COMMUNITY NOISE REPORT SUMMER HILL (III) 2002 - 2012

By Johann Heinrich & Philip S. Lingard

CONTENTS

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

EXECUTIVE SUMMARY

This paper reports aircraft noise monitoring for the period 2002 to 2012 inclusive. The monitoring was carried out by a Summer Hill resident (JH) using a Personal Computer equipped with a *Pico-Tech* "***Dr DAQ***®" analog signal logging device. The residence is 7-8 km from take-off roll at KSA and opposite the Summer Hill State primary school in Moonbie Street. Previous papers[#3, #4] covered the periods from mid 2002 to 30 June 2009. This paper adds the sound level maxima (LA max) for jet aircraft noise events from January 2010 to 31 December 2012. Now after ten years of recording we sadly confirm that the very high level of aircraft noise continues unabated and outside Australian Standard AS2021-2000 guidelines for dwellings . This results from the unacceptably low-flying of large noisy jet aircraft and apparent track convergence into a corridor across the subject residence.

The noise recording instrument captures more than 60% of jet departures from Runway 34L at Sydney airport, amounting to more than 15,000 of ca. 24000 "34L" departures per annum for 2012. Time-of-departure verification against Airservices Australia data confirmed this percentage concentration using coincidence testing for a trial period. Not only is this single home affected , but also those in a corridor around a kilometer wide spreading east to west of an arc from KSA to Moonbie Street.

Over the ten year period the average maximum event noise level (LA max) has stayed at around 74 $dB(A)_s$ ± 5.4 (Standard Deviation). That level is over 10 decibels more than a background noise above which people cannot conduct sensible conversations face-to-face, and is sufficient to penetrate the average home . The average , of course , is not the highest level: 45% , 14% & 3% of noise events are at sound levels greater than 75 , 80 and 85 dB(A) , respectively.

Since 2005 this community issue was repeatedly raised with Ashfield Council and referred to the Government's ***Sydney Airport Community Forum*** (SACF) by a succession of Mayors , without result. Moreover no attention has evidently been paid to it in practical terms by Airservices Australia or the relevant Minister (now Grayndler MP the Hon. Anthony Albanese), and there has been no improvement. Aircraft Noise impacts at this site began in 1997 with the ***"Long Term Operating Plan"*** for Sydney (Kingsford Smith) Airport (LTOP). The dwelling is therefore "Newly" affected. No airport noise exposure forecast (**ANEF**) predicted the noise levels recorded at Summer Hill to-date including the *2009* (for 2029) Airport Master Plan. ***Thus prediction from assumed flight trajectories is not equivalent to monitoring.***

The official metric used for measuring aircraft noise impacts is the Australian Noise Exposure Index (ANEI). The ***ANEI*** (a 365 days average) for the entire period at this property was 19.8 dB(A) ± 0.9 with a value of 21.7 ± 1 dB(A) by operational period[#5]. The Energy and Time-Averaged Equivalent sound pressure level LA_{eq} was 54 dB(A) ± 13 on a whole of year basis, and over 56 dB(A) by operational period. ***Such noise exposures are not forecast for Summer Hill in Sydney Airport's Master Plans until after 2023!***

By ***Australian Standard AS 2021-2000*** such ***ANEI*** values are approaching ***"conditional acceptability"*** for home building near Australian airports. By the ***NSW EPA "Industrial Noise Policy Guidelines (2000)"*** the averaged sound pressures (LA_{eq}) are unsuitable for homes in suburban areas adjacent to loud industrial sites . That nearly 70% of jet aircraft takeoffs from Sydney Airport Runway 34Left converge in this single corridor , centred on and audible from a single residence suggests "Targetting". This area was unaffected by aircraft noise prior to LTOP in 1997 . The paranoid might suggest *"authorities"* are making a scapegoat of Summer Hill to avoid arousing more strident criticism from a wider area. This could explain

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2 P. S. Lingard has been a resident of Ashfield for 43 years and South Ashfield for 31 years.

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

4 Community Noise Report Summer Hill II , Oct . 2009 [SACF Doc. 2009/??? ; Ref. AI 5/04 Meeting 4/2009 27/11/2009];

5 *Operational Period* = Number of days in year flight corridor was in use ; Record Day = one of those days .

our higher measured ANEI than the officially forecast ANEFs from airport Master Plans which are obtained with a wider spatially averaged flight path distribution.

Air traffic planners at Sydney thus appear intentionally to concentrate flight tracks over this home . This contradicts Ministerial Media Statements of 1996 -1997 claiming the aim of LTOP-1996 was to abolish flight path concentrations. The LTOP had proposed departure spreading where possible to promote "fair sharing" . In fact the old North-South single departure flight corridor was abolished by then Minister Sharp's ***Air Navigation Regulation Amendment 1996***[# 6] in order to facilitate spreading. However , the resulting distribution was never even. Moreover successive Ministers directed Airservices to develop and optimise Noise Abatement Departure Protocols (NADPs). These Ministerial Directions were ignored.

The overall integrity of these data is not disputed by Airservices Australia . Indeed the present reported maximum results in decibels ($\boldsymbol{LA_{max}}$) confirm the general event noise levels for B747 aircraft over Summer Hill shown from Airservices Australia measurements in its Environment Branch [EB] Report No. 1360 (2003) at Henson Street , excepting that our calculated $\boldsymbol{LA}_{eq}$ and ANEI are greater.

Readers are warned that reported sound levels (LAmax) are expressed in a form called A-weighted “Slow” -averaged decibels [$dB(A)_s$] as required for aircraft noise reporting by Australian Standard AS2021. This measure for aircraft peak noise is about 3 -4 dB *less* than that commonly used for both peak and continuous monitoring of general environmental noise. On paper this makes recorded noise values for aircraft *appear* numerically less *(ie quieter)* than for non-aviation regulated areas. Also A-weighting significantly attenuates low sound frequencies (< 160 Hz). It is such frequencies that can cause most disturbance for people with hearing disorders like Hyperacusis , Tinnitus and Menier’s disease . A World Health Organisation-commissioned report of 1995[#7] concluded that repeated exposure to high noise levels is potentially harmful to important aspects of human health and welfare , including blood pressure and childhood education at exposed schools , such as at Summer Hill.

The proportion of departures exceeding 80 dB(A) has declined modestly from around 18% in 2002/4 to 13% in 2012, which is good , but 80 decibels is not a healthy noise level to be exposed to. The fraction of departures exceeding 75dB(A) remains at around 46 ± 9 % . Although we can report reductions of the highest decibel event numbers , the number of disturbed days each year remains about constant (at 280 in 2012), and the number of *MOVEMENTS* has risen by 4000 since 2007 to over 15000 in 2012, an increase of 40%. The average LA max , however, is undiminished: Not a creditable result for Airservices Australia.

The chief responsibility for improvement lies with ***Airservices Australia***, whose refusal to implement their 1996-specified ***LTOP***[#8] is the main problem. But Airservices Australia is not the only problem. In 1996 - 1997 the Prime Minister promised that LTOP would not create new noise-affected areas north of the airport, and failed to listen when it did. Urgent action is now required from present and subsequent Governments, which must ensure that their Directives are followed.

Remedies suggested include removing the arrival ceiling; full ***LTOP*** implementation with the "***high and wide***" arrivals promised in 1996 ; better noise abatement departure protocols (NADPs) than the minimalist NADPs (once ICAO-"A") and low-level takeoffs practised today ; and increased use of over-water modes (ie SODPROPs). In 2006 Lingard showed that departure procedures using steeper initial climbs could potentially reduce ground noise at Summer Hill by 10-20 dB(A) for B747’s (IMC)[#9] . These calculations used the United States Federal Aviation Administration's aircraft noise computer model the INM[#10] . Steeper takeoffs from Runway 34L are presently blocked by the dangerous ceiling of overflying arrivals at 6000 ft. This ceiling would not exist had LTOP included the promised offshore (“high & wide”) arrivals components , and its removal would potentially enable less noisy flight paths over Summer Hill.

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6 *Air Navigation (Aerodrome Flight Corridors) Regulations (Amdt)* 1996 *No 37, March 1996.*

7 *Berglund, B. & Lindvall, T. "Community Noise" , ISBN 91-887-8402-9, 1995*

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

9 *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 IMC.

10 INM = Integrated Noise Model (Computer Software produced by the United States Federal Aviation Administration).

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" [#11]. It was also viewed sceptically by the government's Sydney Airport Community Forum (SACF), which in 2003 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 [#12] Chairman 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 Airservices noise complaints line (NEU).

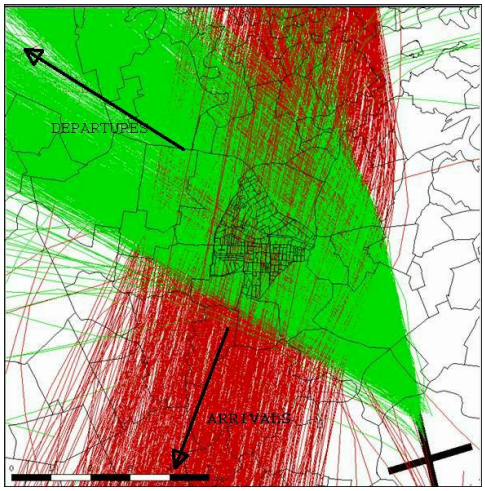
During early 2003 Airservices Australia Environment Branch conducted a 3 month aircraft noise monitoring study at a home in Henson Street, Summer Hill (ASA EB Report No. 1360, Sept. 2003[#13]). That study , after five years of pseudo - LTOP operation, was the very first extended noise monitoring exercise carried out in the Ashfield area beyond the semi-continuous monitoring by Airservices Australia Noise Monitoring Terminal at Croydon's PLC[#14] (NMT 15 , see Appendix "C" Figure 3) .

That Airservices study reported Boeing 747 jet aircraft noise levels averaging 80 dB(A) ± 4 (SD) at the Henson Street residence (<0.5 km from the subject property of this report). 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 was found to be caused by the much denied arrival ceiling. The arrival ceiling is illustrated from that report in Figure 1 .

Figure 1 (a) shows the crossing flight paths over Ashfield and Summer Hill as in October 2003. The Arrivals travelling at above 6000 ft are shown in RED (crossing north-east to south-west) , and the northwest Departures, beneath them are shown in GREEN.

FIGURE 1 (a) Plan View of Crossing Flight Paths:

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 . Red Lines are Arrivals and Green Lines are Departures . Though masked by the colouring, the RED arrival tracks are at greater altitude than the GREEN Departure tracks.



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11 Minister Vaile Press Release, April 1998

12 IMC = Implementation and Monitoring Committee (of LTOP)

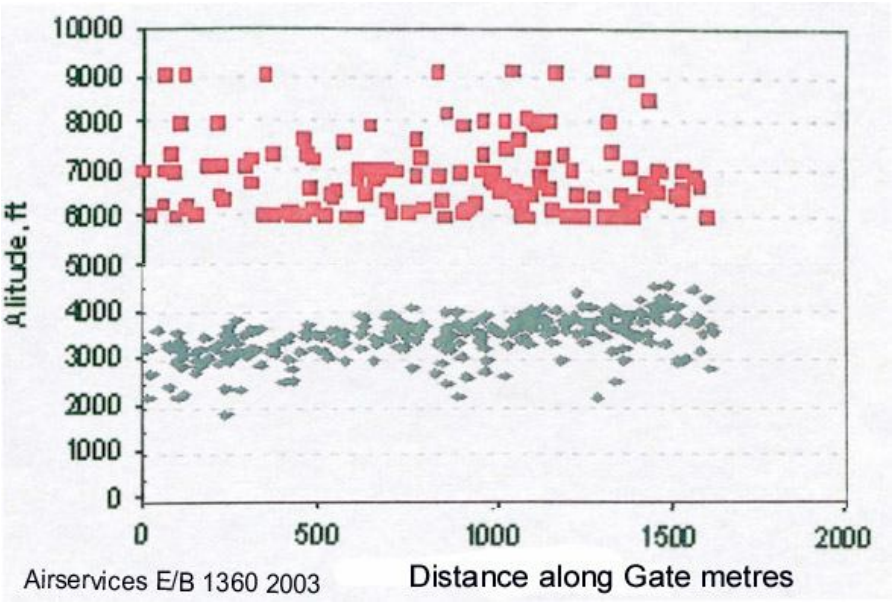
13 Airservices Australia Environment Branch report No. 1360 , *"Short Term Study into Aircraft Noise and Flightpaths"*, February to May 2003, Summer Hill.

