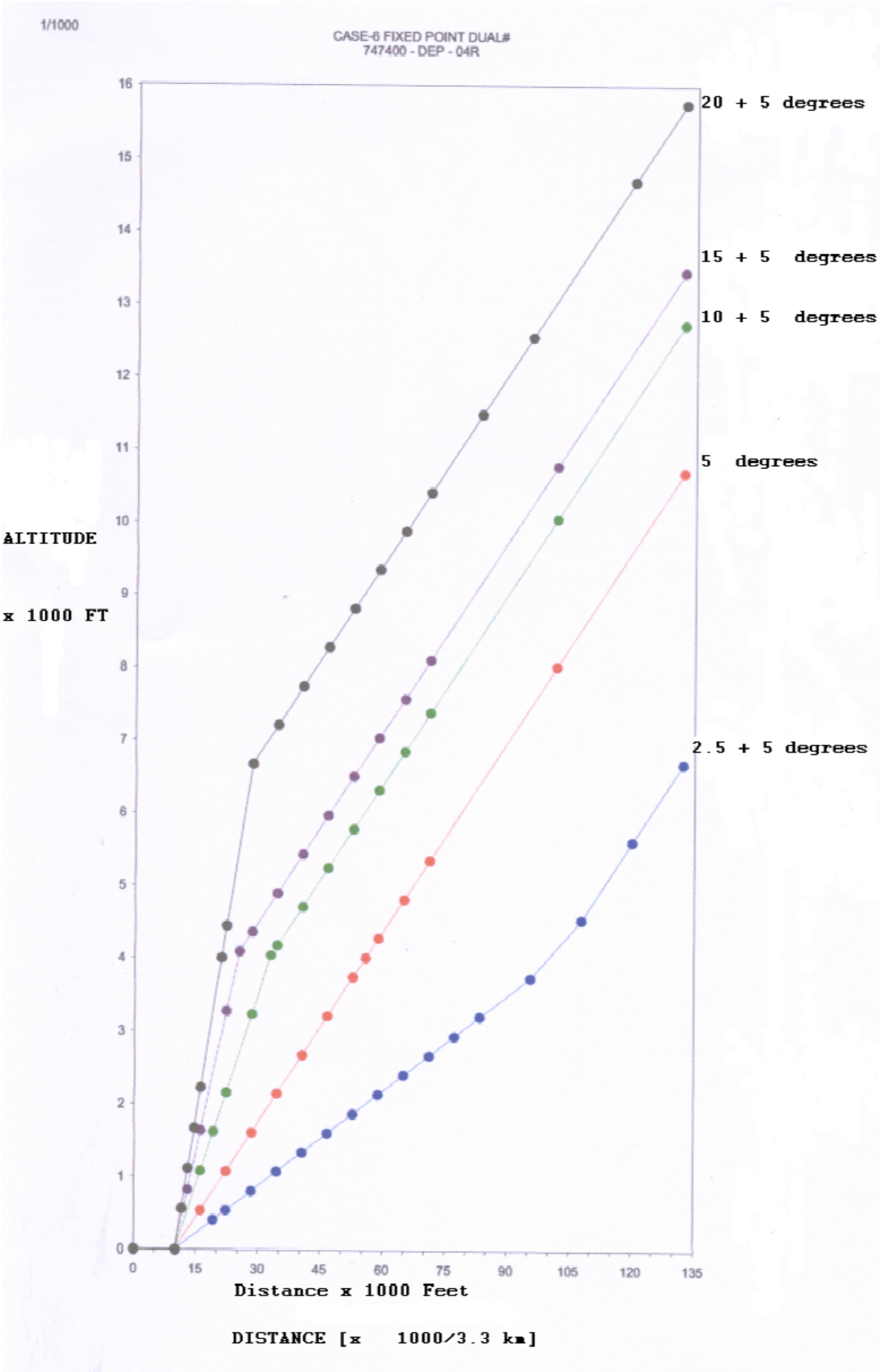
Image modified from "The Long Term Operating Plan for Sydney (Kingsford-Smith) Airport", Airservices Australia, Dec. 1996, p. 62 to show changes made in response to consultation resulting during Proponent Statement Exhibition.