14 NMT #`15 at Presbyterian Ladies College; "Semi-continuous" because this Noise Monitor was not always on .

Figure 1(b) shows the height of monitored aircraft across the 1.7 km measurement (east-west) "Gate" across the monitoring location in the Airservice Environment Branch Report (EB 1360 , 2003). The arrival aircraft positions are drawn as (red) squares from the red tracks in Figure 1 (a) showing the effective departure "ceiling" created. The levels of departing jets are shown as horizontal (blue/green) diamonds , being effectively limited to flying below 5000 ft , the majority being much lower than that, due to the 1000 ft Separation Rule.

FIGURE 1 (b) The Arrival Ceiling Over Summer Hill - Vertical Section across Henson Street "Gate":

Image by P. S. Lingard by digital reconstruction. Airservices Data of Figs 7 & 10 of EB Report 1360 2003 [ibid. 13] . The Red Squares show the positions of arriving planes transitting over Summer Hill before turning to fly in through Botany Bay. The Green-Blue diamonds show the departing aircraft restricted to heights below 5000 ft .



The validity of the high noise levels documented in the EB 1360 Study were at first viewed sceptically by the government SACF. The reported noise levels were more like those previously found at Sydenham and Tempe than for Summer Hill at 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. Later 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 noise abuse from Airservices Australia. In 1996, the people of Lowe (which then included parts of Ashfield) were promised by the former Prime Minister (Hon. John Howard MP) that they would receive *no more* aircraft noise with the then proposed LTOP[#15] than they received before , which had been precisely nil! Yet even today , 16 years from LTOP commencement, this report confirms that matters were made worse , not merely held in status quo, by the failed LTOP implementation.

Only two official noise monitoring exercises were 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 reasons unofficially admitted to have been "*due to too many echoes* !" (As if this did not in fact reflect what owners were complaining about). 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, Leichhardt & Kurnell) , whilst newly

[15] SMH 9/2/1996

LTOP-noise-affected areas (such as Ashfield) were being ignored, despite the then coalition Environment Minister's 1996 instruction for such monitoring to occur [#16] .

Fixed 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 being directly over it: See Appendix C. Hence one may reasonably conclude that the data from the NMT 15 at PLC is atypical and understates the aircraft noise impact for the surrounding neighbourhoods.

Apart from the above-mentioned studies, the present series of ***Community Noise Reports*** seem the only unofficial attempts to scientifically quantify "LTOP" - related aircraft noise at specific homes in the inner north west.

Responsible Authorities (both government and beaurocratic) must understand that for many people annoyance from aircraft noise is not a matter of mere dislike. It occurs because with regular exposure at the sound levels reported in the present report and Environment Branch Report No. 1360, some people (including one present author) actually experience pain , with resulting physiological and psychological harm [#17]. Far from such complainants being "nutters" , as contemptuously described by one Airservices employee at a Government SACF meeting in 2003, people can be actually harmed by Airservices continued pursuit of its half-aborted LTOP. It is submitted that continuation of abusive noise without proper environmental controls , in full knowledge of its effects, amounts to a form of bureaucratic persecution.

This paper reports ongoing noise monitoring being conducted 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) [#18], a SACF Proxy for the Mayor of Ashfield from 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 by some. All such affected people should complain loudly both to Airservices Australia and responsible government Ministers, 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® [#19], DrDAQ® data acquisition unit) , designed for 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" .

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

17 "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.

18 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 154 Summer Hill, NSW 2130, Tel: (02) 97989606. He is contactable at Email: pslingard@tpgi.com.au.

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

The microphone is located in the open, at a height of 930mm above a grassed surface attached by 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, so 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.

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 relatively easy, 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) per event is logged against the time of the recording, and a day-file for each series of events created .

The methods of use, calibration , data processing and verification were described in the two previous reports and are repeated here as ***Appendix "A"*** (***METHODS OF NOISE MONITOR USE IN DETAIL***) to avoid cluttering the main text with technical detail. The noise monitor only operates when the subject family is in residence. Therefore from 2002 to 2009 there were periods of up to 30 days in those years when data are unavailable (See Table 4A below). In 2009 only the first half year was monitored.

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 below have been calculated.

3.1 Average Noise in A-weighted Decibels :

Table 1 provides the average noise and standard deviations for each year of this Report. An overall average of 13101 noise events/annum was recorded from 2003 to December 2012.

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	11,620
2010	*79.5*	*74.9*	*5.3*	*57*	*92.2*	*14,141*
2011	*79.5*	*73.9*	*5.3*	*60.5*	*92.2*	*13,338*
2012	*79.8*	*74.3*	*5.1*	*59.5*	*91.8*	*15,213*
AVERAGES	**80.0**	**74.0**	**5.0**	**56**	**94**	**13,101**

* Part Year only ## = Recorded See Appendix
# Recorded data - 5.5 dB A

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 , "ANEI (record days)". The ***ANEI*** are calculated by the methods described in AS 2021-2000 *(Aircraft Noise Intrusion - Building Siting and Construction)* and summarised in ***Appendix "A"***.

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**
2010 [279]	*23.9*	*25.0*	***18.4***	***19.5***	*62.7*	*63.9*	***57.2***	***58.4***
2011 [260]	*24.9*	*26.4*	***19.4***	***20.9***	*63.7*	*65.2*	***58.2***	***59.7***
2012 [279]	*25.6*	*26.8*	***20.1***	***21.3***	*64.3*	*65.5*	***58.8***	***60.0***
AVERAGES	*25.3*	*27.2*	***19.8***	***21.7***	*59.7*	*61.9*	***54.2***	***56.4***
SDs	*0.9*	*1.2*	***0.9***	***1.2***	*12.6*	*12.1*	***12.6***	***12.1***

For Defence -related airports with intermittent overflying , the methodology in AS2021-2000 [para. A2.4] recommends that the corrected (operational or record day) data in Column 5 of Table 2 should be employed. This gives an ANEI of 21.3 for 2012. It is submitted that this better allows for the frequent, but intermittent , wind-directional use of the Summer Hill corridor, following the Defence airport anology. It is noted here that some accousticians recommend adding 8 decibels [dB(A)] to the ANEI figures as under LTOP the tracking area is a newly affected area [#20] . Adding a "*newly-affected*" loading of 8 dB(A) raises the ANEI to a value of 29.3 which is well outside the residential-area "conditionally acceptable" range recommended by the Australian Standard. This is a radical view , however.

3.3 Departures Exceeding Certain Noise Thresholds:

Table 3 provides the percentage noise levels for each year falling into each of 6 threshold categories according to decibel (dB(A) level. The table also shows the number of flights per "operational day" for the subject site in each year .

*[**Correction Note**: In this report an error is corrected from the previously -published (2009) version of Table 3 whereby uncorrected LA max results were used to calculate the "**percentages-over**" data for years 2002 - 2005 , though the corrected LA_{max} data had been used elsewhere. This had the effect of raising the reported percentages of events over a given decibel level]*

[20] See PPK DRAFT EIS ***Second Sydney Airport*** S. 11.3.2; Supplementary EIS Chapt. 8.3.3 .

COMMUNITY NOISE REPORT SUMMER HILL (III), 2002-2012, Cont'd:

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

YEAR	*TOTAL*	*>65*	*>70*	*>75*	*>80*	*>85*
2002 Total 158 DAYS	9,670	9,184	7,645	4,991	1,736	446
Percent 02 >	**100%**	**95%**	**79%**	**52%**	**18%**	**5%**
No. per day-02	61	58	48	32	11	3
2003 Total 221 DAYS	11,441	11,221	9,185	4,890	1,237	292
Percent 03>	**100%**	**98%**	**80%**	**43%**	**11%**	**3%**
No per day-03	52	51	42	22	6	1
2004 Total 251 DAYS	14,081	13,773	10,804	5,121	1,163	149
Percent 04 >	**100%**	**98%**	**77%**	**36%**	**8%**	**1%**
No. per day-04	56	55	43	20	5	1
2005 Total 248 DAYS	14,662	14,279	11,565	6,519	2,182	331
Percent 05 >	**100%**	**97%**	**79%**	**44%**	**15%**	**2%**
No. per day-05	61	59	48	27	9	1
2006 Total 265 DAYS	13,219	12,996	10,744	6,574	2,635	661
Percent 06 >	**100%**	**98%**	**81%**	**50%**	**20%**	**5%**
No. per day-06	50	49	41	25	10	2
2007 Total 227 DAYS	12,214	12,021	10,015	6,274	2,553	687
Percent 07 >	**100%**	**98%**	**82%**	**51%**	**21%**	**6%**
No. per day-07	54	53	44	28	11	3
2008 Total 201 DAYS	11,078	10,806	8,684	4,973	1,608	428
Percent 08 >	**100%**	**98%**	**78%**	**45%**	**15%**	**4%**
No. per day-08	55	54	43	25	8	2
2009 Total 115 DAYS to end June	5,810	5,473	4,188	2,500	730	110
Percent 09 >	**100%**	**94%**	**72%**	**43%**	**13%**	**2%**
No. per day-09	52	49	38	23	7	1
2010 Total 279 DAYS	14,141	13,589	10,653	6,231	1,688	235
Percent 10 >	**100%**	**96%**	**75%**	**44%**	**12%**	**2%**
No. per day-10	51	49	38	22	6	1
2011 Total 260 DAYS	13,339	12,991	9,844	6,030	1,729	227
Percent 11 >	**100%**	**97%**	**74%**	**45%**	**13%**	**2%**
No. per day-11	51	50	38	23	7	1
2012 Total 279 DAYS	15,213	14,916	11,633	7,071	1,959	235
Percent 12 >	**100%**	**98%**	**76%**	**46%**	**13%**	**2%**
No. per day-12	55	53	42	25	7	1
AVERAGES 2002 -2012	**TOTALS**	**>65**	**>70**	**>75**	**>80**	**>85**
AVERAGE TOTALS	12,261	11,967	9,789	6,020	2,142	514
AVERAGES %>	**100%**	**97%**	**78%**	**45%**	**14%**	**3%**
AVERAGES #/Day	54	53	43	26	10	2

3.4 Data Verification:

3.4.1 Verification Against Airservices SACF Briefing Notes

Table 4A compares the aircraft noise event numbers as a monthly percentage of northwest departures per day from runway 34 Left **,** obtained from ***"Sydney Airport Briefing Notes"*** . Because early "Briefing Note" data were not always reliable[#21] , 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 these data except at significant cost (ie $1000's). However, after publication and discussion of the initial report in Government SACF in 2006 , and representations by one of us (PL) in SACF, the required departure time data were supplied by Airservices Australia after intervention by Senator Marise Payne (Chair of Government SACF from 2002 through Nov. 2007).

***TABLE 4 A Data Verification by Month showing Percent Detected Jet 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%**
2006	82%	78%	83%	68%	75%	76%	78%	82%	79%	84%	77%	79%	**49%**	**79%**
2007	78%	98%	55%	84%	79%	82%	33%	40%	75%	41%	62%	26%	**36%**	**66%**
2008	79%	82%	57%	44%	37%	69%	38%	75%	65%	73%	75%	41%	**36%**	**57%**
2009#	75	68	na	77%	68%	64%	na	na	na	na	na	na	**49%**	**75%**
2010	54%	63%	62%	66%	70%	63%	64%	70%	67%	66%	64%	63%	**43%**	**65%**
2011	68%	65%	67%	66%	63%	62%	61%	67%	68%	68%	66%	72%	**43%**	**66%**
2012	60%	63%	70%	67%	73%	64%	66%	67%	65%	67%	68%	64%	**41%**	**66%**

** Note 1 2002 Data Year Incomplete*
 # Note 2 2009 data for half year to June 30 , only.
Note 3 Airservices Data shown for Years 2006-12 is for Jets only .
2002 - 2005 data was originally provided only for total departures - with 60% of them being Jets.

The monthly data is the percentage of recorded aircraft noise events compared with total 34L jet takeoffs , the final two columns being period averages.

3.4.2 Coincidence Testing of Noise Events against Verified Takeoff Times:

Table 4A (above) compares the recorded data as percentage of jet aircraft takeoffs detected at the sound level meter against reported total and jet aircraft takeoffs from Runway 34L. As noted above, the times of the ***DrDAQ*** ® recorded noise events for ***2002-2005*** were separately compared against Airservices Officially listed runway 34L departure times for jet aircraft . For a departure time to be accepted as *"coincident"* for inclusion in the statistics the subject takeoff 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 around 61% of aircraft noise events at this location were jets 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).

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

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

YEAR		QTR 1	QTR 2	QTR 3	QTR 4	OVERALL 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%	**61%**
	FALSE POSITIVES	0	0	0	0	

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.

Airservices Australia could greatly assist the community by itself conducting extended professional noise monitoring across the northwest, in locations actually on current flightpath corridors .

4. SHORT SUMMARY OF RESULTS:

For the following it is remarked that the peak sound levels [LAmax = 70 dB(A)] for domestic equipment are generally recorded using noise meters switched to a *"Fast integration"* setting (Measurement averaged for 0.125 seconds) . For aircraft noise monitoring , however, Australian Standard AS2021 requires equipment to be used in the *"Slow integration"* setting (Single second averaging).

The *"slow-average"* peak sound level for a given (rise and fall) noise event is 3~4 dB(A) less than the same nominal 70 dB(A) *"fast"* integration value employed for general noise comparison . Hence aircraft noise will appear to the observer to be louder (decibel for decibel) than the numbers suggest. This is a subtle but important difference because an observer , familiar with domestic and industrial noise issues, might be misled into ignoring the significance of seemingly lesser aircraft noise levels if not aware of the different measurement standard used in aviation practice.

In this report all raw recorded sound level data were obtained by a method initially equivalent to the *"fast"* -integration process and afterwards *"corrected"* by deducting an amount of 5.5 dB(A) as discussed in ***Appendix "B"***. The resulting values are then considered as being equivalent to "slow" integrated data and labelled "*corrected*" in Tables 1 & 2 above. Hence the actual apparent peak noise (as commonly understood) would have been greater than the record suggests.

4.1 In 2002-5 , detailed Departure Coincidence testing confirmed the reported flight track concentration findings in Table 4.

4.2 From 2002 to 2004 the proportion of all jet aircraft crossing over the subject location exceeding an LA max of 80 dB(A) decreased from 18 to 8% .

4.3 From 2005 to 2007 the fraction of all jet aircraft passing over the subject location exceeding an LA max of 80 dB(A) rose from 15% to 21%. The percentage over 80 dB(A) declined from 2008 onward to a level around 12-13% for 2010-12.

4.4 Between 2002 and 2012 the proportion of all jet aircraft producing maximum sound levels over 70 dB(A) and 75 dB(A) has stabilised at averages of 78% and 45%, respectively .

4.5 The **N(70)** [number of jet aircraft noise events per operational day exceeding 70 dB(A)] fell from nearly 60 in 2002 to 43 per day in 2012.

4.6 The **N(80)** [events per day exceeding 80 dB(A)] declined from 34 in 2002 to 7 in 2012 , the overall average being 10 , a much needed improvement *[See Table 3]*.

4.7 The **ANEI** from 2005-2007 based on a ("365 day"**)** calendar year *[Table 2, Col 4]* all exceeded the the Standards Association "*Acceptable*" band (ie >= 20 ANEF) for dwellings according to AS2021-2000 *[See Table 7 below]*. However , between 2002 and 2004 and from 2008 to 2011 the **ANEI** lie just within the Standards Association "*Acceptable*" band (ie <20 ANEF) . For 2012 the value of 20.1 marginally exceeds acceptability. By AS2012 the Metric to be used varies with type of Airport . The ***ANEI*** for large civilian (*ANEF published*) airports is calculated assuming a 365 day year . The ***ANEI*** *[Table 2, Col 5]* for Defence-related airports with intermittent flight path operation is based on "record days" , and is usually higher than that obtained assuming a 365 day year. For the studied location this ***ANEI*** is over 20 dB(A) , and thus by AS2021 is in an only *"conditionally acceptable"* zone for all years excepting 2010 where the $\boldsymbol{ANEI}_{\text{(record day)}}$ was 19.5.

4.8 For ***"Light General Aviation Aerodromes"*** without an ANEF chart [#22] , the chosen Metric is listed in Table D1 of AS2021 and is based on number of flights per day above critical decibel levels. This states that more than 20 flights per day above 75dB(A) is only *"conditionally acceptable*", while more than 20 /day over 85dB(A) is "unacceptable" without noise insulation . In the studied location the N(>75dB(A)) averaged 26 per day over 10 years and would likely be a candidate for the provision of Noise Insulation at the industry's or Government expense , given a strong enough legal support.

4.9 Some authorities argue that newly-affected areas such as Summer Hill should benefit from an 8 dB(A) noise bonus[#23] (added to measured ANEI) when considering eligibility for insulation support. Given a "*new affectation*" loading of 8 dB(A) it would be classed as bearing an unacceptable noise burden throughout the recording period.

4.10 Comparison of *noise event numbers* with Airservices Runway 34L *takeoff numbers* from 2002 - 2012 shows that from 60 to 90 % (in 2005) of ***jet aircraft*** and /or 50% of ***all aircraft*** overflew the subject location in Summer Hill. Our 2002 - 2005 verification study confirmed that 61% of aircraft recorded at this location were verifiably jets that departed Runway 34L at the stated time (Table 4A), and also that none were *"phantoms"*. For 2012 that ratio stands at 66% (Table 4A) .

While flight-track concentration decreased somewhat between 2003 and 2007, the Moonbie Street jet aircraft capture rate for 2010-2012 was around 66% . This excludes results for the first half of 2009 showing a capture rate of 75% for only a half year's data.

5. DISCUSSION OF RESULTS:

5.1 Flight Track Concentration (Table 4A)

Airservices has never implemented the promised LTOP movement distribution ie : 17 % of Movements North , 13% East , 15% West and 55% South. Over 15 years , in every single report to SACF and Government , Airservices has flunked this primary test with a range of 35 -40% of movements over the north. Despite the LTOP promotion of departure track spreading and eliminating flight corridors, the concentration of departing jet flight tracks over this home is marked. We submit that such traffic concentration over single homes is unfair and discriminatory. Flight path concentration can be avoided for departures , and its continuance reflects a seemingly callous disregard by ***Airservices Australia*** and the airlines for those in affected residential areas.

5.2 Movement Numbers (Table 1) :

Table 1 shows that the annualised average number of recorded events per year from 2002 - 2012 was 13100. From 2003 they increased from 11441 to over 15000 in 2012. While event numbers actually declined from 2005 to 2009 (to around 10000) , they have risen since 2010 to more than 15000 per annum in 2012. Despite modest flight path spreading across the inner north west , 66% of reported jet takeoff events from Runway 34L were captured by this single noise monitor. That this is an actual confluence of flight paths was previously confirmed by Takeoff-Time Coincidence testing from 2003 to 2005 [See Table 4B]. From 2002 -2009 , the numbers may <u>*underestimate*</u> the maximum exposure due to operator absences for annual leave etc, but from 2010 recording has been continuous.

5.3 Sound Level Maxima in dB(A) (LA max)

Average noise levels (LA max) in A-weighted decibels [dB(A)] were listed in Table 1 with percentages of overflights exceeding given decibel thresholds shown in Table 3.

Table 1 lists annual average LA max (decibel) values for all jet aircraft of 80 dB(A) [*uncorrected*] , and 74dB(A) [*corrected* for *"slow integration"*] . The range of variation is 60 -92 dB(A) -*corrected* . The

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[22] In breach of Ministerial Direction, Sydney had no ANEF for 5 years from the implementation of LTOP in 1997!

[23] PPK DRAFT EIS Second Sydney Airport S. 11.3.2; Supplementary EIS Chapt. 8.3.3

average sound level value of 74 dB(A) is 8 -9 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 talking face to face at a distance apart of 0.5m.

Similar average levels were reported for B747 class jet aircraft in Airservices Australia's Henson Street (Summer Hill) Environment Branch (EB) report No. 1360 of July 2003 (EBR 1360). That 93 day official monitoring exercise at a point 0.5 km south west of Moonbie Street showed that B747 jets were being flown so low that the resulting ground noise level was 80 $\pm$ 4 (SD) dB(A) .

Table 3 confirms and extends the Airservices data of EBR 1360 revealing unacceptable levels throughout the year when Runway 34L is used for departures in LTOP Mode 9. From 2002 to 2012 the percentage of flights above 75 and 80 dB(A) averaged 45 and 14% , respectively . This reflects very poor management of the human environment compared with recommended standard Indoor Design Level values for various dwelling types listed in Table 6 (Taken from Table 3.3 Australian Standard ***AS2021 -2000***).

The data show that 45% of noise events 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[#24] . For ***"other habitable spaces"*** (Table 6), where people may 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), which is a huge 20 dB(A) below external averages for the aircraft noise events in Moonbie Street. The Standard (AS2021) recommends the provision of additional insulation where outside levels exceed those which , given the insulation standard of a building , would produce indoor levels greater than those in Table 6.

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

INDOOR DESIGN SOUND LEVELS -Houses, home units, flats [#1]	Level dB(A) [LA_{max}]
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
2 Southgate et al , Expanding Ways to Describe and Assess Aircraft Noise, March 2000

While the construction standard of dwellings in Summer Hill is historically sturdy, ie double and/or cavity brick, at most 20 dB(A) would be taken off the outdoor level of 75 dB(A) , and this with windows and doors tight shut . Whilst reducing indoor levels to 55 dB(A), this is unacceptable for sleeping areas. In homes of less substantial construction (e.g. brick veneer or weatherboard) the reduction would be far 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, thus breaching the AS2021 recommendations *[See Table 6]* , and here we only consider the "average" aircraft noise event of 74.5dB(A). With 78% of events greater than 70 dB(A) , and levels up to as high as 94 dB(A) , this owner has a justified complaint.