APPENDIX F PROPOSAL FOR STEEPER TAKEOFF PROFILES

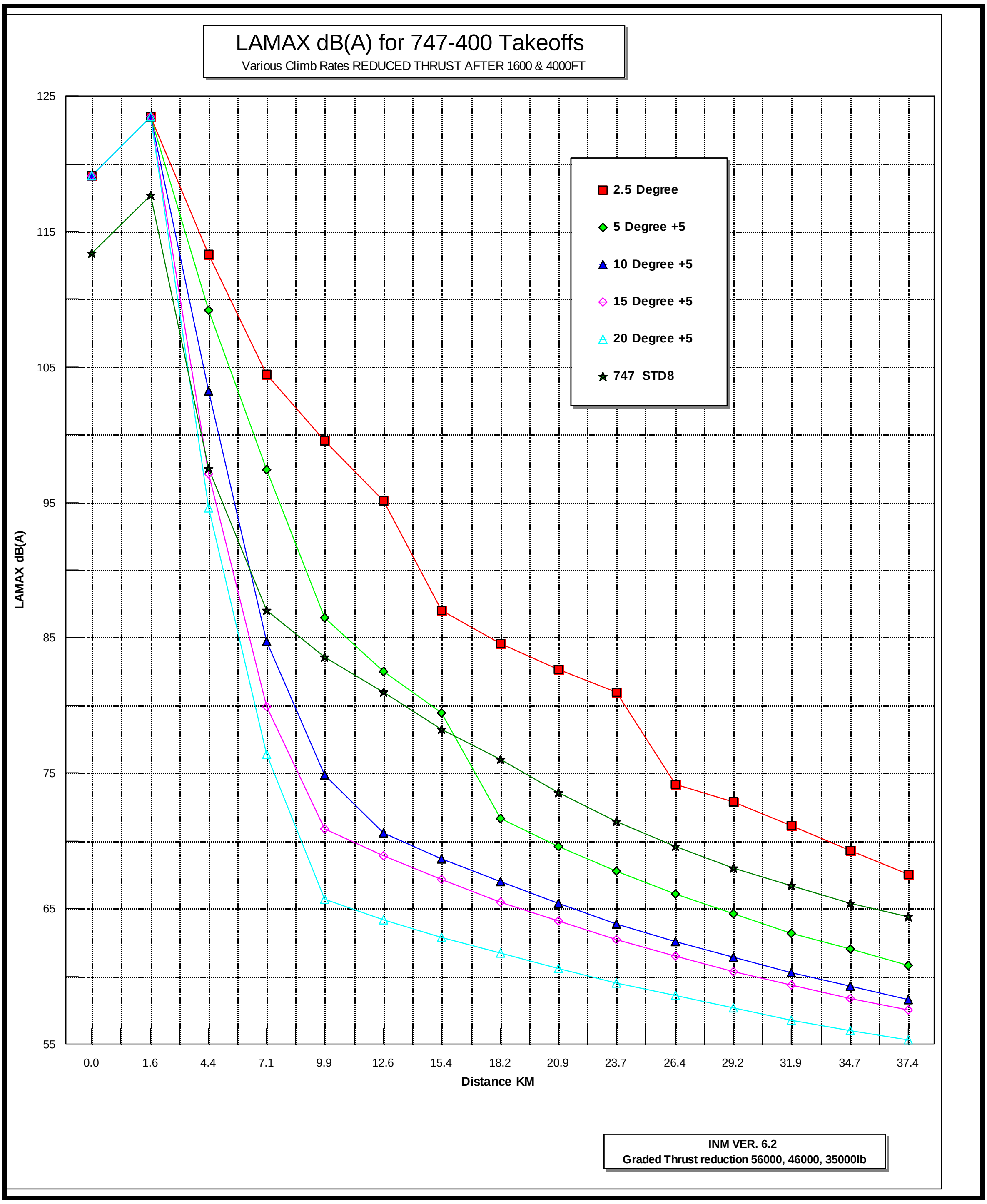
FIGURE 1 SUGGESTED CLIMB PROFILES:

Reproduced from SUPPORTING DATA FOR SACF NOISE ABATEMENT DEPARTURE PROTOCOL [NADP] DISCUSSION By P.S. Lingard, BSc., Ph.D., LLB. , Figure 1, SACF Doc 2007-022, 8/6/2007.



APPENDIX F PROPOSAL FOR STEEPER TAKEOFF PROFILES, cont'd:

FIGURE 2. TYPICAL PROFILE SET SHOWING IMPROVED LA $_{max}$ NOISE LEVELS WITH THE INITIALLY STEEPER TAKEOFFS SHOWN IN FIGURE 1
Reproduced from SUPPORTING DATA FOR SACF NOISE ABATEMENT DEPARTURE PROTOCOL [NADP] DISCUSSION By P.S. Lingard, BSc., Ph.D., LLB. , Figure 2, SACF Doc 2007-022, 8/6/2007.



E