Both the 1996 ***LTOP Reports***[#25] (Airservices Australia's "***fair share noise plan***") , and a more recent Department of Transport document [#26] , emphasise the desirability of restricting external aircraft noise to at most 70 dB(A) at outside ground level. This was ostensibly because 70 dB(A) is the outside sound level , with doors and windows open, that *"normal"* home insulation will reduce to *"the indoor design sound level"* . However, the Department of Transport document (***Expanding Ways etc***) wrongly cites the "design level" as 60 dB(A), contradicting the AS 2021-2000 values of 50 dB(A) for sleeping areas and of 55 dB(A) for *"other habitable spaces" (See Table 6 , above*) .

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24 AS2021 Table 3.3
25 "The Long Term Operating Plan for Sydney (Kingsford-Smith) Airport, Airservices Australia & SACF, Dec. 1996.
26 *"Expanding Ways to Describe and Assess Aircraft Noise"* D. Southgate et al ., March 2000.

Table 3 shows that 78% of recorded values were above or equal to 70 dB(A) , with 14% of values more than 80 dB(A) . Anyone interested in providing "***real solutions***" to the aircraft noise problem , must explain why Airservices Australia has never addressed this issue, given its 2003 Report at nearby Henson Street (EBR 1360) , and previous editions of this Community Report in 2006 & 2009. 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 aircraft noise at Summer Hill more like the expectation for Sydenham , for example **?**

5.4 Calculated ANEI for the Summer Hill Residential Location [Table 2]

The ANEI parameter ("Australian Noise Exposure Index"), is employed to track "progress" towards noise impact *"targets"* predicted by an airports "*Australian Noise Exposure Forecast*" (ANEF) . Airservices Australia computes ANEF contours using the US FAA's Integrated Noise (computer) Model (INM) [#27] . The INM can take input from either measured noise data (as used here) or from theoretical flight track profiles (distance , altitude etc) assumptions for each takeoff and aircraft type. It assumes that it is known exactly where each aircraft is in three dimensions at any time along its path.

However, ANEI may be obtained directly from actual measurement of aircraft noise impacts at a site (See AS2021-2000 p. 45 ; also ***Methods***, Section 2 above , and Appendix "A") . This is the method used in this report to calculate ANEI from surface measurements of the maximum aircraft noise, LA(max). Use of actual sound levels reflects people's daily experience and avoids assumptions about aircraft location , because the noise is actually measured when aircraft are overhead. Table 2 (above) compares both calendar-year averaged and operational-day based ANEI for each monitored year from Equations 1 to 3 in Appendix "A".

Reference to AS2021 tabulations (See *Table 7*, below) then shows whether the aircraft noise at the location is satisfactory. Thus an ANEI value above 20 ANEF represents a site which is only ***"conditionally acceptable"*** for a house, home unit or flat[#28] .

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 comparison of the Table 7 criteria with the 2012 (365 day*"corrected"*) ANEI value of 20.1 dB(A) shows the result is just beyond acceptability according to the Standard for houses, homeunits or flats.

Such values exceed recent Sydney Airport Master Plan (2023 & 2029) predictions that the ***20 ANEF contour*** would not have reached Lewisham (which is a suburb closer in) by 2023! This exceedance is significant in context of the damages recently awarded against Port Stephens Shire Council for failing to warn new home buyers that their area was affected above the 20 ANEF contour from Williamstown airbase operations, and should constitute a warning that NSW Courts will listen to arguments based on the AS2021-2000 standard.

If one expresses ANEI relative to the number of days of affectation (AS 2021 para. A2.4) , as recommended for Defence Department Airport runways with intermittent use, the period ANEI of 21.7 dB(A) [#29] is now not borderline, warranting the only ***"conditionally acceptable"*** label in Table 7. The

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27 Integrated Noise Model (INM) US Federal Aviation Administration (US FAA).

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

29 The value reported for the Airservices tested site in 2003 (EB Report No. 1360) was ANEI = 17dB(A), which was

Defence Airport analog is consistent with the intermittent use of the various LTOP Modes , which employ different take-off tracks subject to the direction of the prevailing wind. It is submitted that the Moonbie Street site thus deserves being provided with noise mitigation measures at Airservices or the Airport Authority's cost.

An ANEI of 25 dB(A) or above would warrant rating the location as unacceptable, with noise insulation essential. For ANEI's above 30 dB(A) [equivalent to about 1600 70 dB overflights per day], then the home would have qualified for the former Commonwealth subsidised noise insulation under SANIP [#30] , but not otherwise . This stringent qualification for noise insulation [>= ANEF 30 dB(A)] greatly exceeds the former (Third Runway) Community Advisory Committee [CAC], NSW Environment Protection Agency, and the Commonwealth Environment Protection Agency 1995 recommendations that in the interests of human welfare noise insulation should be provided for ANEI above 25 dB(A) [# 31] . Making the matter worse is that just across the road, is the large Summer Hill State primary school, where children's classes suffer from frequent interruption.

5.5 AS2021 Standard for "Light General Aviation Airports" (Appendix D)

Table 3 lists the number of flights per day above given decibel thresholds . For example the year 2012 saw 26 departures per operational day exceeding 75 dB(A)

The AS2012-2000 "Appendix D Standard" 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). Therefore even by the general aviation "standard" this Summer Hill dwelling is at the "conditionally-affected" Aircraft Noise Level!

Whilst seemingly provocative to moot a "***general aviation aerodrome standard***" for an area close to a major international airport such as Kingsford Smith , with a "*nominal ANEF*", the intermittent , weather -dependent nature of flight track usage suggests such treatment may be apt. Also Sydney Airport ran without an ANEF until March 2004 . Until then it fitted the designation for AS2021 Appendix D. It is reasonable that the noise exposure standard for people near a major airport should not be worse than for a light GA airport , so why is no legal liability placed on anyone for providing noise insulation for the homes of Summer Hill ?

5.6 Energy Averaged Equivalent Noise Level , LA eq

The LA eq is a noise metric defined in terms of the energy averaged sound exposure level, again in decibels.

Table 2 (Section 3) lists the calculated LA eq for (a) a full year and (b) operational recording days. Thus for 2012 , the calculated values for the corrected data are between (a) 59 [365d] and (b) 60 [279d] dB(A) . Comparing these data with New South Wales Government , EPA- prescribed noise guidelines for Suburban areas near industrial sites [#32] *[Table 8 , below]* shows that the LAeq exceed the recommended acceptable values for noise at an industrial site adjacent to or within earshot of a suburban residential area.

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

stated to be "acceptable" for the residential use as being less than 20.

30 SANIP "Sydney Airport Noise Insulation Program"

31 Fitzgerald, P. (1998) The Sydney Airport Fiasco, Hale and Iremonger, p. 134-135

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

Tables 2 and 8 show that aviation noise over Moonbie Street produces energy averaged noise levels exceeding acceptability guidelines for evening and night , assuming the flying machine could be notionally replaced by noisy industrial machinery in a hypothetical overhead industrial site. Although the practice of flying aircraft overhead is not defined in State Law as a type of State ***"industrial"*** activity, it is submitted that our State Legislators should consider making it subject to the *Table 8* (State) restrictions for the benefit of NSW airport neighbours. The States should also rescind any agreements they have with the Commonwealth which allow the ***Airports Act*** to prevail over State Environmental Laws near an airport.

6. SUGGESTED ENVIRONMENTAL IMPROVEMENTS:

The following outlines a number of ways aircraft flight track concentration and noise could be reduced at close-in airport neighbourhoods such as Summer Hill if implemented by Airservices Australia:

6.1 Eliminate The Departure Ceiling:

The Departure Ceiling (created by arriving aircraft) referred to in Para. 1[***Introduction***] is a key problem as illustrated in Figure 1 . Eliminating the simultaneous overflying of departures by arrivals across the north west , west and east would be a key improvement. It will enable lifting the takeoff ceiling permitting more rapid aircraft progression to cruising altitude with consequent long-range fuel savings for all airlines. The ***single major cause*** of the above problem is that the ***original 1996 LTOP*** was never fully implemented. The overflying is amply illustrated in the Environment Branch Henson Street report No. 1360 for the period from 14/10/2002 - 14/4/2003.

The effective altitude *"ceiling*" for departing jets is created by the simultaneous overflying of arrivals as seen in Figure 1 (a) & (b). With the ceiling at roughly 6000 feet, climbing jets from runway 34L are constrained to fly at more than 1000 ft beneath the crossing arrivals (the regulatory separation requirement) , ie well under 5000ft This low-fly zone extends westward all the way from Summer Hill to Parramatta and beyond. To confidently minimise the risk of collision with an arrival, departing pilots prefer to reduce their initial takeoff climbout altitude to maximise separation. This explains why, at Summer Hill, departing jets conduct extremely slow initial climbs leveling out to altitudes of only 1000 to 2500 ft until west of Winston Hills . Hence the resulting ground noise is more severe .

This necessity for extreme low flying occurs because the originally-planned mainly offshore ***"high and wide"*** arrival procedures for northerly winds were abandoned by ***Airservices***, despite having been asserted as fully achievable and safe in the 1996 LTOP blueprint. The decision to abandon resulted from short-sighted conclusions based on the false assumption that "***high & wide***" approaches increased approach track mileages for aircraft. Yet the offshore tracking needed for ***"high and wide"*** was essential to achieving the LTOP's environmental targets in both the 1996 LTOP Reports, and the LTOP Proponent's Statement .

The problem is resolvable by reinstating the originally planned **"high and wide"** offshore arrival paths to runways 34L & R in LTOP Mode 9 . ***Appendix "C"*** addresses the departure ceiling in greater detail and why it has occurred, illustrated by Figures 7 & 10 from Airservices Henson Street Report.

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

The original LTOP foreshadowed the introduction of the former ICAO [#33] -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[#34].

ICAO-A required initial steepest possible ascents to not less than 1500 feet prior to adjusting engine thrust and turning onto course direction and has since been replaced by ***ICAO*** with a new Noise Abatement Departure protocol called NADP 2. As at 2007 , the standard instrument departure (SID) instructions for Sydney Airport (north) contradicted the NADPs , breaching the Minister's August 1998 direction. In 1999

[33] ICAO- International Civil Aviation Organisation
[34] Press Release T159/98, 28/8/1998

and 2007 at the request of Government SACF , first Minister Anderson and then Minister Vaile emphasised the need to improve Noise Abatement Departure Protocols . Airservices Australia should be asked why did it never implement the directions of three successive Ministers 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. Moreover it has been shown theoretically by one of us (PSL) that better than ICAO noise abatement is possible . Table 9 (below) shows that Protocols could be developed giving noise reductions of 12 to 28 dB(A) for from 10 -20 degree climbouts compared to present 5 and 2.5 degrees, respectively. More details are shown in *APPENDIX "D"*.

TABLE 9 Achievable 747-400 Aircraft Noise Level Reductions for Selected Profiles in Figure 2

CLIMB (Degrees)	***2.5 ^{o}***	***5 ^{o}***	***10 ^{o}***	***15 ^{o}***	***10 ^{o}***	***STD- 8 (747) ~ ICAO-A***
dB(A) at 7.1 km	**104**	**97.5**	**85**	**80**	**76**	**87**
CLIMB-OUT						
cf. 2.5^{O}			**19**	**24**	**28**	**17**
cf. 5.0^{O}			**12.5**	**17.5**	**21.5**	**10.5**

6.3 Employ More Effective Aerial Fanning after Takeoff:

This should be self-evident, but ***Airservices*** has failed to respond innovatively to such suggestions , possibly due to staffing constraints . Perhaps the LTOP was more innovative in design than it was possible to complete, but among excuses provided to one of us (PSL) was that "*pilots don't like changing departure plans*". Before LTOP the government mandated abolition of the northward takeoff corridor (the Bennelong Funnel) [#35] . Thus geographic concentrations of movements should have been eliminated by LTOP so that noise could be "fairly-shared" , if not minimised. Instead the departure Funnel was simply turned thirty degrees westward.

It is submitted that 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". We propose that better NADPs permitting greater vertical space for aircraft to manoeuvre , would facilitate implementing catherine-wheel -style, time-sequenced, computer and radar-directed departure bearings , enabling more uniformly dispersed departure paths.

6.4 Increase The Use of Botany Bay Modes :

Sydney Airport Community Forum Inc [SACF Inc] showed that Modes such as Simultaneous Opposite Direction Parallel Runways Operations (***SODPROPs***) could accommodate as much as 75% of normal Sydney Traffic if artificial restrictions were not placed upon them [#36]. For example it was shown that if a "noise abatement" down-wind condition is applied the use of ***SODPROPs*** could be increased. Such a 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*** was shown to be available an average of 82% of the time assuming prevailing Sydney Weather and Traffic conditions over the 50 years to 1996 (***See Ref. [36] ibid Chapt 6 Table 6.3.5, p. 83)***. With a 10 knot downwind condition applied , ***SODPROPs*** availability was increased more . Takeoffs southward from Runway 16R or left need not pass

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[35] *Air Navigation (Aerodrome Flight Corridors) Regulations 1994*

[36] *"The Way Forward for Aircraft Noise Sharing at Sydney (Kingsford Smith) Airport",* SACF Inc 2004 [*ISBN - 0-9751843-4-2 (pbk); 0-9751843-5-0 (pdf)*]

over Cronulla using the ***Deena*** (16R) and Botany Heads (16L) SIDs [#37]. The ***Deena*** SID , however, is presently unavailable for night traffic , and at last contact airport investment was needed to provide suitable guidance systems to make the DEENA SID available at all hours. The irony is that the Precision Runway Monitors (PRM) , purchased and installed at huge expense for LTOP in 1998-2000 , and turned on for the Sydney Olympics are no longer used , allegedly due to manpower constraints .

6.5 Mitigate the Human Harm and Health Implications:

Use of steeper takeoff profiles (See Table 9 and Appendix D) may be beneficial for some but for others, it is the very low-frequency sounds (not quantified by the A -scale weighting used in aircraft noise monitoring) that may be a bigger 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 [#38] condition, which the above improvements may not assist.

Whether suitably designed urban noise barriers and /or home insulation can provide a satisfactory remedy for such people in the face of inexorable airport expansion seems unlikely. A difficulty is that 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 life-style restrictions claustrophobic and unsatisfactory. Miniature in-ear Noise-Cancelling Hearing aids are expensive (ca. $7000.00 and up) , and these plus provision of residential noise insulation funded by aviation profit centres should be made available to sufferers at no cost if no noise reduction can be otherwise guaranteed.

6.6 Reinstate the Airport Noise Levy and Mandate Provision of Home Insulation:

On 1 July 2007 the Howard Liberal government abandoned the airport noise levy. This policy decision was unexplained and 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 in the 2023 Airport Master Plan [#39]. The lack of any legislative provision in the Airports Act for equitably distributing the legal liability for human environment damage mitigation by providing noise insulation and other compensation with continued airport growth is also inexplicable . More astonishing is the government's apparent abrogation of any responsibility for future aircraft noise mitigation!

*6.7 Eliminate Loopholes and Contradictions in the Airports and Airservices Act*s:

There are Legislative and Regulatory contradictions in the Airports- and Airservices- Acts which thwart any practical solution to the aircraft noise problem . Thus the Airports Act makes Airport Corporations liable to explain in their five yearly ***"Master Plans"*** how they will mitigate harm from aviation operations (Airports Act S. 71) , and the Airservices Act S. 9(2) gives Airservices Australia responsibility for directing aircraft to fly in a manner so as to *"minimise harm to the environment"* . However neither Act of Parliament provides for the appointment of any regulator , nor is there any regulation limiting aircraft noise at ground level . Nor is either corporate entity able to issue directions to the other in this respect . This situation ensures an unworkable framework for aircraft noise regulation . Further, both the airports and ***Airservices*** profit from continually increasing airline traffic flow [# 40] , a situation which is open to abuse.

A more permanent Regulatory and /or Planning solution is urgently needed to avoid ongoing harm and crippling nuisance from our Airports. Shifting heavy jet aircraft to out-of-city airports in lesser- or 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 at Sydney Airport (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 international airport with several cities

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37 *SID = Standard Instrument Departure*

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

39 *CRITIQUE OF SYDNEY AIRPORT CORPORATION LTD'S "PRELIMINARY DRAFT MASTER PLAN 2009" SEPT 2008 , 15 December 2008, P.S. Lingard , H.P. Richard, G.P. Harrison & R.J. Tanner, Sydney Airport Community Forum Inc., ISBN 978-0-9751843-7-0 (pdf); 978-0-9751843-6-3 (cdrom)*

40 *P.S. Lingard Submission No. 43 Senate Inquiry into the Airports Amendment Bill 2006*

(e.g. Sydney/Wollongong , Goulburn / Canberra) and linking them by very high speed rail transport would seem a far-sighted way to go.

6.8 Legal Liability for Negligent 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 . Although this was connected with operations from a military airport , the case is a wake-up call for Councils to specify appropriate noise insulation in approving *new dwellings* and extensions in aircraft noise affected areas.

7. CONCLUSIONS :

1. This report updates two previous reports of similar name prepared in December 2005 and October 2009, respectively, and presents continuing and expanded data from 2010 to the end of 2012 . It describes a significant part of the aviation departure noise problem across the inner north.

2. The Report demonstrates a focussed concentration of around 66% of all low-flying jet departures from Runway 34L measured at one residence in a corridor through Summer Hill. It is submitted that the reported noise impacts on this (formerly quiet) suburb are unacceptable, and must be rectified forthwith.

3. The noise impacts are shown to be unsatisfactory by comparison with several sections of the Australian Standard (AS 2021-2000) , whether for large airport, general aviation or military. Likewise the nuisance fails the test of the NSW State Guidelines for noise impacts adjacent to industrial areas.

4. That the same noise levels were reported 10 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 and its IMC Committee . Both former Prime Minister Rudd and present Transport /Infrastructure Minister Albanese have made political issues of aircraft noise for the attention of their electorates in Brisbane and Sydney , respectively , as have numerous incumbent MPs , thus far without apparent effect.

5. The measured noise exposure values ***(ANEI > = 20)*** exceed the forecasts of Sydney Airport Corporation in its Sydney Airport ***"Master Plans 2024 & 2029"*** that such levels will not be reached at Ashfield until 2023 or 2029 !

6. The proportion of noise events exceeding 80 dB(A) (14%) is unacceptable and breaches Airservices own (inadequate) environment guidelines for all areas except those very close to runway threshold immediately following takeoff. 78% of aircraft noise events are greater than 70 dB(A).

7. The number of noise events per day greater than 75 dB(A) (ie 26/day) fails even the test for ***"conditional acceptability"*** for building construction requirement of AS2021 -2000 for *light general aviation aerodromes* without ANEF (AS2021 Table D) . This means that new homes in this area should be required to have noise insulation, whilst existing homes must continue without.

8. Nearly all noise events at this location produce conditions in adjacent homes which would prevent conversation (i.e. > 63 dB(A)) around three times per hour on an annual averaged basis. Obviously at peak times during intensive operations the number per hour will be much higher.

9. For anyone , the frequency of interruption by such noise levels can be disturbing, but for people with certain auditory abnormalities such as hyperacusis (including Tinnitus and Meniers Syndrome) they can be both painful and/or physically or psychologically harmful. This is an environmental

public health issue that must be addressed . The issue is wider than hearing loss and includes learning disorders for children, productivity losses for working adults , with psychological and cardiovascular implications for all as shown by Berglund et al . Why has nothing been done to address these issues in the ten years since the tabling of Airservices Australia, Environment Branch Report No. 1360 in late 2003, not to mention the previous issues of this Community Report?

10. The 20 ANEF boundary has been effectively reached in the Summer Hill flight corridor and Ashfield Council should consider requiring an appropriate level of noise insulation for *new dwellings and modifications* constructed in the vicinity of the referenced and similar homes on pain of being ordered to compensate affected future owners for failure to warn of adverse environmental impacts with ANEF greater than 20 dB(A) : *Port Stephens Council v Booth & Ors [2005] NSWCA 323* .

11. As to Legal Liability however it is ***Airservices Australia*** which is operating the flight corridor in excess of airport master plan predictions. We therefore propose that existing exposed homes should be provided with necessary insulation by the infringing authorities , either by act of Government, or by requiring the Airport Corporation or Airservices Australia to mitigate the involuntarily-suffered and continuing public harm. Without such mitigation by insulation or other treatment both the maximum and the range of noise exposure in Para 2 (***Results***) above will likely cause lasting foreseeable harm to regularly exposed susceptible individuals whether directly or at an initially subliminal level.

12. More immediately , Airservices Australia should be ordered to remove the causes of aircraft noise concentration and the high noise event levels in the Summer Hill corridor and the wider north west . It is suggested this may be achieved by greater spreading, better jet aircraft noise abatement profiles, and increased departures across Botany Bay. The onus is now on Airservices Australia, the author of the failed "***Long Term Operating Plan***" and the ANEF forecasts to ***actually monitor*** aircraft noise levels in the inner west, instead of pretending that their two off-corridor monitors at Croydon (PLC) and Norton Street Leichhardt are filling that role. ***Prediction from assumed flight trajectories is not equivalent to monitoring.***

13. Airservices Australia should also take meaningful remedial action through intelligent air traffic control and properly implement the 1996 LTOP with the originally-promised offshore arrival routes (the so-called "High & Wide") . In particular it should develop and implement significantly improved noise abatement departure protocols compared to the present as directed three times by successive Transport Ministers in 1998, 1999 and 2007 as has been shown to be possible.

14. Communities, Governments and Councils must 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 appear some 3 - 4 dB(A) less than the standard used in general environmental monitoring using the “Fast” - integrated signal.

15. Standards Australia should revise the Standard AS 2021-2000 (Aircraft Noise and Building Siting and Construction) : (1) to bring it into line with State Noise Regulatory Systems which employ the “Fast” -time averaged maximum sound level metric (LA max) ; and (2) To consider creating a Standard covering Building Damage and Human Harm caused by low frequency infra sound aircraft noise components not covered by the current standard.

16. The continuation of abusive noise without proper environmental controls amounts to singling out of communities in noise corridors like Summer Hill . All similarly affected people , especially those with hearing difficulties , should complain loudly both to the

responsible government Minister and Airservices Australia, and collectively seek compensation in the form of noise insulation at government or aviation industry expense.

17. A permanent Regulatory solution is urgently needed to avoid ongoing harm and crippling nuisance for many people in Sydney consistent with the growth of traffic at Sydney Airport. There is an urgent need for a sincere attempt by the legislature to eliminate the gaps between the responsibilities of Airservices Australia, the Airlines and the Airports in the environmental provisions in the Airports and Airservices Act.

19. Shifting heavy jet aircraft to an out-of-city airport outside the Sydney Basin airshed seems the best answer both for the airlines and international airport users (whether passenger or freight) whose movements to and from 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.

20. The onus now rests on Airservices Australia to find an effective noise minimisation solution for a serious problem - no buts! Airservices Australia , as beneficiaries of the current noise regime together with Sydney Airport and the Airlines , should be required to offer noise insulation to all homes and individuals similarly affected. John Howard's 1996 pre-election promises prior to introducing the LTOP , that no one north of the airport would receive more aircraft noise than they had before LTOP (previously nil) should be honoured by those charged with implementing the present LTOP plan.

EXPLANATORY NOTE:
The instrumentation and data collection work described was accomplished entirely by one industrious, hard-working and public -spirited citizen trying to protect both his own and his neighbours' health and rights to quiet enjoyment, ie. Mr. Johann Heinrich . The data processing, application of AS2021-2000 formulae and written organisation were the responsibility of Philip S. Lingard.

ACKNOWLEDGMENTS :
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 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 (Referred to in para 3.4.1) was appreciated. The support of the former Mayors of Ashfield Cr. (Rtd) Rae Jones, and Cr. Ted Cassidy is also appreciated.

E

APPENDIX "A" METHODS OF NOISE MONITOR USE IN DETAIL

1. 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 data trace in Appendix "A" Table 1).

A typical day trace showing the manually -extracted LA max [#41] levels is reproduced in Table 2 of this Appendix. Monitoring occurs continuously throughout the year, excepting for periods when the monitor owner's family takes annual vacation. (See Main Text 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.

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 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" .

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 in the main text 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.

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

2. 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 of the Main Text.

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 Main Text Table 4 B.

3. 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 [#42], 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"*** [#43] , 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 :

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

where i is the i'th event and :

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

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 [#44] , ie:

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

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.

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

43 *"The Way Forward for Aircraft Noise Sharing at Sydney (Kingsford-Smith) Airport",* P.S. Lingard et al ., SACF Inc, PO Box 154 Summer Hill, NSW 2130, 2003; ISBN 0-9751843-4-2 (pbk); 0-9751843-5-0 (pdf) .

44 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 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.

Table 1 - Typical partial output trace from the recording system

Date	Time	Sound	Frequency	Int Temp	Light	Ext Temp	
m/dd/yy		dBA	Hz	℃	Level	℃	
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**	
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	

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

COMMUNITY NOISE REPORT SUMMER HILL (III), 2002-2012, Cont'd:

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 of Picotech "Dr DAQ" against Airservices Breull and Kerr Meter

(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 Airservices 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		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**		
				1 Hz	***10 Hz***	
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" SUGGESTED ENVIRONMENTAL IMPROVEMENTS (In Detail) :

C.1 Eliminate The Departure Ceiling:

The Departure Ceiling (created by arriving aircraft) referred to earlier [***Introduction***] is a key problem as illustrated in *Figure 1 (Page 3)* . Eliminating the simultaneous overflying of departures by arrivals across the north west , west and east would be a key improvement. It will enable lifting the takeoff ceiling permitting more rapid aircraft progression to cruising altitude with consequent long-range fuel savings for all airlines. The ***single major cause*** of the above problem is that the ***original 1996 LTOP*** as designed was never fully implemented.

The overflight problem is amply illustrated in the Environment Branch Henson Street report No. 1360 for the period from 14/10/2002 - 14/4/2003, referred to in Figure 1 .

The effective altitude *"ceiling*" for departing jets is created by the simultaneous overflying of arrivals as seen in Figure 1 . With the ceiling at roughly 6000 feet, climbing jets from runway 34L are constrained to fly at more than 1000 ft beneath the crossing arrivals (the regulatory separation requirement) , ie well under 5000ft (See upper right hand panel of This Appendix "C" Figs 1 & 2). This low-fly zone extends in practice westward all the way from Summer Hill to Parramatta and beyond.

To confidently minimise the risk of collision with an arrival, pilots prefer to reduce their initial takeoff climb out to maximise separation. This explains why, at Summer Hill, departing jets conduct extremely slow initial climbs leveling out to altitudes of only 1000 to 2500 ft , making the resulting ground noise more severe . For this reason jets departing over Ashfield fly at obscenely low altitudes, from Lewisham/Summer Hill to as far out as Parramatta and Winston Hills [#45] . This is in contrast to the norm when, with clear skies ahead, pilots would naturally prefer to quickly gain cruising altitude so as to minimise fuel consumption for the trip.

The problem is caused because the originally-planned mainly offshore ***"high and wide"*** arrival procedures were abandoned by ***Airservices***, despite these being promised as fully achievable and safe in the 1996 LTOP blueprint. The abandonment 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.

We submit that such offshore tracking was environmentally essential to achieving LTOP in both the 1996 LTOP Reports, and the LTOP Proponent's Statement .

C2. The Reason for the Departure Ceiling Over Summer Hill

Figures 1 & 2 below are from Airservices Australia Environment Branch Report No. 1360 , ***"Short Term Study into Aircraft Noise and Flightpaths"***, Figures 7 & 10 , Feb. to May 2003, Summer Hill .

The effective altitude ceiling created by the arrivals overflying the simultaneously departing jets is evident from the main text Figure 1 and the EBR 1360 (2003) Report at Figures 7 and 10 . These are reproduced in this APPENDIX as FIGURE 1 & 2 . Appendix Figure 1 shows all jet arrivals onto 34 Left, while Appendix Figure 2 shows all jet departures from 34 Left in the same period .

The ceiling is roughly at 6000 feet, so 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 Appendix Figures 1 & 2). The low-fly zone created in practice extends westward all the way from Summer Hill to Parramatta and beyond.

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

APPENDIX "C" Figure 1 All jet arrivals onto 34 Left from 14/10/2002 - 14/4/2003. *(EBR 1360 Figure 7)*

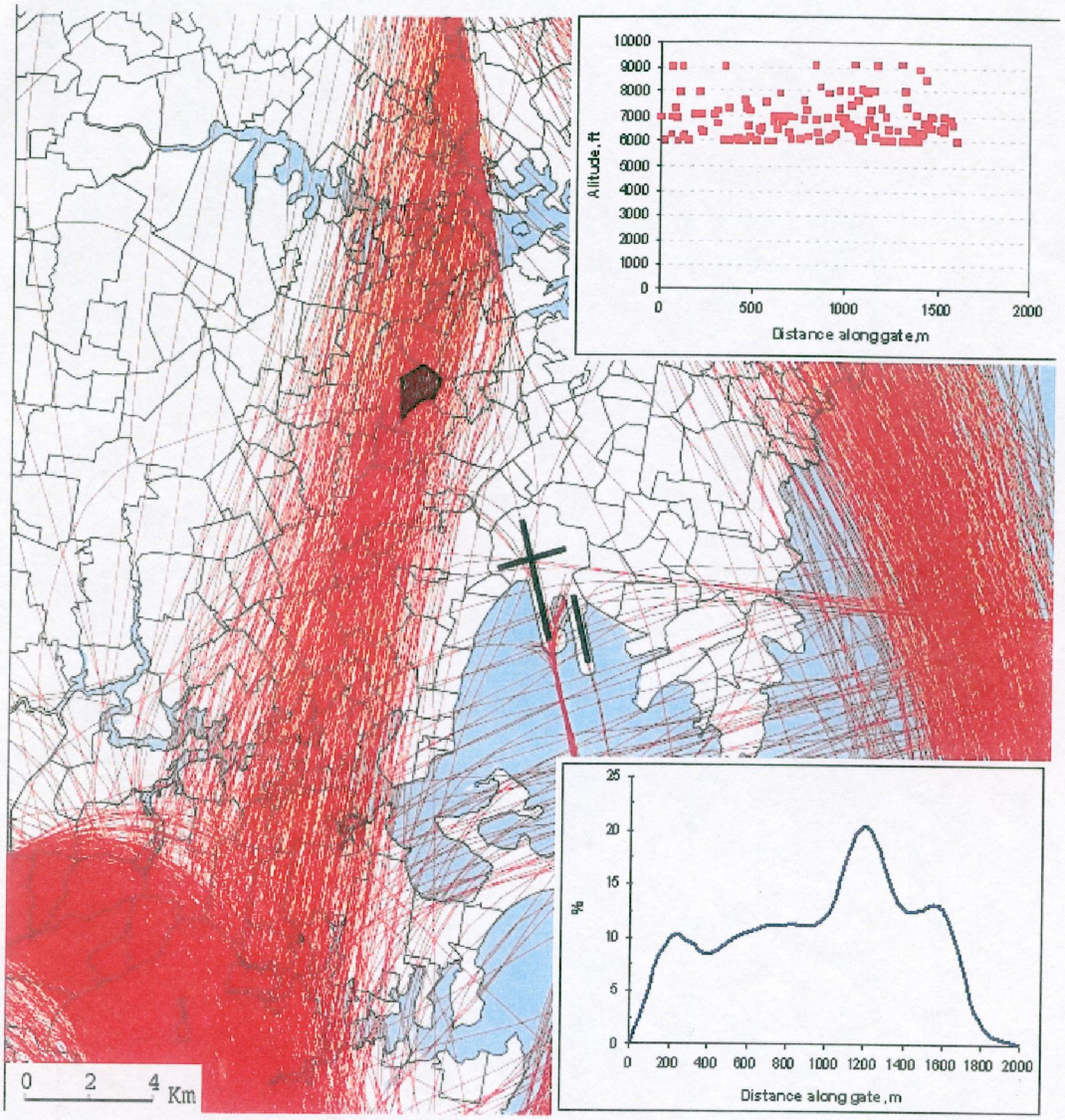

Figure 7 Track plots, height graph and distribution for Jet arrivals onto runway 34L which overfly the suburb of Summer Hill (shaded) for the sample periods 1-14/10/2002 and 1-14/4/2003.

APPENDIX "C" Figure 2 All jet departures from 34 Left in the same period *(EBR 1360 Figure 10).*

AIRSERVICES AUSTRALIA

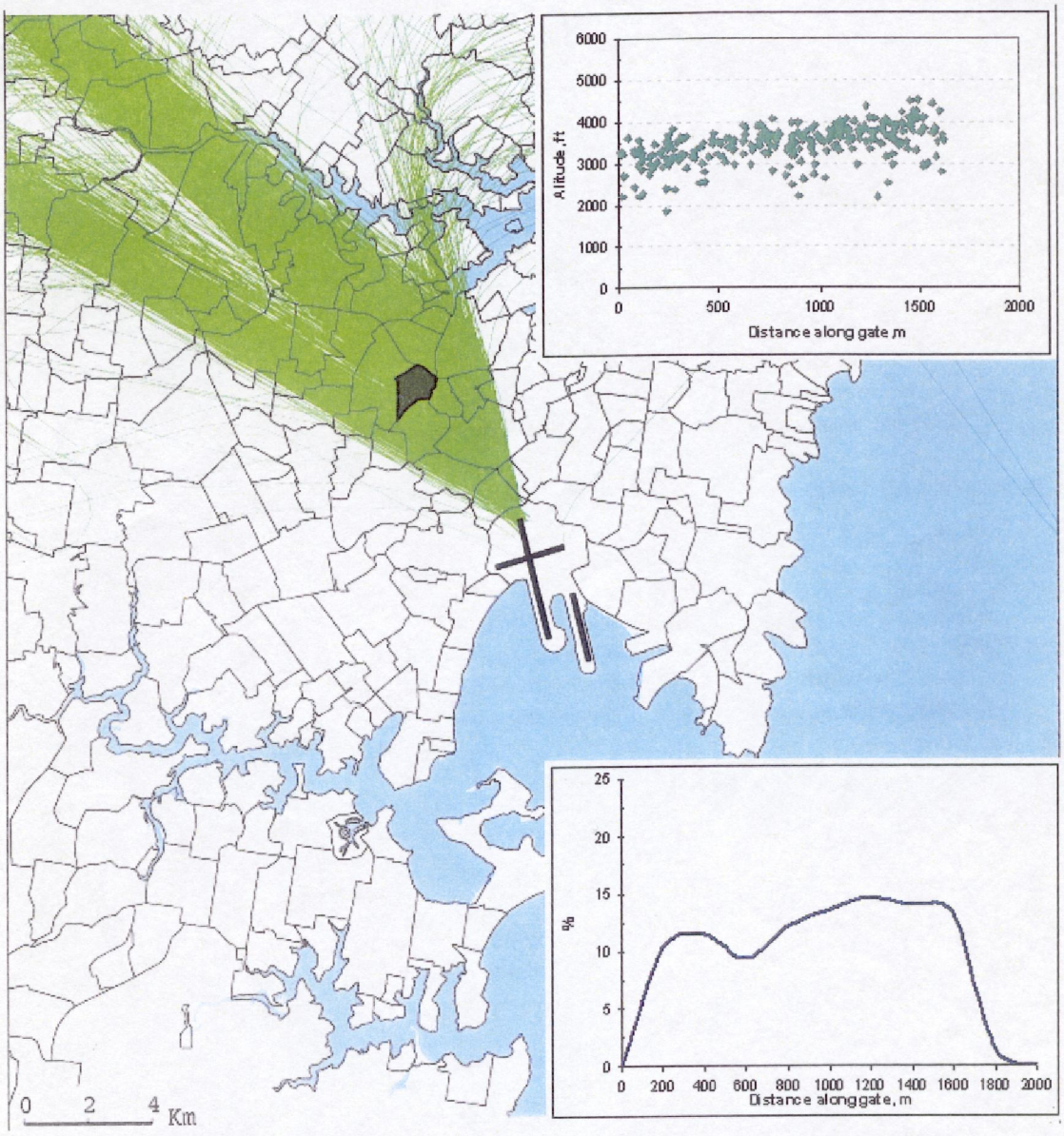

Figure 10 Track plots, height graph and distribution for Jet departures from runway 34L which overfly the suburb of Summer Hill (shaded) for the sample periods 1-14/10/2002 and 1-14/4/2003

Aircraft noise and flight path study at Summer Hill, Sydney Page 21

Instead of crossing over the inner west (and east) , 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. These are shown in This Appendix Figure 4 . Only thus can low-altitude cross-overs be avoided in the inner west and beyond. Had the original LTOP been implemented this practice would now be followed.

The original LTOP-described mainly offshore **"High and Wide"** arrival procedures were abandoned by Airservices Australia , despite having being promised as fully achievable and safe in its 1996 LTOP blueprint. The extent of this total failure was first admitted in a 2003 document [#46] , 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***" as a decision criterion , above that of Sydney's human environment was 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 , and resulting "Falling on Deaf Ears" Senate Inquiry Chair by then Senator Warwick Parer . 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 [# 47] .

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 [46], 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 This APPENDIX C, Fig. 4]* .

It thus appears that LTOP implementation was executed by an organisation not fully committed to the process. Despite the dubiously revolutionary idea of "noise sharing", almost zero practical effort 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 the LTOP Reports ordained.

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[46] *"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] .*

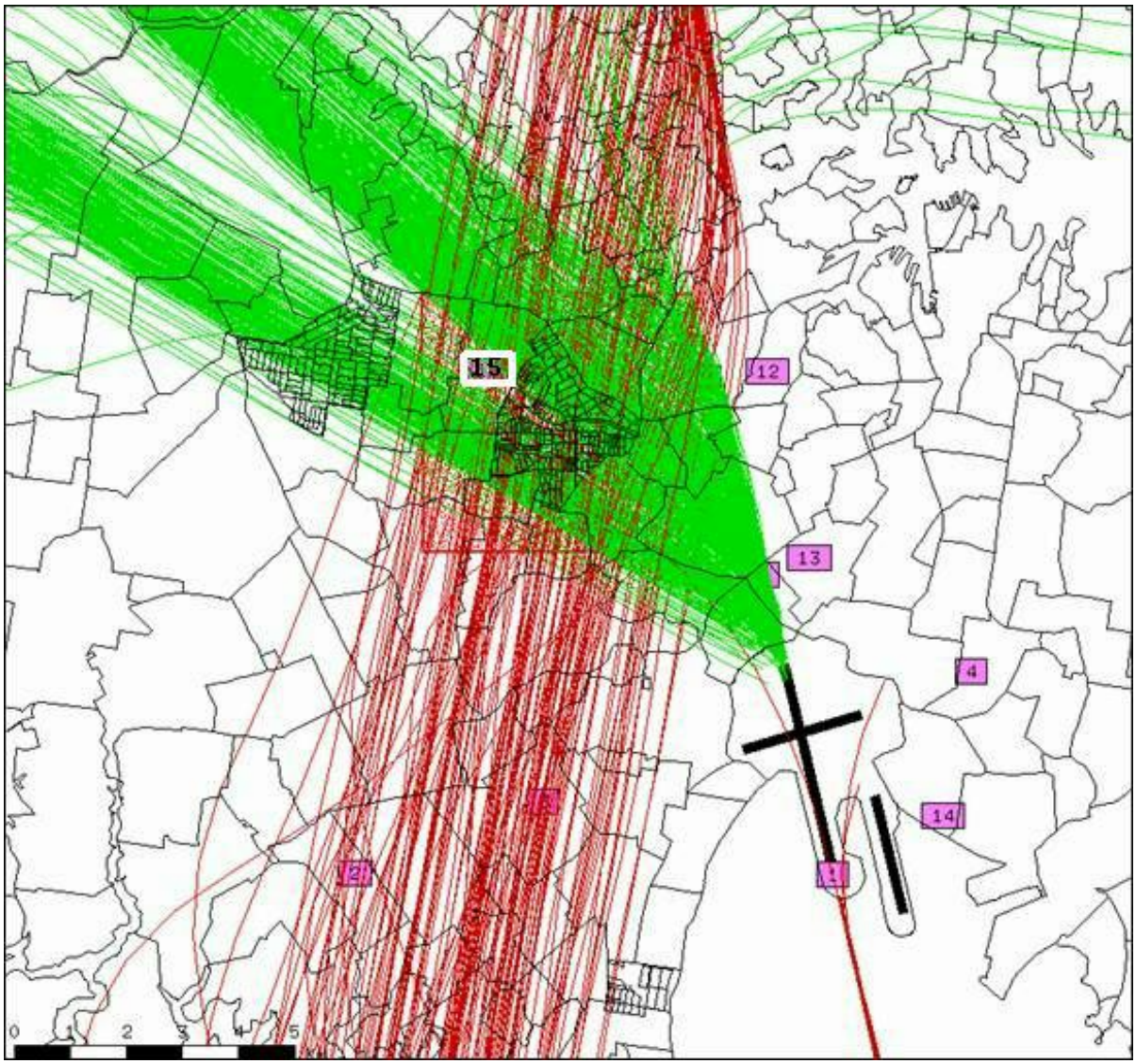
[47] *P.S. Lingard, unreported calculations submitted to the IMC, Sept. 2007 (Details available on request).*

APPENDIX "C"Figure 3 DETAILED OVERFLYING OF SUMMER HILL *[AIRSERVICES EB 1360 MONITORING (Feb. To May 2003)] :*

Important Note: In this Figure 3 , although the track colourings mask it , the RED Arrival Tracks are at greater altitude than the GREEN Departure Tracks.

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 .

It shows the obvious avoidance of Noise Monitor 15 at PLC **C**roydon, with consequently unrepresentative noise measurement caused by track -splitting.



Instead the LTOP 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

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 34L & R in LTOP Mode 9 should be reinstated, which as shown [Ref. Ibid 46, Para 3.2 , p. 15] DO NOT INCREASE TRACK MILEAGE ! These are shown below in this Appendix at Figure 4

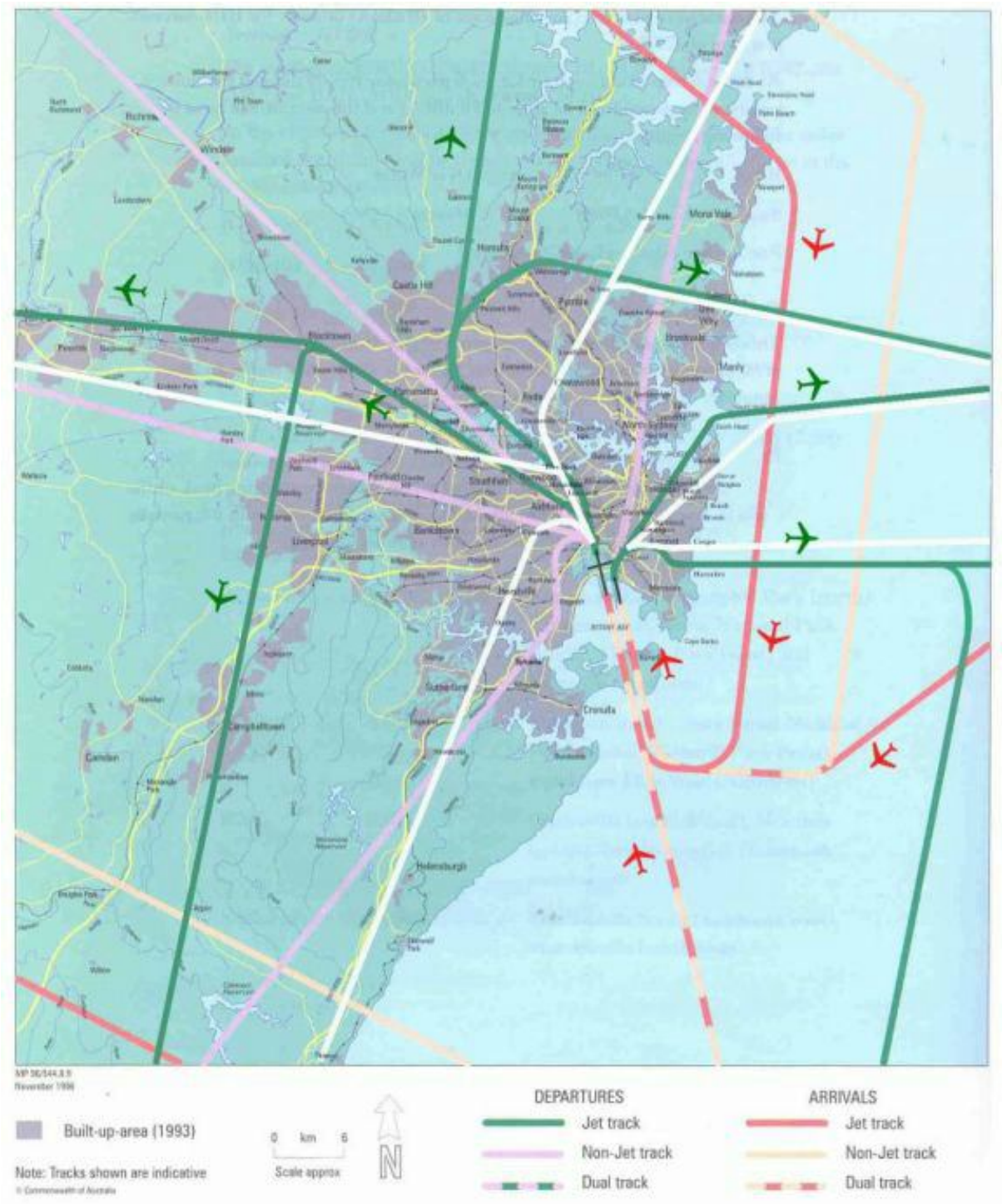
The Offshore tracking was environmentally essential to achieving LTOP in both the 1996 LTOP Reports, and the LTOP Proponent's Statement . The documents clearly project that in northerly winds there would be widely spread offshore jet arrival routes, both up and down the coast , which would clear the 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) shown in Figure 1 ***(Introduction***). This would allow northerly departing aircraft to maximise height while decreasing ground noise levels for the inner environs of 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? The problem might be resolved by reinstating the originally planned ***"high and wide"*** offshore arrival paths to runways 34L & R in LTOP Mode 9 .

If not then the date for transfer of heavy jet movements from Kingsford Smith Airport to a judiciously chosen airport outside Sydney's pollution-basin, and suitably linked to multiple cities with 21st Century Very High Speed Rail should be brought forward to a point well before 2020.

APPENDIX C Figure 4 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 D PROPOSAL FOR STEEPER TAKEOFF PROFILES

The original LTOP foreshadowed the introduction of the former ICAO [#48] -A-style Noise Abatement Departure Protocols (***NADP***s) where appropriate, with urgent attention to be given to improved abatement takeoff profiles . In August 1998[#49] , after consultation with SACF, ICAO - A was duly mandated by Transport Minister Vaile for all takeoffs over residential areas.

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. The principle was once enshrined in Airservices own ***Noise Abatement Procedures*** (NADPs) in DAP -East[50] . However by 2007 the standard instrument departure (SID) instructions for Sydney Airport (north) contradicted the NADPs , breaching the Minister's August 1998 and subsequent NADP directions.

In 1999 and 2007 at the request of Government SACF , first Minister Anderson and then Minister Vaile again emphasised the need to improve Noise Abatement Departure Protocols . Airservices Australia should be asked why it never implemented 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" with climbouts of not much better than 2.5 degrees are conducted for the benefit of airlines only, not for residents, and are unsatisfactory for noise abatement. Moreover it has been shown theoretically by one of us (PSL) that better than ICAO noise abatement procedures could be developed , see this Appendix "D" Figures 1 & 2 (Below) .

The ICAO - A / NADP-2 protocols were always compromised at Sydney by misconceived airline fuel cost concerns becoming the mainstay of resistance to fuller LTOP implementation . The technical weakness of the Government's SACF in the face of Airservices and departmental obfuscations did not help. Unfortunately, ICAO-A itself does not achieve fantastic noise reductions. Better NADPs can be developed however as demonstrated to SACF by one of us in 2006-7 [#51]. These involve much steeper takeoffs than existing after takeoff roll, with a quick initial climb to around 4000 feet.

To accommodate the above-described "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 . 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 the following Figures 1 & 2.

Figure 2 (below) shows that at 7.1 km from takeoff residents under the flight paths could benefit from reductions of from 12.5 to 28 dB(A) depending on which climb angle is chosen compared with current 2.5 or 5 degree profiles, and certainly appear at least worth trialling. The 747 Standard 8 [747_STD 8] protocol in Figure 2 is not much different from former ICAO -A , but not as beneficial as the 10 , 15 or 20 degree climbouts shown in Figure 2. The potential benefits at 7.1 km are listed in ***This Appendix Table 1*** (below) .

It is noted that in the USA at Washington National (Reagan) and Boston Logan Airports , fines are imposed on Pilots whose aircraft produce more than 70 dB(A) over defined Residential Areas, so the above proposal is not an unreasonable ask!

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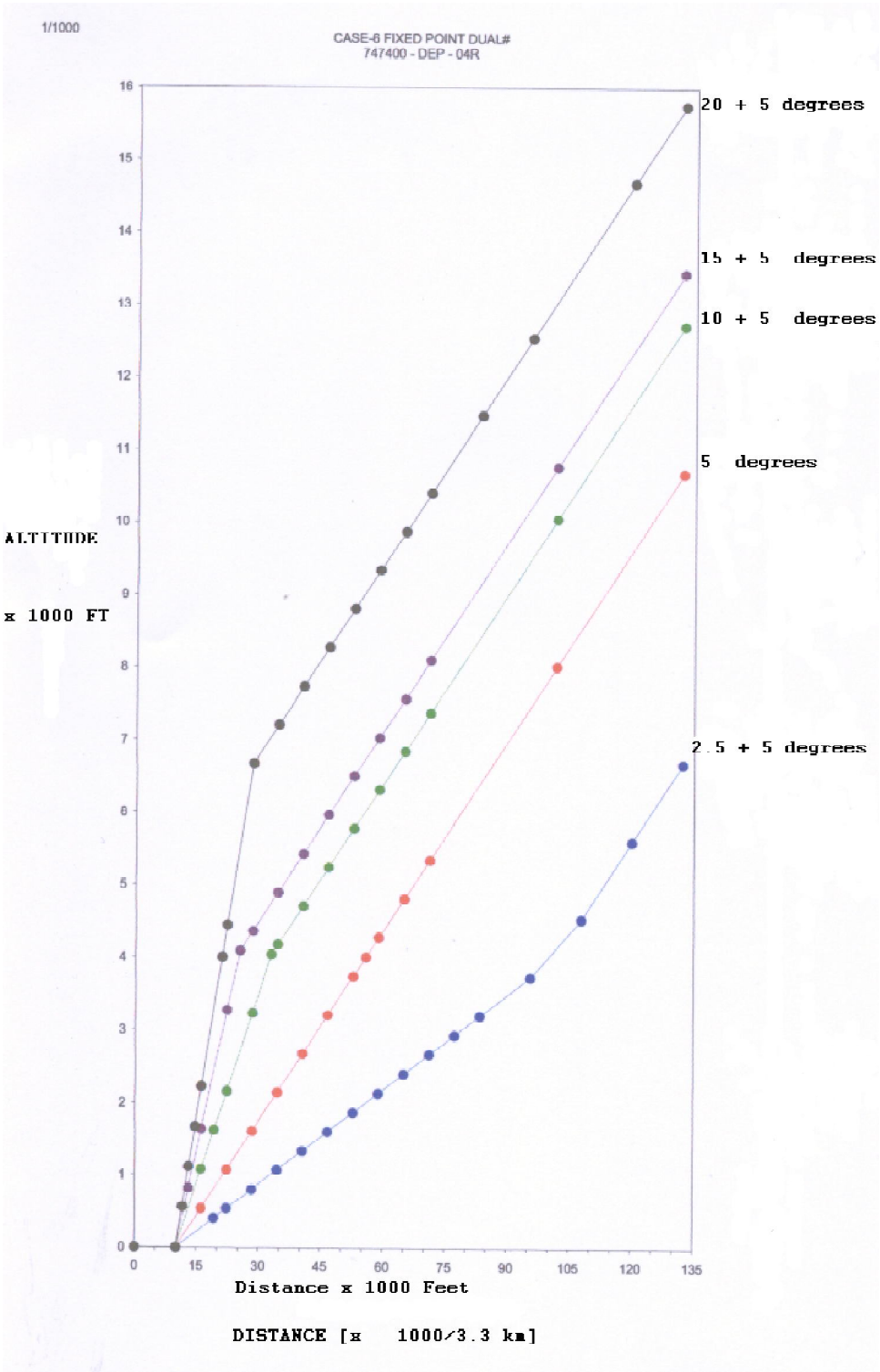
48 ICAO- International Civil Aviation Organisation

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

50 Airservices Departure and Arrival Procedures-East [DAP -East]

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

APPENDIX "D" 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 "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.

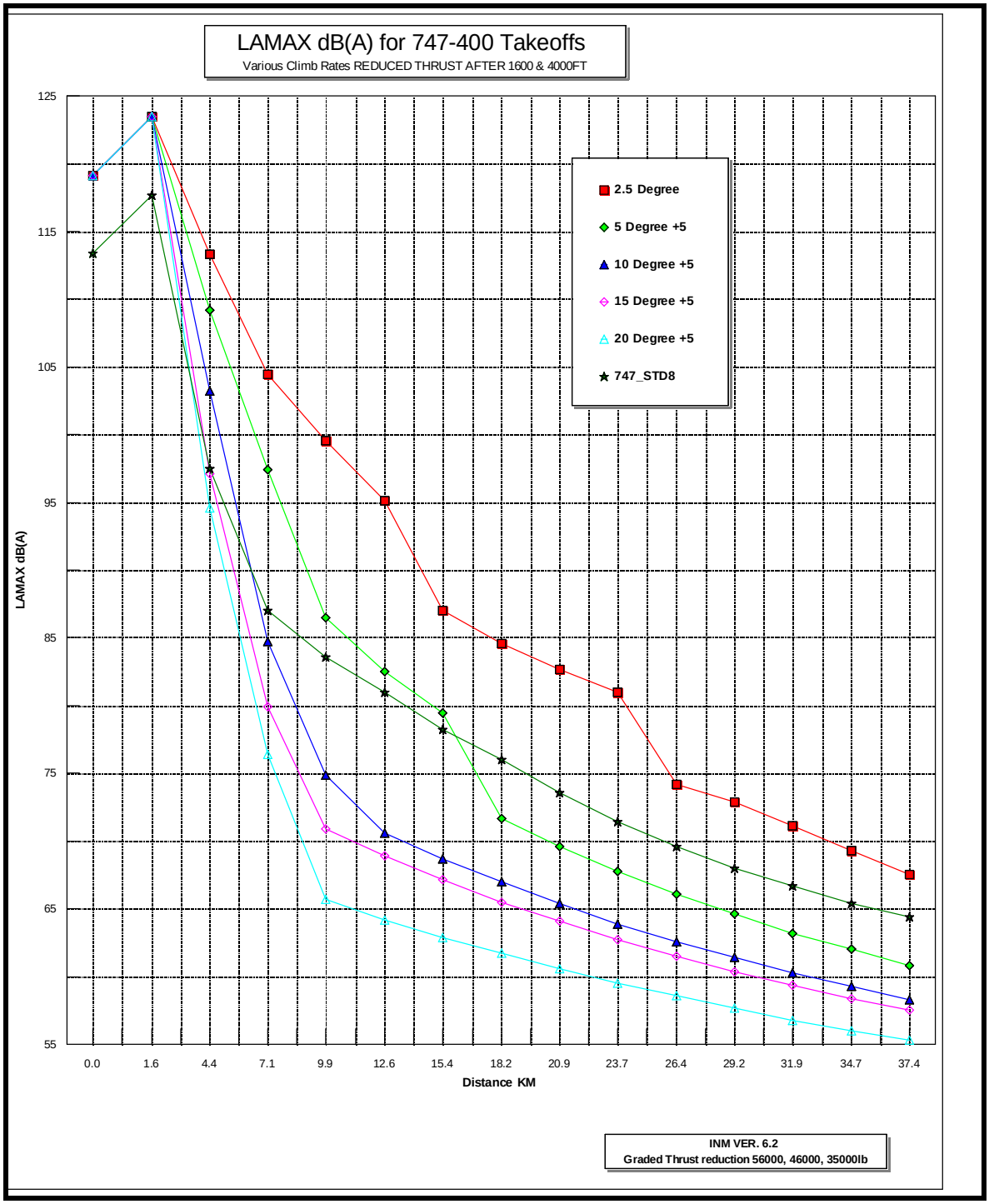


TABLE 1 Achieveable 747-400 Aircraft Noise Level Reductions for Selected Profiles in Figure 2

CLIMB (Degrees)	***2.5 ^{o}***	***5 ^{o}***	***10 ^{o}***	***15 ^{o}***	***10 ^{o}***	***STD- 8 (747) ~ ICAO-A***
dB(A) at 7.1 km	**104**	**97.5**	**85**	**80**	**76**	**87**
CLIMB-OUT						
cf. 2.5^{o}			**19**	**24**	**28**	**17**
cf. 5.0^{o}			**12.5**	**17.5**	**21.5**	**10.5**

E